In spite of well-intentioned and rigorously pursued prevention efforts by law enforcement and others, a certain amount of crime will likely always occur. When criminal acts do happen, the focus of law enforcement shifts to finding the most effective ways and methods to respond. In this chapter, the process of police response is broken down into the broad areas of situational reporting, tactical communication, protection of officers, and management of pursuit. The chapter concludes with a discussion of the special interest topic of counter-terrorism.

Major findings from the chapter include:

- Command and control technology is considered a high or medium priority by 93 percent of both state and local law enforcement organizations. Not unexpectedly, larger urban departments felt this was a higher priority than smaller or rural departments.

- Although state police agencies rated communications interoperability as a higher priority than local departments, 87–92 percent of both types of departments rated it at least of medium priority.

- When police department representatives were queried about a number of less-than-lethal weapons and other technologies, they identified a number of roadblocks to their future acquisition and deployment. Primary among these was cost, likely reflecting both the cost of the systems and the trade-offs that are involved in funding technology versus other uses of funds. Training, techno-
logical risk, and potential liability/public opinion were also cited for some but their impact varied among technologies.

**SITUATION REPORTING**

Before police agencies can respond to a crime in progress or the aftereffects of criminal activity, they must become aware of what is happening within their jurisdiction. As a result, characterizing the assets that are available to these organizations for situational reporting is an important first step in the analysis of their technological needs.

**Emergency Reporting Systems**

911 systems provide a means for the public to report emergencies to the police. Availability of 911 systems has steadily increased over the years for which data are available. As Figure 1 shows, most local departments now have enhanced systems, which can automatically identify the location of a caller.

Not unexpectedly, urban departments serving larger populations are the best equipped, with most having enhanced 911 systems. Rural departments are the least well equipped, with more of the basic 911 systems and fewer of the enhanced ones. Fifteen percent of rural departments do not have any 911 system. One-third of state police have enhanced 911 systems, and another one-third have basic systems (LETS, 14).1,2

Only 2 percent of local and none of the state departments responding to the RAND Law Enforcement Survey characterized their 911 systems as obsolete. Twenty-three percent of local departments said

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1It is interesting to note that urban departments serving populations between 75–225K appear to be slightly better supplied with 911 systems than those serving the largest cities. From the LETS survey, 96 percent of the 75–225K city departments have enhanced systems, 3 percent have basic systems and only 1 percent lack a system. Of the largest city departments, 84 percent have advanced systems, 12 percent have only basic systems and 4 percent lack a system (LETS, 14).

2For 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.
their systems were old but serviceable, and 66 percent described theirs as modern or state of the art. Seventeen percent of state police described their systems as old but serviceable, and 58 percent said theirs were modern or state of the art (LETS, 22a).

Non-Emergency Reporting Systems

In addition to 911 systems, a number of other reporting systems can serve to promote situational awareness on the part of police organizations. One such system is a three-digit, non-emergency reporting system. The RAND survey found that 7 percent of local departments have three-digit, non-emergency phone call systems, with municipal police departments accounting for 6 percent and county police or sheriffs’ departments only 1 percent (LETS, 15).

More commonly, departments have one or more hotlines to deal with specific law enforcement problems. The most prevalent type of
hotline is for reporting domestic violence, such as spousal, child, or elder abuse. Municipal departments are twice as likely as county police/sheriffs’ departments to have hotlines. Other types of hotlines include those for reporting graffiti, gun tips, gangs, teens, homeless, and environmental accidents/natural disasters (LETS, 15d,e,f).

**Mass Notification Systems**

In the event of a major emergency that requires mobilization of a large fraction of the police force, technological systems can greatly increase the speed and effectiveness of contacting and recalling officers. Such mass notification tasks can be performed by either phone or fax machine. In 1997, 10 percent of municipal police departments with 100 or more officers had fax-based mass notification systems and 23 percent had phone-based systems (Reaves and Goldberg, 1999). The RAND Police Survey, performed three years later, indicated that 11 percent of municipal police departments of all sizes have fax-based systems, and 23 percent have phone-based systems. Thus, we found no evidence of growth in these types of systems over the past few years (LETS, 15b).

