PART ONE
Introduction to Theory and Basics
Chapter One
Introduction to Police Technology

Learning Objectives

• The student will understand the layout of this text.
• The student will understand the difference between tactical and strategic information.
• The student will understand what is meant by technology in conjunction with this textbook and why technology in law enforcement should be explored.
• The student will understand the difference between efficiency and effectiveness.
• The student will understand the community policing model.
• The student will understand the connection between situational crime prevention and technology.
• The student will understand the concept of fragmentation.

Introduction

He was wanted for thirteen murders. A sophisticated ex-convict had ruthlessly taken over the leadership of a street gang. One detective referred to him as a monster who enjoyed killing. One murder was a tagger from another neighborhood; next, the homeless man who was unfortunate enough to witness the tagger’s demise. Then there was the casual girlfriend he sent back to a third murder scene to get his cellular telephone; he had dropped it during that murder. He murdered her because she knew too much. The others were drug rip-offs, robberies, and grudges.

For the first six months after he was connected to the murders, his warrant for arrest languished. One federal agency and one local agency made an effort. But he was protected, hidden behind the fear in his neighborhood—and technology. His gang monitored the police radio. They used cellular telephones because the telephone calls were digital and more difficult to intercept. They used night-vision devices to watch for the police. They used a sophisticated call-forwarding scheme that involved a virtual private telephone number—it insulated the murderer so that he could control the gang without concern his number was being traced. They used the Internet to post messages and e-mail, when driving outside of their neighborhood, they used sophisticated counter-surveillance driving techniques.

Even though he was wanted, the murders and other criminal activity continued. Then a different group of police officers, from another federal agency and a separate local agency, formed a task force to stop him. These officers were different. Sure, they were good cops, but they were also patient and technologically savvy. They brought technology into the search.

They used high-powered optical equipment linked to a video monitor that allowed them to read the label on a pair of pants from more than a mile away. In the dark they used night-vision and thermal-imagining gear. They scoured government, commercial, and Internet data sources. Telephone switching boxes were rerouted to outside the gang-controlled neighborhood, and telephone traps were hung to gain the number called back and forth between residences and businesses.
associated with the murderer. The officers obtained wiretaps on the cellular tele-
phones and monitored calls originating in California that were dumped by satel-
lite to a Florida location and then forwarded via the Internet to a wire-monitoring
station in yet a different Southern California city. They searched government data-
bases for information. They organized their information into a central database
and began to analyze the link between the information. The officers used crime-
mapping technology to plot the crimes, sightings, and associates. More technology
surfaced—remote video cameras, special radios that transmitted on little-known
frequencies and in an encrypted manner, and specially equipped aircraft and ve-
hicles. When they served search warrants, they had advanced weapons systems,
soft body armor, flash bang devices, and special communications gear.

They used the technology to flush out the murderer. A fugitive on the run is
more readily caught than one burrowed deep into the mass of humanity. But it
wasn’t just the technology. It was the cop work, too. It was working all through
Thanksgiving weekend, using their laptops and radio equipment to triangulate
and track cellular telephone conversations. It was cop work—talking to people
and using media interest to keep the pressure up—newspapers, television news-
casts, and America’s Most Wanted. Their technology allowed them to break
down the protective technological barrier the gang had erected. The technology
allowed for the easy access to and organization of evidence. The technology
made their operations more secure and safer. But in the end, it was diligent, solid
police work that paid off.

The murderer was wanted in Los Angeles, tracked to Las Vegas—actually
tracked to the Apache Indian Reservation in Arizona—and tracked back to Los
Angeles. And finally, in a small city on the Arizona side of the Colorado River, the cop work and technology paid off. The officers sat for a few hours, watching an apartment building. The murderer came out and was taken into custody without a whimper.¹

The technology did not apprehend the murderer. It did not bring him to justice—people did. Computers don’t solve crimes, arrest violators, or find missing children—courageous, dedicated people do. Certainly the technology gave the officers an edge. But the real advantage they had was their knowledge of what the technology could and could not do. Moreover, as we shall see throughout the text, technology is not a substitute for good judgment, it cannot compensate for insufficient training, provide leadership, or replace the street savvy of veteran police officers.²

The officer’s advantage was in their acceptance, understanding, and use of the technology because technology can only help gather, organize, and analyze data; computers can’t solve the crimes.³ Their advantage was their team leaders, leaders who bridged the gap between the techies and the street cops. It was making decisions about how far to allow a technology to gather information before taking action. It was making decisions on when using a technology, because it was sexy or glitzy, impeded an investigation. The power of the technology was released by integrating the cultures, tactics, and technologies of the separate teams so they could work as one. I should know; I was one of the team leaders.

