

...[At] a time when we have a budget surplus that enables us to make some larger investments in the future, there is no reason not to “think big” when it comes to crime technology R&D. After all, the rationale for spending on crime-fighting R&D is at least as strong as the basis for the more prominent areas of federal R&D spending. As with defense, government is the ultimate consumer of law enforcement R&D. As with medical research, the public’s health and safety is at stake. As with environmental research, the problems and questions are becoming more complex and more difficult to address without a coordinated program. As with all longer-range R&D, market failures limit the amount of private investment in the field.

The fact that technology alone will not solve the crime problem is hardly a reason not to invest in the area. Changes in individual and societal behavior are also needed to solve medical and environmental problems, but no one suggests that we should cease our research into new medications or environmental technologies simply because they cannot be the entire answer. [As] the DNA revolution has shown...technology can not only make law enforcement more effective, but also more fair. The deeper cause of justice is served by crime technology research every bit as much as the practical cause of safety (Boehlert, 2001).

## **BACKGROUND AND PURPOSE**

Improving law enforcement doesn’t just mean putting more police on the streets. Better law enforcement and crime fighting mean improving public safety, using economic resources wisely, and promoting a fairer and more just society. As we shall see, technology can

serve to reduce public fear of and concern about crime by actually making our communities safer. Technology can also be the economical way to fight crime. Policing is both labor intensive and—because our police deserve to be well paid—it is expensive. As earlier RAND work reported, about 95 percent of a typical law enforcement agency’s budget is dedicated to personnel (Schwabe, 1999, p. 31). Technology can represent an important way to leverage and magnify investments made in human resources and act as a “force multiplier.” Given the capabilities of technology currently existing but not yet universally available and the very plausible promise that research and development holds for yet more effective and efficient law enforcement technology, there is real reason to expect we can become safer at lower cost. So, if technology can improve public safety and be an efficient use of resources, what about justice?

Though we Americans love what technology can do for us, there lurks in the psyche of many a fear or dread of technology as a tool of repression and control, as a means for government to invade the privacy of law-abiding people, or as a force unto itself. This represents an important trade-off for the American people: the fear of technology as a concentrator of power, in this case in the hands of law enforcement, versus the good that might be accomplished with that concentrated power. This fear of the dark side of technology has often been expressed in popular culture, for example, as the omnipresence of Big Brother in George Orwell’s novel, *1984*, or as HAL, the computer without respect for human life in Stanley Kubrick’s movie, *2001: A Space Odyssey*. Unfortunately, abusive use of technology—including such use by police—has not been confined to fiction.

Balancing these two opposing forces hinges on just how technology is used. While acknowledging the potential for abuse, if it is used well, technology more likely offers hope for increasing the fairness and justice of law enforcement. In the light of a lengthening string of well-publicized examples, the value of DNA testing to identify the guilty and exonerate the innocent is becoming widely known. Later in this report we comment on how crime mapping, video recording of police-public interactions, and quick access to criminal justice databases can improve not only crime-fighting effectiveness and efficiency but also police accountability.

## Factors Affecting the Use of Technology by Law Enforcement

This report explores how modern technology used in the service of law enforcement may improve public safety and promote justice. It attempts to build on the efforts of our earlier work (Schwabe, 1999) and provide a more comprehensive and nuanced view of the factors which affect the ways law enforcement organizations learn about, adopt, and use potentially beneficial technologies. The primary inputs into this characterization are two nationwide surveys that were performed of police and forensic science organizations. The view of technology taken in the surveys and, as a result, in this analysis is quite broad encompassing traditional technology topics like computer access and useful gadgets like less-than-lethal weapons and also less “high profile” topics such as technologies for coordinating the management of law enforcement organizations or remote case filing.

From survey responses about the technology presently available to state and local agencies and their stated technology-related priorities, we seek to gain some insight into the factors that promote or get in the way of these organizations pursuing and using new technology. The process of technology adoption by any organization is always a difficult process involving numerous risks. These risks, which can effectively block organizations from pursuing new technology or, if they do pursue it, from using it effectively include:

- **Costs**—All new technologies have associated costs that, at their most basic, must be paid out of funds in an organization’s budget. Evaluating these costs is an important part of technology decisionmaking and requires a number of different trade-off assessments.
  - *Trade-Off Between the Technology and Other Organizational Investments*—Because dollars spent for technology cannot be spent elsewhere as well, the cost of a new technology must be traded-off against the cost of other resources. In the case of law enforcement organizations, which must devote a large fraction of their budgets to human resources, this trade-off can be difficult.
  - *Trade-Offs Among Technologies*—Because a number of different technologies could contribute to the goals of law en-

forcement, organizations also make judgments about which technologies they will pursue. Such assessments are, at least formally, cost-benefit calculations to determine how given technologies will contribute to public safety given the specific operating conditions of a police department.