**TACTICAL COMMUNICATIONS**

In the management of evolving police operations under often-dangerous conditions, clear and effective communication between officers and their leaders is critical. Without the ability to rapidly convey information and intelligence about circumstances and activities, it is impossible to position officers and other resources efficiently and could result in injury or loss of life to both public servants and private citizens. As a result, communications is an area of great technological importance for law enforcement activities.

**Communications Within Agencies**

Because of the geographic area over which all police departments must spread their resources, it is obvious that facile intra-agency communication is essential for operational effectiveness and coordination of department activities. According to the RAND survey, virtually all police departments have high-quality radios available
First Response 29

(LETS, 22l). Most local departments also have cellular telephones available to support their operations. Only 14 percent of local departments indicated that cellular telephones were not available; 60 percent of departments indicated that their systems were modern or state of the art (LETS, 22c).

A recent study conducted by the National Law Enforcement and Corrections Technology Center, Rocky Mountain Region, found that most state and local law enforcement agencies (73 percent) currently have conventional analog communications systems that operate in high VHF bands; however, by 2007, agencies operating in 800 MHz are expected to grow from 23 to 51 percent, those using digital systems are expected to increase from 13 to 25 percent, and organizations using trunked systems are expected to increase from 24 to 27 percent (Taylor, Epper, and Tolman, 1998, pp. ix–x). Such a shift implies a significant demand for new technology in this area and a significant amount of technology adoption activity.3

In order to assess the perceived need for these types of technologies among local and state departments, the RAND survey asked respondents to rate their need for technology for command and control of their agency’s operations as high, medium, or low/no priority. Overall, 55 percent of local departments rated this as high priority, 38 percent as medium priority, and only 7 percent as low/no priority. Among state police the percentages were 75, 17, and 8, respectively (LETS, 9b).

The RAND survey found major differences in perceived need for command and control–related technologies between rural and urban departments. Urban departments of all sizes were about twice as

3The integration of command and control technology into the fundamental processes of police department operation can be especially challenging. Examples of information sources intended to facilitate this process include the recent publication by Imel and Hart (2000) of an in-depth guidebook on wireless communication technology and issues for law enforcement planning and management. Additional information on communications technology and on funding communications projects can be found at the web site of the Public Safety Wireless Network (PSWN), www.pswn.gov. The vision of PSWN is for seamless, coordinated, and integrated public safety communications for the safe, effective, and efficient protection of life and property. Improving interoperability and public safety communications is seen as a multidimensional challenge, taking into account spectrum, funding, technology, organization, and operations.
likely as rural departments to consider this need a high priority. Nearly one-fifth of rural departments indicated that technology to improve command and control was a low priority or not a priority for their agency (LETS, 9b). This most likely reflects the greater complexity of managing the operations of the larger urban departments.

**Interoperability Among Agencies**

The Law Enforcement and Corrections Technology Advisory Council (LECTAC) Communications Subcommittee has identified interoperability as its highest priority. As a result, it has recommended that any future funding for interoperability of law enforcement and corrections follow the PSWAC\(^{4}\) regulations and system guidelines and not be tied to manufacturers (LECTAC, 2000, p. 31).

The study cited in the previous section by Taylor et al. has also provided strong evidence for the need for interoperability among agencies. They found that agencies of all sizes and types need interoperable communications, “with 93 percent interoperating on a daily or weekly basis with local organizations, 63 percent interoperating with state-level organizations daily or weekly,” though only 15 percent interoperate with federal organizations daily or weekly (Taylor, Epper, and Tolman, 1998, p. x). The authors went on to say that “agencies of all sizes and types identified limitations in funding and different bands as the two biggest obstacles to interoperability” (Taylor, Epper, and Tolman, 1998, p. xi).

The RAND survey asked respondents to rate their need for technology for interoperability with other agencies as high, medium, or low/no priority. The state police respondents ascribed the greatest importance to interoperability with 67 percent indicating it was a high priority, 25 percent a medium priority and only 8 percent as low or not a priority. For the local organizations, interoperability was seen as somewhat less important with 45 percent identifying it as high priority, 42 percent as medium priority, and 13 percent as low/no priority (LETS, 9b).