Text Design

This text is for people interested in how technology affects the criminal justice system. By the end of the text, you will not be a programmer or engineer, but you will be a more informed student or practitioner of criminal justice—specifically in the area of law enforcement. For that purpose, as technology in law enforcement is explored, we will be interested in technical explanations of a technology for three reasons. First, a technical explanation may help to understand how the technology impacts law enforcement. Or we may delve deeper into the technical aspects in order to understand the potential and limitations of a technology. Finally, certain technical explanations are helpful to build a base from which to understand other developments.

Although we are going to examine a great many technical aspects of technology, especially in the first section of the text, to gain a true sense of the potential, limitations, and challenges associated with technology we have to look at it in context of how it is used. The more interesting questions concerning technology are about how it is used, not what it is. Our study of technology will be infinitely more valuable if we look at it as a background to vital themes in law enforcement today.⁴

As a means to examine how technology is used by and impacts law enforcement, we will follow themes that cut across the study of criminal justice such as criminological theories, policing models, and practical problems. By using the framework of traditional criminological theories and practical problems, the text will convey the challenges, potential, and limitations of technology in law enforcement.

We will also explore three distinct points of view: the line employee, the supervisor, and the police manager. While these three points of view are at times similar, they often diverge significantly. When discussing line employees, we are referring to both police officers and civilian police employees. Indeed, work traditionally performed by uniformed officers has increasingly been given to civilian employees. Usually these are jobs that don’t require law enforcement, such as...
repairing motor vehicles, programming computers, analyzing forensic evidence, and operating radio-dispatch systems. Indeed all police employees 27 percent in the United States, 35 percent in Great Britain, 20 percent in Canada and Australia, and 12 percent in Japan are now civilians.5

Police officers are commonly referred to as sworn employees because they have taken an oath of office and generally have the authority to arrest under circumstances that are different from the civil population. In essence, a civilian can only make an arrest for a felony if a felony has actually been committed, whereas police officers can make an arrest for a felony if they have sufficient probable cause to believe a felony was committed.6 It is necessary to consider the role of both sworn and nonsworn because many of the technology-related assignments in law enforcement are performed by nonsworn employees. Moreover, according the Bureau of Justice Statistics (BJS) 2000 Census of State and Local Law Enforcement Agencies, of the 1,019,496 state and local law enforcement employees, who are employed by 17,784 organizations nationwide, 311,474—or just over 27 percent—are nonsworn employees.7 So the term line employee includes both sworn and nonsworn police employees.

At times, police officers will be specifically identified in the task because the technology relates to the duties normally performed by a sworn employee. Moreover, at times we will differentiate between a detective who is doing investigative work and a police officer who is a first responder in the field. However, it is important to remember that many of the technologies involved in the police service are used, maintained, and managed by nonsworn employees.

All three points of view are similar in that a greater understanding of technology will lead to a better understanding of the challenges, potentials, and limitations of technology in law enforcement. However, the points of view do diverge at a number of points. For instance, when information systems are used to track potential problem officers, the point of view of the line employee may be different than that of the supervisor or manager (the technology used to track problem officers is discussed in Chapter Nineteen). Moreover, line employees and supervisors are primarily the end users. End users would benefit from an understanding of the technology because they would probably become more proficient with it. Also, technology changes rather rapidly. An educated end user, who has had successful experiences with technology, is probably going to be more open to use new or upgraded systems. Indeed, there have been cases wherein the deployment of substandard equipment and/or inadequate training has soured line employees to future technological changes.

For the police manager or executive (who could be either sworn or nonsworn), the text has significant value because the manager who is more educated on the types of technologies available—and their potentials and limitations—is in a much better position to make decisions about acquisition and implementation. Technology can be expensive. And technology that does not meet expectations or has undesirable unintended consequences can have even greater expense to the agency. Indeed, one survey indicated that 75 percent of police departments were less than satisfied after a technology had been introduced and that 25 percent of the technologies did not function as expected.8 A police manager who is better educated is in a position to ask the right questions, make better decisions, and lead his or her agency to a full realization of the potentials of a technology.9 Finally, police managers themselves are end users of some of the technologies we will explore.