- **Technology Risk**—The choice to use any new technology is always attended by the risk that the technology will not perform the desired tasks adequately. The risk that a technology will not measure up to expectations is ever present, even for the most technologically knowledgeable organizations. This risk, which varies among technologies and over time as new technologies become more established, can lead organizations to delay or even pass up potential investments in new techniques.
- **Human Associated Risks**—When an organization alters its operations or integrates a new technology into existing procedures, there is adjustment required on the part of its members. This adjustment, which includes learning how to use the technology, in what situations it is effective, and what other changes its use requires, can be facilitated by training programs or learned through use of the technology. If organization members are not able to make the necessary adaptations, the technology could be “incompletely” adopted and ineffectively applied. The risk of this happening can be a serious barrier to technology decisionmaking in organizations.
- **Unanticipated Potential Costs**—It is also the case that the adoption of new technologies almost always has associated, but unanticipated, costs. These costs—termed by some the “law of unintended consequences”—affect technology adoption in law enforcement as they do all other technologies. One example of such an unanticipated consequence is the public reaction to use of a technology by the police. If a use is deemed “unacceptable” in the court of public opinion, any law enforcement benefits could be outweighed by these collateral costs.

Because of society’s interest in law enforcement adopting technologies which make its activities more effective, promote public safety, and advance the cause of justice, how other government activities can serve to lower these barriers to adoption is of great importance to policymakers. Conclusions regarding the ability of external pro-

grams to facilitate this process have important consequences for the challenges and choices federal policymakers face in considering technology-related support for state and local agencies over the coming decade.

## **HOW THE REPORT IS ORGANIZED**

The report is in two parts: the first deals with law enforcement's use of technology at the state and local levels, while the second addresses federal technology-related support of state and local law enforcement agencies.

The first part is divided based on individual "mission elements" of modern law enforcement. Accordingly, Part I consists of the following chapters:

- Chapter 2. Crime Prevention,
- Chapter 3. First Response,
- Chapter 4. Investigation and Apprehension,
- Chapter 5. Forensic Analysis, and
- Chapter 6. Administration and Management.

The second part is divided based on the different areas of federal involvement with local and state law enforcement agencies:

- Chapter 7. Sources of Technology Related Information and Support
- Chapter 8. Research, Development, and Deployment,
- Chapter 9. Technology Application, and
- Chapter 10. Challenges and Choices.

Each chapter is organized primarily by function. For example, within Chapter 3, dealing with the First Response mission element, the major headings are:

Situation Reporting,  
Tactical Communications,  
Officer Deployment,  
Officer Protection,  
Pursuit Management, and  
Counter-Terrorism.

For each function, we discuss technologies supporting it. For example, under Situation Reporting, we describe three technologies: Emergency Reporting Systems, Non-Emergency Reporting Systems, and Mass Notification Systems. To the extent we are able to do so, for each technology we present (1) findings on what's out there, (2) views on what's needed, and (3) ideas on how to get there.

## USAGE OF TERMS

This report uses the term “law enforcement agencies” to include police, sheriffs, and forensic agencies at the local, county, and state levels of government. Unless otherwise denoted, we use the term “local departments” to include police and sheriffs’ departments at the county and municipal levels. Similarly, unless specifically indicated, we include in the term “state police” both highway patrol and state police departments. “Departments” refers to all police, sheriffs, and highway patrol departments at the state, county, and municipal levels. “Laboratories” include forensic laboratories operated by police, prosecutors, or other law enforcement agencies, as well as those operated by coroners and medical examiners.

We use the term “technology-related support” to include the following:

- **Funding for technology acquisition** through direct or indirect grants to state or local law enforcement agencies,
- **Federally supplied technology**, such as DrugFire, the firearms evidence analysis system, which is supplied to state and local agencies by the Federal Bureau of Investigation (FBI),

- **Access to federal technology**, which may be direct, such as to FBI fingerprint data, or indirect, such as access to another agency's federally supplied technology,
- **Advice on selecting technology**, such as evaluations of technology appearing in federal publications, Internet sites, etc.,
- **Technology news**, including news about new technology, available through federal reports, newsletters, etc.,
- **Technology evaluation or standards**, objective information, including equipment/technology performance standards, test reports, and evaluations,
- **Technology assistance**, such as science or engineering advice or support, generally involving use of federal technology to respond to help state or local agencies with specific problems,
- **Technology-related training**, such as training to use mapping software for crime analysis,
- **Technology-related conferences**, and
- **Technology R&D or commercialization**, where "commercialization" refers to actions necessary to make a technology applicable, available, and affordable to state or local law enforcement agencies.<sup>1</sup>

In the course of this study, RAND conducted two surveys, more fully described in the Methodology section following. In this report, the RAND Law Enforcement Technology Survey is abbreviated as LETS, and the RAND Forensics Technology Survey as FTS. Where numbers follow those abbreviations, they indicate the number of the applicable survey question; for example, if the source of data is cited as "LETS, 27b," the data represent responses to LETS question 27, part b.