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\(^{4}\)The final report of the Public Safety Wireless Advisory Committee (PSWAC) to the Federal Communications Commission can be downloaded from http://www.pswn.gov/pswac.htm.
OFFICER DEPLOYMENT

Because of the complexity in matching police resources to the evolving needs of a jurisdiction, technology can have a role to play in helping to effectively dispatch officers and department assets. The RAND survey found that 61 percent of local police departments have Computer Assisted Dispatching (CAD) systems; however 37 percent of local police departments and 44 percent of county sheriffs’ departments do not have a CAD system available to their department. Local police departments were twice as likely than county sheriffs’ departments to indicate that the quality of their CAD systems was either obsolete or old but serviceable. About half of rural and urban departments serving populations less than 25,000 did not have a CAD system available to them. Of the 39 percent without CAD, about a third reported no need for it (LETS, 22d).

Among local police with CAD systems, its availability and overall quality differ by size of department. Departments in larger urban areas are more likely to have modern or state-of-the-art CAD systems than rural or small urban departments (LETS, 22d).

We found that a third of state police do not have a CAD system available to them. Sixty percent of state departments rated their CAD systems as being old but serviceable or modern/state of the art (LETS, 22d).

OFFICER PROTECTION

Weapons and Personal Protection Devices

Law enforcement officers use weapons and various personal protection devices to deter or suppress violent criminal acts and to protect themselves, the public, and criminals themselves from avoidable violence and injury.

Lethal Weapons

Because of the inherent danger associated with criminal justice activities and responding to violent crime, deployment of service handguns and other lethal weapons is an important part of most departments’ officer protection programs. The Bureau of Justice...
Statistics (BJS) 1997 Law Enforcement Management and Administrative Statistics (LEMAS) study found that 94 percent of local police departments and 95 percent of sheriffs’ departments authorized use of some type of semiautomatic sidearms. This was a substantial increase since 1993, when the figures had been 84 percent and 82 percent, respectively. In 1997 two-thirds of both local police and sheriffs’ departments authorized use of the 9mm semiautomatic, more than half authorized use of the .40-caliber and .45-caliber semiautomatics, while less than 20 percent authorized .38-caliber and 10mm weapons. Sixty-two percent of local police and 64 percent of sheriffs’ departments supplied sidearms to officers (Reaves and Goldberg, 2000, p. 20; Goldberg and Reaves, 2000, p. 21).

Less-Than-Lethal Weapons

Because of the reasonable desire to limit injury to suspects, officers, and other citizens, lethal force is always viewed as the most serious response to public safety situations. As a result, in an effort to provide other options to officers, research has been directed toward developing alternate technologies and techniques. “Less-than-lethal” has come to be the preferred term for protection devices that are, somewhat optimistically, referred to by the public as “non-lethal.” More conservatively, some police officers refer to them as “less lethal” weapons. Regardless of the term used, these weapons and devices are intended to allow officers to take control of confrontational individuals and unstable situations without needing to resort to deadly force. This is desirable both from humanitarian and risk management perspectives.

For many years the most commonly used less-than-lethal weapon has been the baton. More recently, the collapsible/expandable baton has been gaining favor over the traditional or side-handled varieties. Pepper spray (OC)\(^5\) has come into common usage as a chemical

\(^5\)OC is an abbreviation for Oleoresin Capsicum, a product derived from various peppers. OC is an inflammatory agent that works upon contact, causing a very painful burning sensation in the eyes, nose, mouth, and throat, making it very difficult, for someone who has been sprayed, to do the simplest of functions.
agent that can subdue individuals without undue harm. CS\textsuperscript{6} and CN\textsuperscript{7} gases are chemical agents that are far less commonly used.

Table 6 compares responses in 1997 when LEMAS asked if local departments authorized use of various LTL devices to responses in 2000 when LETS asked local departments to describe their use of the same devices as “not in use,” “limited use,” or “widespread use.” What we see is that, although a substantial minority of local departments now make limited use of CN, CS, and flash/bang grenades, very few make widespread use of these devices. Capture nets are scarcely used at all.