The police supervisor (again, who could be either sworn or nonsworn) has duties that fall somewhere in between those of the line employee and the manager. The supervisor is probably more of an end user than the manager but has the

An end user is the primary user of the technology, the one for whom it has been designed.
responsibility to provide daily training to and supervision of the employees and the technology. Prior to the advent of high technology, workers did one thing, supervisors did another, and managers did yet a third. Now, as we enter the twenty first century, we find that workers, supervisors, and managers have many common concerns regarding technology. So with a variety of themes and points of view, we will explore police technology.

The text is organized into four sections. The first section is a collection of chapters whose primary goal is set the stage by explaining a variety of fundamental technological concepts. We move out of the first section with a brief look at the history of technology in law enforcement. The next two sections broadly separate police technology into strategic and tactical tools. Later in this chapter those concepts will become clearer. The final section looks at technology as it specifically relates to the management of the police service. Now this is a very broad field with developments occurring simultaneously. In order to bring some sense to the chaos of creativity, the text begins at the very basic and builds forward. But at times we will delay discussing part of a technology until later in the text because it might be better explored in the context of other themes.

The themes and the points of view are lenses for us to view how the technology has impacted the everyday functions of law enforcement. The focus is on what has happened and the intended and unintended consequences of technology. There are essentially four overriding themes in this text: community policing, efficiency and effectiveness, situational crime prevention, and fragmentation. These themes make sense because community policing is the most widely used model, efficiency and effectiveness are continuously used as arguments for implementation, situational crime prevention is the foundation for many of the current uses of technology, and fragmentation is probably considered the most vexing problem in police technology.

At the beginning of every chapter you will find Learning Objectives. These objectives should give you an idea of what to expect in the chapter and assist you in determining if the learning experience has been successful. As the text develops, terms and concepts with which you may not be familiar are introduced. New terms and concepts will be explained in one of three ways. First, the term or concept's definition may be woven into the text at the point of introduction. Second, there may be a quick explanation of the term in a marginal note on the page where the term or concept is introduced. Third, an explanation of the term or concept may be delayed until later in the text. Some terms and concepts are given explanations in other chapters because their stories require wider explorations.

Throughout the text you will find Try This boxes. Sometimes things are more easily demonstrated by practical experience. We hope they will help to demonstrate what you have read. At times these Try This boxes may be links to Web sites that provide more information about a subject.

The last two items at the end of each chapter are discussion questions and a list of the key terms discussed in that chapter. The discussion questions are often questions the author pondered while researching and writing the chapter. At the very end of each chapter you will find a collection of key terms. You can check your understanding of the information with a quick check of those terms. If you understand them, you probably understood the chapter. The final learning tool you will have at your disposal is a Web site that is a companion to this textbook—www.hitechcj.com. At that Web site, you will find a variety of educational tools, text updates, and links to other sources of information.

The text begins with some very basic information, which is developed into some very complex technologies in later chapters. Consequently, the discussion
of the impact of technology will become increasingly more complex and interesting. The last section of the text is about the future. The future, or emerging technologies, is best explored after the past and present have been examined. Information about past performance is the guide we will use in an effort to forecast possible futures.

**What Is Technology?**

Before technology in law enforcement can be understood, the term technology should be defined. At the most basic level, technology is any tool. Indeed the root word of technology refers to the Greek word for the skill or craft of making tools.\(^\text{11}\) Technology has also been defined as a system, as information and as knowledge.\(^\text{12}\) For our purposes, technology can be any tool. Technology can be a hammer, the wheel, or a desktop personal computer. But it is important to consider that technology in the twenty first century is not defined by what it is or does, but more by how it is used. It is the context of use that defines technology.\(^\text{13}\) Since most work done by police employees involves information, we will concentrate on information technology, or, as in the parlance of the industry, IT.\(^\text{14}\)

When a police officer is interviewing a victim or witness, interrogating a suspect, or cultivating an informant, he or she is gathering information. At the line employee level, police work is primarily about communication—talking with people. Indeed the best police officers are those who can talk to anybody. But how do police officers know with whom to talk? They use information. Sometimes that information comes in the form of a *call for service*.