Certain findings from LETS categorize local police departments as "rural" or "urban," with urban being subdivided by size of population served. Our definition of rural is based on the "Rural/Urban Continuum Code," as used by the Department of Agriculture. The

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<sup>1</sup>For more examples of technology-related support, see Schwabe (1999) and Appendix B of this report.

codes form a classification scheme that distinguishes metropolitan counties by size and non-metropolitan counties by degree of urbanization or proximity to metropolitan areas. Counties with codes 7–9 were defined as rural, and all others were defined as urban. When we refer to “small departments,” we mean urban departments serving populations no greater than 25,000.

## METHODOLOGY

We were asked by the sponsors of the study to consider three questions: Where are we now? Where do we need to go? How can we get there?

The three questions are qualitatively different. The first—where are we now—seeks objective, factual information about what technology is available and in use. We felt the best way to get that information is the most direct way: Ask people in the law enforcement agencies what technology is available to them. Recognizing that, we developed and administered two nationwide surveys of state and local law enforcement agencies. The RAND Law Enforcement Technology Survey (LETS) was mailed to a stratified random sample of 710 local police and sheriffs’ departments. Four hundred eleven responded, for a 60 percent response rate. In addition, 17 state police and highway patrol organizations were randomly drawn from the 50 states, of which 15 responded. The RAND Forensics Technology Survey (FTS) was sent to all 165 members of the Association of Crime Laboratory Directors (ASCLD) whom we judged to be heads of state and local forensics laboratories; we received 70 responses, representing 105 laboratories. Appendix A describes our survey methodology in greater detail.<sup>2</sup>

The second question—where do we need to go—depends more on perceptions. We knew from previous work that answers to questions of this sort can be expected to vary widely, depending on one’s organizational perspective, time horizon, and experience level. Accordingly, we chose a dual-track approach: first, include questions

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<sup>2</sup>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.

about technology-related needs in the RAND surveys and, second, augment this with literature research, interviews, and focus groups to seek a broader perspective.

The third question—how do we get there—is, perhaps, most subjective. The RAND surveys provide information on factors perceived as limiting future acquisition or use of certain technologies.<sup>3</sup> Through these questions, some insights could be extracted on impediments to the adoption of certain technologies. We augmented that with interviews and feedback from people whom we have reason to believe really “know the system,” as well as our own considered judgment.

We are aware that there are limitations to this methodology and to the resulting study. “Technology” and “law enforcement” are so broad that it was not feasible to research everything in detail. Since there are virtually no empirical data on causal relationships between technology and crime reduction or public safety, there is no consensus on which technology matters most. Thus, we had to use our best judgment of which technologies to research.

As mentioned, we surveyed police and sheriffs’ departments and forensic laboratories. We did not survey corrections agencies nor otherwise sufficiently research their technology to warrant inclusion in this report. We were able to provide only limited information on technology related to courts; what we do provide is mostly from the perspective of police.

We are also aware that respondents to surveys vary in their understanding and appreciation of current and emerging technologies. In providing data on agencies’ stated priorities we are neither judging nor verifying the wisdom of those priorities; we are merely presenting them. The surveys were sent to heads of departments and laboratories, who presumably used their best judgment in deciding who would actually fill out the questionnaire. In some cases we speculate

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<sup>3</sup>The Law Enforcement Technology Survey considered the following factors as possibly limiting future acquisition or use of a technology: no need, cost, effectiveness or reliability, training requirements, risk or liability, and public opinion. The Forensic Technology Survey considered the following factors: no expected requirement, cost, effectiveness or reliability, training requirements, lack of trained personnel, and lack of equipment or lab space.

about the source of certain responses based on broader generalizations on organizational and human behavior.

In order to augment the survey and support analysis, the focus group research sought information bearing on three questions:

1. Viewing law enforcement as a system, the components should ideally be in balance. Considering public safety, cost effectiveness, and justice as the relevant criteria, are there important imbalances in the system? If so, which appear most amenable to correction through technology?
2. Considering findings from the RAND surveys, what do you make of them?
3. Anticipating apparent societal, technological, and criminal trends, what are the most valuable technology-related investments the federal government should make to help prepare state and local law enforcement for the coming decade?

Although these questions were not answered definitively, they were conducive to stimulating productive discussion and the insights gathered helped place the survey responses from the law enforcement organizations in a broader context.

**Part I**

**LAW ENFORCEMENT'S USE OF TECHNOLOGY**