Similar to the situation in local police departments, batons (especially collapsible/expandable ones) and pepper spray are in widespread usage among state police. Other types of gas/chemicals and crowd/riot control devices are in limited use by state police

Table 6

<table>
<thead>
<tr>
<th>Device or Agent</th>
<th>Authorized by Local Police, 1997</th>
<th>Authorized by Sheriffs, 1997</th>
<th>Limited Use by All Local, 2000</th>
<th>Widespread Use by All Local, 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional baton</td>
<td>46%</td>
<td>38%</td>
<td>26%</td>
<td>19%</td>
</tr>
<tr>
<td>Side-handled baton</td>
<td>47%</td>
<td>36%</td>
<td>17%</td>
<td>15%</td>
</tr>
<tr>
<td>Collapsible/ expandable baton</td>
<td>61%</td>
<td>59%</td>
<td>25%</td>
<td>53%</td>
</tr>
<tr>
<td>OC (pepper spray)</td>
<td>89%</td>
<td>87%</td>
<td>12%</td>
<td>76%</td>
</tr>
<tr>
<td>CN (tear gas)</td>
<td>3%</td>
<td>3%</td>
<td>23%</td>
<td>3%</td>
</tr>
<tr>
<td>CS</td>
<td>4%</td>
<td>4%</td>
<td>22%</td>
<td>2%</td>
</tr>
<tr>
<td>Capture net</td>
<td>—</td>
<td>1%</td>
<td>1%</td>
<td>—</td>
</tr>
<tr>
<td>Flash/bang grenade</td>
<td>11%</td>
<td>19%</td>
<td>26%</td>
<td>1%</td>
</tr>
</tbody>
</table>

SOURCE: Reaves and Goldberg, 2000, p. 21; Goldberg and Reaves, 2000, p. 22; LETS, 31. Values from LETS are statistically adjusted percent of local departments indicating each level of use for individual LTL technologies.

\textsuperscript{6}CS, an abbreviation for O-chlorobenzylidene malonontrite, causes severe eye irritation, a profuse flow of tears, skin irritation (especially on moist areas of the body) and irritation of the upper respiratory tract, causing sneezing, coughing, and difficulty in breathing.

\textsuperscript{7}CN is an abbreviation for Chloroacetophenone, commonly called tear gas, which causes profuse tearing, an intense burning sensation to the face, and disorientation.
Handheld electrical devices and flash/bang grenades were more common among state police than local police—though their usage was limited.

Because of the inherent danger in the situations police officers face in the line of duty, less-than-lethal techniques must be considered carefully; while there are good reasons to provide officers with options in responding to situations, it is important to understand how the use of those different options may change the risk posed to officers in the line of duty. Although risk comparisons between lethal force and non-lethal force are difficult, examinations have been made among less-than-lethal technologies. In one study, for example, technological LTL technologies like chemical sprays were compared with “lower tech” responses like basic bodily force (Meyer, 1991). This examination found that the TASER and chemical irritant sprays were safer and about as effective as any of several other LTL weapons or tactics (Table 7).

In an effort to gauge the barriers to police departments acquiring these technologies, the RAND Police Survey addressed both department requirements and barriers to future acquisition of LTL devices or products. Looking across different categories of less-than-lethal devices, roughly a quarter to a third of local police indicated no future requirement for these types of devices. These values could reflect both departments that already have the technologies and therefore see “no need” for future acquisition in addition to departments that lack the technology but do not desire it. In terms of other factors that might limit future acquisition decisions, local police cited:

- Cost, training requirements, and liability rated as the top three factors cited in terms of limiting future acquisition or use of these technologies.

- Cost showed the greatest variability among the different categories of less-than-lethal devices or agents in terms of the percentage of local police that viewed it as being an important limiting factor. Between 25 and 30 percent of local police rated cost as an important limiting factor for crowd/riot control devices and individual apprehension devices. In contrast, for batons—which
Table 7

Safety and Effectiveness of LTL Weapons and Tactics

<table>
<thead>
<tr>
<th>Weapon or Tactic</th>
<th>Major or Moderate Injuries to Suspect</th>
<th>Major or Moderate Injuries to Officer</th>
<th>Successful in Ending Altercation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baton</td>
<td>61%</td>
<td>16%</td>
<td>85%</td>
</tr>
<tr>
<td>Karate Kick</td>
<td>20%</td>
<td>11%</td>
<td>87%</td>
</tr>
<tr>
<td>Punches</td>
<td>64%</td>
<td>36%</td>
<td>75%</td>
</tr>
<tr>
<td>Miscellaneous Bodily</td>
<td>46%</td>
<td>15%</td>
<td>94%</td>
</tr>
<tr>
<td>Force</td>
<td>80%</td>
<td>4%</td>
<td>96%</td>
</tr>
<tr>
<td>Swarms</td>
<td>24%</td>
<td>16%</td>
<td>92%</td>
</tr>
<tr>
<td>TASER</td>
<td>0%</td>
<td>0%</td>
<td>86%</td>
</tr>
<tr>
<td>Chemical Irritant Sprays (CS and CN)</td>
<td>0%</td>
<td>0%</td>
<td>90%</td>
</tr>
</tbody>
</table>