Other times they stop and talk to people such as a traffic violator or a suspicious person. When police officers conduct self-initiated activities (the traffic violator, for instance), many times they are using information they gained from their own observations. In the instance of the traffic violator, the police officer saw a speeding vehicle. However, some *self-initiated activities* are based on information a police officer receives from another source, or the activity the officer initially undertook is modified based on information received from another source. Take the traffic violator, for example. As the police officer begins to stop the car, he or she may check the car license plate via radio or computer in order to establish ownership. Sometimes that check reveals the car is stolen. This information dramatically changes the police officer's response to the situation. The police officer is relying on information, but where does it come from? How does the police officer receive the information? How accurate is the information? These are a few of the questions the text will seek to answer.

In addition to using information, police officers gather information. In the original scenario, the traffic ticket issued to the violator has the potential to become important information to other parts of the criminal justice system. For example, if the violator does not go to court, the information on the citation may be used for the issuance of a warrant for the violator's arrest. Or the traffic violator may have been speeding away from a more serious crime she had just committed. The police officer, unaware of that crime, simply issued a ticket. Later, during a criminal investigation, that ticket may be the evidence that solves the crime. Again questions arise—how does the citation information get to the court or to the state department of motor vehicles? Just as important, how does the officer working on the more serious crime find out about the traffic citation? What if the officers work for adjacent yet separate law enforcement agencies? How is the information exchanged between all of the different parts of the criminal justice system?
A police officer is constantly using and gathering information. And the way that a police officer uses, transmits, and receives that information has changed. For instance, in 2000 32 percent of state and local police departments were using computers to dispatch calls for service. Moreover, because the 32 percent of the state and local police departments using computers to dispatch calls for service tended to be larger organizations, in total they employed 78 percent of the law enforcement employees nationwide.\(^{15}\)

Information from people or about people is not the only kind of information police officers collect. Evidence collection and analysis is also information gathering. The most common type of evidence is testimony presented at a trial. A police officer or detective is usually the person who initially interviewed the witness. A witness’s or victim’s statement is information that is later presented in court, becoming evidence to prove or disprove a fact surrounding a crime. This is, of course, fairly consistent with the information gathered from the traffic violator.

The physical evidence, such as a fingerprint, that line employees recovered from a crime scene is generally circumstantial evidence. With the fingerprint, it is forensic evidence or information that proves someone touched an object and may be developed into a logical inference that a person was at the scene of the crime. As technology has become more sophisticated, the types of forensic evidence that line employees gather and analyze has become more complex (collection, analysis and preservation of evidence is explored in Chapter Thirteen).

Because so much of the job of the police involves the collection, transmission, retention, and organization of information, we will concentrate on information technology. Technologies other than information management cover a wide spectrum from concealable body armor to vehicle tires. At times our text may diverge from the path of information and examine another realm of police technology. This will become especially true during the tactical information section of the text. The technologies examined in that section are only representative of the types of technologies being used, developed, and implemented to assist line employees in field situations that are peculiar to law enforcement.

**Why Examine Information Technology?**

The use of IT in law enforcement is rapidly expanding. Indeed, in 1996 it is estimated that state and local governments spent an estimated $3.5 billion on information technology goods and services, and they were expected to spend as much as $4.5 billion in 2001.\(^{16}\) The use of computers by local law enforcement agencies is an increasing trend. Figure 1.2 compares the total number of officers in local police departments nationwide in 1997 and 2000 who used computers for a variety of information functions. Between 1997 and 2000, the number of local police departments who used computers for Internet access more than doubled, increasing from 24 percent to 56 percent. If the information from the Bureau of Justice Statistics (BJS) report is further examined, you would find that the trend to incorporate information systems (computers) into the police service is increasing at the greatest rate for smaller agencies. For instance, between 1997 and 2000, local departments serving less than 10,000 people nearly tripled their use of computers for Internet access. The BJS data also shows that between 1997 and 2000, the percentage of local police officers working for an agency with some type of in-field computer more than doubled.\(^{17}\)

The use of computers to manage information is clearly pervasive and increasing in state and local police departments. Now you might think that this information management is simply a function that concerns police managers. As we
continue to examine technology, we will see that the technology is having a significant impact on all levels of the local police agency. For instance, not only are police officers obtaining information in the field from the radios and computers in their vehicle, but the trend for police officers to report information directly into a database from the field via computer is increasing.