are standard police equipment—cost was rated as being an important limiting factor by only 5–10 percent of local police.\(^8\) In addition to reflecting the differences in absolute cost of the different technologies, these cost judgments contain implicit assumptions about the benefits of the technologies.

- Not unexpectedly, training requirements varied markedly among the different technologies as a barrier to adoption. They were highest for flash/bang grenades (22 percent) and blunt trauma/soft projectiles (20 percent) and lowest for traditional batons (11 percent) and other chemical agents (8 percent).

- About 1 out of 20 local police rated public opinion as a limiting factor for most LTL. This factor was especially important for handheld electrical devices where more than 1 in 10 cited it as a reason.

- Concern about the effectiveness or reliability of the technologies was cited by a small number of local departments and ranged from 2 percent (for flash bang grenades) to 8 and 9 percent (for handheld electrical device and traditional batons) (LETS, 31).

\(^8\)Not surprisingly, since batons are in common usage.
The RAND survey found that factors considered important in terms of future acquisition decisions for less-than-lethal devices vary by size of department as measured by size of population served. Overall, urban police serving larger populations are more likely to expect future requirements for gas/chemical agents, individual apprehension devices, and flash/bang grenades. Except for pepper spray and traditional batons, larger departments across the various categories of less-than-lethal devices and agents tended not to view cost as being an important limiting factor influencing future acquisition decisions. This could reflect the greater absolute resources of these departments or a greater perceived benefit of the technologies to their operational needs.

Larger departments tended to be less likely to consider training requirements to be limiting use of batons. This suggests that the human factors associated with technology adoption could be more problematic for small police forces that, because of their smaller pool of officers and staff, may make learning and assimilating new technologies more difficult.

Potential unanticipated consequences of adopting these technologies also seem to be more important for larger departments. While larger departments are less likely to view liability or risk as a limiting factor with respect to the use of batons, they are more likely to view risk as being a limiting factor with respect to the use of handheld electrical devices (stand-off only) and flash/bang grenades. In addition, larger departments are also more likely to view public opinion as an important factor when considering future acquisition decisions with respect to gas/chemicals, handheld electrical devices (direct contact and stand-off), and flash/bang grenades.

Larger departments also seem to have a greater sensitivity to technological risks of these technologies, possibly because of the broader scope/higher stakes of many of their operations. Across most categories of less-than-lethal devices and agents, larger departments are more likely to consider effectiveness or reliability of the device as an important factor limiting future acquisition decisions.
**Body Armor**

Because of the use of firearms in criminal activities, shielding of police officers via body armor is an important part of force protection. In 1997, 43 percent of local police and 39 percent of sheriffs’ departments required that all field/patrol officers wear body armor while on duty. Eighty-one percent of local police and 85 percent of sheriffs’ departments supplied protective body armor to at least some of their regular field officers. In departments of all sizes, use of body armor has steadily increased since 1990 (Reaves and Goldberg, 2000, p. 20; Goldberg and Reaves, 2000, p. 21).

In the RAND survey, survey respondents were asked about the availability of ballistic- and/or stab-resistant armor and, if it was available, to rate its quality as state of the art, modern/little room for improvement, old but serviceable, or obsolete. A large majority of local police officers have access to body armor; only 9 percent indicated that it was not available. A majority of those with armor available (58 percent) responded that their available armor was modern or state of the art; the remainder (33 percent) characterized their armor as old but serviceable or obsolete (LETS, 25a). Such a response is interesting because the technology of commercially available body armor has not markedly improved in recent years and, furthermore, studies have demonstrated that the actual protective properties of armor do not degrade over time. It is also the case that stab-resistant armor has only recently begun to come on the market so it is not yet in wide use. As a result, this response should not be interpreted to mean that these police are at greater risk because of the age of their body armor but rather as a demonstration of both the importance of this technology to officers and the large likely payoff to research and development that can improve the performance (and comfort) characteristics of these products.

**Smart Guns**

“Smart guns” are firearms equipped to prevent firing by unauthorized people. The rationale behind their design and production is to increase firearm safety. Several rationales for smart gun development have been offered including:
• Reduction in numbers of police and corrections officers shot by criminals gaining access to the officers’ firearms;
• Reduction in numbers of accidental or intentional shootings by children, youth, or others gaining access to adults’ weapons; and
• Reduction in numbers of thefts of guns (if stolen smart guns were unusable).

The federal government has funded smart gun development; however, to date, reliability of prototype models has been questioned. Design requirements for smart guns are rather stringent, including the need to be usable in either the right or left hand. Present semi-automatic handguns probably cannot be retrofitted as smart guns, but there is a possibility that “smarts” could be retrofitted into revolver handgrips. Some smart gun concepts would call for electronic detonation of special ammunition, which would presumably be more expensive than common bullets with conventional primers.

Cost is the most commonly cited factor limiting future acquisition of smart guns by state and local law enforcement agencies (LETS, 36q). Given that these firearms are not yet on the market, this cost concern must be interpreted either as a perception of their likely cost or a judgment that the money that could be spent on smart guns would be better invested elsewhere. Some people we interviewed see a greater potential for smart gun use by corrections employees than by police officers.

The LECTAC Law Enforcement Operations Subcommittee has viewed the smart gun as "more oriented to the civilian market than law enforcement” (LECTAC, 2000, p. 40), while the Weapons and Protective Systems Subcommittee favored continued development of a smart gun “in spite of serious concerns about product reliability” (LECTAC, 2000, p. 44). These technological uncertainties are also clearly reflected in the survey results (Table 8).

The fraction of departments expressing concern about the training required to use smart guns is comparable to or higher than many of
the other technologies in the survey. This suggests that the organizations have concerns about the adjustment that will be required by their officers if they chose to pursue the technology. This is notable given that firearms in general are arguably one of the most completely and effectively adopted technologies by law enforcement and the addition of user-recognition technology could be considered an incremental change to the basic firearm design. More striking than the departments citing training, however, is the level of concern about the effectiveness and reliability of the technology. The numbers observed for smart guns (14 percent among local police and 20 percent among state departments) are the highest for any technology in the survey. This suggests that there will be a high barrier to adoption of these firearms by law enforcement until further R&D demonstrates their effectiveness and reliability.

### Drug and Weapons Detection

The LECTAC Contraband and Detection Subcommittee has identified its top priority for law enforcement the development of an improved “handheld weapon, drug, and currency detector that is affordable, easy to use, rugged, reliable, and portable (LECTAC, 2000, p. 32). These desirable characteristics have been echoed by similar committees concerned with problems and challenges in the management of correctional facilities. Having a reliable ability to detect concealed weapons before confronting a person at close quarters would greatly assist police and security guards in enforcing laws and ensuring safety of officers, the public, and suspects.
Sherman et al. (1997, pp. 8-30 to 8-32) has suggested that proactive arrests for carrying concealed weapons via directed police patrols in gun crime hot spots and better methods for discovering weapons during traffic enforcement and field interrogations as promising means to reduce gun crimes. Advances in law enforcement technology could facilitate both approaches. Technologies offering promise in this area include magnetic resonance devices, acoustic devices, and edge detection radar.

PURSUIT MANAGEMENT

Because of the high profile and high risk associated with vehicle pursuit, technologies to make automobile chases more manageable (or avoid the need for direct pursuit) could be very useful to law enforcement. The top priority recommendation of the LECTAC Law Enforcement Operations Subcommittee is for vehicle stopping, including “run flat” tire effort (LECTAC, 2000, p. 39). At the current time, respondents to the RAND Police Survey indicate that use of vehicle stopping and tracking technologies by local police departments is quite limited. When asked about the general category of “fleeing vehicle interdiction equipment,” most respondents (69 percent) indicated that none was available to their department (LETS, 26a). When asked about specific technologies, the results were essentially analogous (Table 9).

State police reported on average limited-to-widespread use of tire deflation spikes. However, they indicated either no use or limited use of tracking devices.