Although the increasing pervasiveness of technology in the police service is a good reason to explore the various technologies, there is another substantial

<table>
<thead>
<tr>
<th>Population served</th>
<th>Records management</th>
<th>Internet access</th>
<th>Crime investigations</th>
<th>Personnel records</th>
<th>Dispatch</th>
<th>Crime analysis</th>
<th>Inter-agency</th>
<th>Automated booking</th>
<th>Fleet management</th>
<th>Crime mapping</th>
<th>Resource allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All sizes</td>
<td>60%</td>
<td>56%</td>
<td>44%</td>
<td>40%</td>
<td>32%</td>
<td>30%</td>
<td>28%</td>
<td>18%</td>
<td>16%</td>
<td>15%</td>
<td>10%</td>
</tr>
<tr>
<td>1,000,000 or more</td>
<td>93%</td>
<td>100%</td>
<td>93%</td>
<td>93%</td>
<td>100%</td>
<td>86%</td>
<td>53%</td>
<td>47%</td>
<td>87%</td>
<td>86%</td>
<td>67%</td>
</tr>
<tr>
<td>500,000–999,999</td>
<td>88</td>
<td>94</td>
<td>88</td>
<td>85</td>
<td>85</td>
<td>91</td>
<td>83</td>
<td>56</td>
<td>85</td>
<td>82</td>
<td>65</td>
</tr>
<tr>
<td>250,000–499,999</td>
<td>98</td>
<td>98</td>
<td>88</td>
<td>90</td>
<td>100</td>
<td>98</td>
<td>78</td>
<td>48</td>
<td>60</td>
<td>90</td>
<td>58</td>
</tr>
<tr>
<td>100,000–249,999</td>
<td>89</td>
<td>89</td>
<td>80</td>
<td>69</td>
<td>90</td>
<td>92</td>
<td>61</td>
<td>51</td>
<td>50</td>
<td>80</td>
<td>41</td>
</tr>
<tr>
<td>50,000–99,999</td>
<td>89</td>
<td>88</td>
<td>75</td>
<td>67</td>
<td>85</td>
<td>76</td>
<td>51</td>
<td>50</td>
<td>38</td>
<td>53</td>
<td>35</td>
</tr>
<tr>
<td>25,000–49,999</td>
<td>86</td>
<td>80</td>
<td>72</td>
<td>60</td>
<td>79</td>
<td>58</td>
<td>51</td>
<td>40</td>
<td>33</td>
<td>34</td>
<td>22</td>
</tr>
<tr>
<td>10,000–24,999</td>
<td>81</td>
<td>72</td>
<td>65</td>
<td>54</td>
<td>63</td>
<td>48</td>
<td>36</td>
<td>32</td>
<td>30</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>2,500–9,999</td>
<td>66</td>
<td>57</td>
<td>50</td>
<td>43</td>
<td>32</td>
<td>29</td>
<td>29</td>
<td>16</td>
<td>17</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Under 2,500</td>
<td>40</td>
<td>42</td>
<td>25</td>
<td>27</td>
<td>8</td>
<td>13</td>
<td>17</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

**Figure 1.2** This graph shows the increase in the use of in-field computers by state and local law enforcement agencies.

**Figure 1.3** This table looks at the use of how local police agencies used computers in 2000. The table is organized by the size of the population that the police department serves. Overall, 60 percent of all local police departments, which employed 85 percent of the local police officers nationwide, used computers for records management. And 56 percent of the local police departments, which employed 85 percent of all local police officers nationwide, used computers for Internet access.

*Source:* Department of Justice, Bureau of Justice Statistics, 2000 state and local law enforcement statistics.
reason. In some instances, overall satisfaction with technology after implement-
mentation is troubling. One study found that a quarter of the agencies imple-
menting a new technology considered it a failure. When the reasons for low
satisfaction and failure are examined, there is one glaring consistency—a lack
of knowledge and understanding of the technology chosen. As an example,
managers failed to evaluate and redesign critical processes, they failed to align
the technology with organizational policies and procedures, and they simply
misunderstood the potential and limitations of the technology. For end users
satisfaction and failure have also been associated with agencies having unreal-
istic expectations regarding the potential benefits of a technology. Moreover,
in many instances end users did not utilize the technology because they did
not have the technical skills necessary to implement or operate the technol-
y. Simply put, by studying technology and educating end users we ulti-
mately have a better chance of successfully implementing and using new IT.
Indeed, at the federal level, in 1992 cost overruns totaling more than $7 billion
were directly attributed to poor management, ineffective planning and a lack
of user involvement. Over and over again, the literature in the field returns
to one overriding reason for IT failure—a lack of education and understanding
at all levels.