Not unexpectedly, use of vehicle stopping and tracking technologies differed among different categories of police departments. Tire deflation spikes are twice as likely to be used by urban departments serving more than 25,000 than by rural or smaller urban departments. Furthermore, none of the rural or smaller urban departments responding to the RAND Law Enforcement Survey have stolen vehicle-tracking technology, such as LoJack. No more than 11 percent of the larger departments have it. These differences likely  

9LoJack represents an interesting case where the availability of a technology to local police is independent of the departments’ decisionmaking processes. LoJack provides
Table 9

Use of Vehicle Stopping/Tracking Technologies by Local Police

<table>
<thead>
<tr>
<th>Device</th>
<th>Not in Use</th>
<th>Limited Use</th>
<th>Widespread Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tire deflation spikes</td>
<td>67%</td>
<td>18%</td>
<td>15%</td>
</tr>
<tr>
<td>Stolen vehicle tracking (e.g., LoJack)</td>
<td>86%</td>
<td>12%</td>
<td>2%</td>
</tr>
</tbody>
</table>

SOURCE: LETS, 36m,o. Numbers are statistically adjusted percent of departments responding as indicated.

reflect differences in need for the systems in addition to access to them.

The RAND survey found that cost was highlighted as an important factor in limiting future acquisition of vehicle stopping or tracking devices, indicating that they did have concerns both about the absolute and relative costs of these technology.\(^\text{10}\) In addition to cost, other factors also came into play as well. Local police considered reliability, training, and risk or liability as limiting acquisition (LETS, 36).

Rural and urban departments serving populations less than 25,000 were more likely to cite cost as a limiting factor; this could reflect that other uses of those resources are simply perceived as more appealing based on the assumed payoff of the technologies. It is relevant to remember that at a low enough cost, any technology becomes attractive. The larger the population served by a department, the more likely factors such as reliability, training, and risk or liability as being important. This is consistent with the fact that these departments would likely have a greater assumed payoff from the technologies (since they would likely use them more frequently) and

the receiving units to police departments free of charge in areas where it wishes to offer its car recovery transmitters to customers. As a result, the availability of this technology to departments is more dependent on LoJack’s business model than local choice.

\(^\text{10}\)It is puzzling that 55 percent of respondents indicated that cost was a barrier to adopting vehicle recovery systems since, in the case of LoJack, the technology is provided free of charge to police departments. This result may reflect concern about associated costs or simply reflect the other concepts of costs discussed in this report—that the relative benefits of this technology may not be high for some departments. This is not inconceivable for many very small or rural police agencies.
would be more concerned about the more operational facets of adopting the devices.

For electrical/engine disruption\textsuperscript{11} and stolen vehicle tracking devices, a similar pattern was found for likely similar reasons. Rural and urban departments serving populations less than 25,000 were more likely to cite cost as a limiting factor with respect to acquisition; larger departments were more likely to consider reliability and risk or liability as also being important. Interestingly, training requirements were not viewed as being as important by departments serving populations of more than 225,000. The largest departments (greater than 225,000) were also more likely to cite public opinion as being an important consideration.

State police departments cited cost as being an important limiting factor for the vehicle stopping/tracking devices. Reliability, training requirements, and risk or liability were also considered by these departments to likely limit future acquisition.

\textbf{COUNTER-TERRORISM}

Since the 1995 bombing of the Alfred P. Murrah Federal Building in Oklahoma City, the federal government has paid increased attention to the threat of terrorist acts within the United States. Although domestic terrorism has fortunately remained largely a potential, rather than realized, problem for law enforcement, gauging the degree of preparedness for such situations is of interest.

As the following table (Table 10) shows, counter-terrorism technology is generally not available to the majority (55–75 percent) of local police departments and only a small percentage of departments indicate that the technology is “not needed.” (LETS, 28).