In addition to improving the chances for successful use and implementation,
an education about law enforcement IT can enhance the prosecution of offend-
ers. If a police officer finds himself in court, testifying about how he used a tech-
nology in a criminal case, the court has an expectation that the police officer will
know something about how the technology works. In one case, the court refused
to allow the introduction of evidence because the officer’s testimony about the
technology was lacking. The overriding lesson from the court was that police of-
ficers should be provided training in technologies, or police agencies should be
prepared to call expert witnesses.

Simply installing advanced IT does not guarantee that employees will use it.
And if employees won’t or can’t use a technology, the gains in performance and
productivity will not occur. Normally, when an employee can’t or won’t do
something, the manager or supervisor provides the employee with training or
finds some means of motivating her. However, what many organizations are
finding out is that if the supervisor or manager doesn’t know the technology, he
cannot effectively lead, train, or supervise.

At other times the potential and limitations simply were not understood.
Clearly, all of these reasons for low satisfaction and failure are connected to
knowledge. The primary reason police technology should be studied is that as
end user and decision-maker knowledge increase, success and satisfaction with
technology is likely to increase. The more the nature of a technology is under-
stood, the more likely that its design and implementation will be consistent with
organizational goals and requirements. This requires informed decision makers,
or police managers. The more a technology is understood, the more likely an end
user will make full use of the technology.

In many cases there are significant advances in these other types of technolo-
gies. Indeed, as technology develops and it becomes less expensive to implement
and end users become more knowledgeable, the amount of technology in the law
enforcement workplace will likely increase. Although the table only looks at nine
types of special technologies, it is clear from the information that the larger the
agency, the more likely it is to be using or experimenting with different types of
technologies. And these special technologies tend to be more field orientated
than information-management technologies.
There are also public or community expectations that law enforcement agencies are involved in the use of technology. Everyday experiences people have with computers in their own lives and the bevy of television programs that demonstrate law enforcement’s use of technology has created an expectation that the police are hi-tech. The people expect us to use technology to protect them. The final reason there is value in studying IT is the explosion of IT related crimes. In Chapter Sixteen we will look specifically at hi-tech crimes. But consider that the fundamental problem associated with investigating technology-related crimes is a lack of training and understanding about technology.

25 Consider that technology enables $500 billion to be laundered globally each year. How can law enforcement officials investigate technology-related, technology-created, and technology-enhanced crimes without a basic knowledge of technology.

Tactical and Strategic Information

The focus on information technology in law enforcement is primarily about computer-processed information. As technology has progressed, some of the ways in which police officers receive, transmit, and record information has changed. Those changes have caused changes in the way that police officers respond to situations and the decisions that they make. Decisions that police officers make in the field, those required to be immediate, can be thought of as tactical decisions. For instance, in the not-too-distant past a police officer conducting a field interview of a suspect had to rely on her experience to judge the veracity of the information that was given by the suspect. Today, most police officers can double-check information via radio or computer terminal in the field. Finally, with the better information, an officer is less likely to be surprised or overwhelmed by a situation. 27

In some cases police officers have other technological resources in the field to further determine a suspect’s identity. They may have scanning devices in their patrol cars that allow them to scan fingerprints and nearly instantaneously com-
pare those fingerprints with a wide variety of databases (currently, approximately 49 percent of the local police officers employed nationwide are members of a department that is implementing or experimenting with this type of technology). In the future, police officers will probably have many other technological tools available for field identification.

In addition to receiving information about a suspect, police officers now receive information about situations via a variety of technologies. For instance, the way in which police officers are dispatched to calls for service has changed. During the first fifty years of the twentieth century, police officers were assigned to specific beats (geographic areas of responsibility). They sometimes received information about crime or social problems during a preshift briefing. Other information they received during their shift came from direct contact with the public.

Now police officers receive information in a variety of means—from the radio, computer dispatch, and databases. As we will see, these advances in technology also created new challenges and problems to the police service. For instance, the greater reliance on information from official sources (radio, computer, etc.) resulted in reduced public contact and as a result, may have reduced public confidence. For purposes of our examination of police technology, we will view devices that can be used in the field for immediate decision making as tactical information technologies. They provide information to a police officer in the field, enhancing her ability to make an immediate decision or take an immediate action.