In addition to querying agencies on the array of counter-terrorism technology which they had available, the RAND Police Survey also asked about whether agencies had received federal funds, equip-

\textsuperscript{11}Electrical/engine disruption technology for vehicle stopping is not yet available. We interpret the survey response to mean that many departments expect such technology, if and when available, to be expensive.
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Table 10  

Counter-Terrorism Technology Available to Local Departments  

<table>
<thead>
<tr>
<th>Technology</th>
<th>Not Needed/NA</th>
<th>Not Available</th>
<th>Obsolete</th>
<th>Old but Serviceable</th>
<th>Modern/ State of the Art</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosives detection</td>
<td>8%</td>
<td>62%</td>
<td>0%</td>
<td>9%</td>
<td>17%</td>
</tr>
<tr>
<td>Bomb containment/disablement</td>
<td>8%</td>
<td>58%</td>
<td>0%</td>
<td>9%</td>
<td>21%</td>
</tr>
<tr>
<td>Chemical agent detection</td>
<td>8%</td>
<td>68%</td>
<td>0%</td>
<td>7%</td>
<td>12%</td>
</tr>
<tr>
<td>Radioactive agent detection</td>
<td>8%</td>
<td>63%</td>
<td>6%</td>
<td>8%</td>
<td>10%</td>
</tr>
<tr>
<td>Blister/nerve agent protective clothing</td>
<td>11%</td>
<td>75%</td>
<td>1%</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>Electronic listening</td>
<td>8%</td>
<td>55%</td>
<td>4%</td>
<td>11%</td>
<td>18%</td>
</tr>
<tr>
<td>Long-range video monitoring</td>
<td>9%</td>
<td>66%</td>
<td>5%</td>
<td>5%</td>
<td>12%</td>
</tr>
</tbody>
</table>

SOURCE: LETS, 28. Numbers are statistically adjusted percent of local departments responding as indicated.

ment, or training for response to chemical, biological, or nuclear (CBRN) incidents since 1997. Of local police departments, 8 percent indicated that they had received federal help in counter-terrorism technology in the past three years. Not surprisingly, the fraction of departments reporting receiving that aid increased significantly with the population served. While only more than 6 percent of small urban (less than 25,000 population) and rural departments reported receiving aid, just over 33 percent of departments serving the largest cities indicated receiving it (LETS, 34). The perceived usefulness of the aid that was received was also somewhat dependent on the size of the police departments. Between 75 and 95 percent of most departments believed that the aid at least somewhat improved their organizational capabilities in the listed areas (LETS, 35).

In considering these results it is important to note that RAND did not survey fire departments or other agencies that may be better equipped than police. In addition, the reader should be aware that there are two aspects of response to terrorism incidents: crisis management and consequence management. The federal government exercises lead authority and responsibility in crisis management. Final authority to make decisions on scene regarding the causes of
the incident, securing the scene perimeter, identifying and rendering weapons safe, and capturing terrorists rests with the FBI’s On-Scene Commander. State and local agencies exercise lead authority to make decisions regarding the consequences of terrorism, including decisions regarding rescue and treatment of casualties and protective actions for the community (OES, 1998, pp. 3–4). Local agencies, such as police, coroner, medical, mental health, public works, and utilities may be assisted in consequence management by the Federal Emergency Management Agency (FEMA) (OES, 1998, p. 51).

It should also be noted that all police agencies, depending on their jurisdiction and whether it contains or abuts any particularly attractive terrorist targets, will not have the same needs (either in kind or in magnitude) for terrorism preparedness resources. To guide acquisition by departments that believe they do need the technologies, the Office for State and Local Domestic Preparedness Support (OSLDPS) has published an authorized equipment purchase list, which includes the following categories of equipment: personal protective, chemical and biological detection, and communications.

For those interested in more information on this topic than is provided by the RAND survey, in Fiscal Year (FY) 1999 the Department of Justice funded a national assessment of state and local agencies’ equipment capability, readiness, and training needs for chemical, biological, radiological, nuclear, and conventional explosive responses (Mitchell, 1999). That study is expected to produce more comprehensive data than we are able to provide here.

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12This represents another instance in the survey where it is clear that the number of departments selecting “technology not needed” is almost certainly unreasonably low. Based on reasonable probabilities for terrorist incidents, it is obvious that the needs of major urban police forces and isolated rural departments would not be comparable. As a result, the responses to this question likely represent an unwillingness by respondents to indicate they do not want something that has the potential to bring resources to their departments. It is therefore likely to be more appropriate to view these figures as primarily descriptive. For the sake of illustration, it is doubtful that providing nerve agent protective clothing to every law enforcement agency in the United States would have as beneficial an effect on public safety (or even terrorism preparedness) as many other possible uses of those resources.

13See http://www.ojp.usdoj.gov/osldps/lib_fy99cm_appd.htm or current web site.