The way in which information gathered by police officers is used has also changed dramatically. Information gathered, processed, analyzed, and retained by the police service is beginning to serve a strategic purpose. Strategic information can be thought of as information used in planning. As the power of computer processors has increased, so has ability to use the information gathered about what has happened in order to make some predictions about what may happen. This is the primary focus of crime analysis—looking at what has happened in order to make judgments about what may happen. This, too, has undergone dramatic change in the past decade. Later in the text, when we examine crime analysis, we will see the strategic implications of information gathered by police officers.

Information is used strategically by police officers, detectives, and police managers in a number of other ways. Sometimes detectives use information tactically, to make an immediate decision. However, most of the time detectives work with strategic information. In the opening paragraphs of this chapter the information gathered during the search for the murderer was used strategically to break down the barriers protecting the murderer and to plan for direction actions like search warrants and surveillance operations. It was also used tactically during the field operations. In this instance, the information was used both tactically and strategically. For detectives, information (statements, evidence, and their own observations) is organized and analyzed in order to determine what happened and who did it.

For police managers, issues like deployment, scheduling, training, and risk management have been greatly affected by technological developments. The police manager is able to get more complete and timely information than ever before. Indeed the information needed to perform complex management functions like cost benefit analysis or forecasting of trends is readily available.

As we further examine police technology we will find that some information has both tactical and strategic value. For instance, Geographic Information Systems (GIS) (GIS will be explored in Chapter Twelve) can provide police officers with useful information during the field incidents. A police officer responding to
an overturned tanker truck can access information about the surrounding geography that may help in establishing a command post, conducting evacuations, and securing a perimeter around the location. In a strategic sense, the same GIS systems are powerful tools for planning for potential disasters and analyzing crime trends.

Police work is about information. Indeed the skill that separates the outstanding police officer from his peers is his ability to gather information with his communication skills. As we will see, technology has at times enhanced the police’s ability to use the information that is gathered, retained, and analyzed. Yet the police service’s march into the information age has not been without missteps, costs, and unintended consequences.

### Efficiency and Effectiveness

One of the major arguments used for the implementation of a new technology or the upgrade of an existing system is that the organization will save money. It is generally recognized that the initial costs can be high (most IT projects are expensive), but the potential long-term savings provide a substantial return on the initial investment. According to the argument, the savings are realized by a reduction in the number of employees because the technology will allow fewer people to do the same job. Moreover, in many instances personnel costs can be more than 80 percent of an agency’s budget, so it sounds like fewer people equals less money spent. In essence, increased efficiency, created through technological advances, increases productivity savings. Sounds great—maybe. Before we explore that argument further, let’s define **efficiency** as doing something cheaper. For instance, in a factory, before a technological innovation, a worker could make three shirts an hour. Now with the new technology, she can make ten shirts an hour. But the worker doesn’t get more money, so the cost of producing the shirts decreases, and efficiency has increased. Now consider that costs include direct (such as salaries), indirect (such as maintenance of a new technology), and opportunity (such as choosing to do one thing instead of another, e.g., an agency can choose to use budget money to install new computers instead of buying new cars).

So our first step in determining if an IT project is efficient is to look at cost, and the second step is to compare those costs against benefits. This is called cost-benefit analysis. Estimating benefits is generally much harder in public service because many of the benefits are intangible or difficult to quantify. From a theoretical point of view, measuring the impact of a technology in business is somewhat more straightforward than measuring its impact in government service. For the business, the technology may reduce the cost of inputs or increase the demand for the product. Both can result in an increase in profit. While the calculations necessary for a business are more complex, at least the business has an idea of the output.

For the government, specifically law enforcement, businesslike economic models can still be used to determine the impact of a technology. However, there are several inherent difficulties. First, what is success? What is the output? What is the goal of law enforcement? Is it public satisfaction? Is it a reduction in crime? Is it a reduction in the perception of public disorder? Police managers have considerable guidance regarding measuring and evaluating police performance. Among the recommendations are measuring patrol services, investigations, traffic services, drug control, and crime prevention. Let’s take a look at the goal of a reduction in crime.
There are a few problems with measuring crime rates. Later in the text we will look at the Uniformed Crime Reporting Act and National Incident-Based Reporting System (NIBRS), but for now it is enough to know that some small jurisdictions don’t even self report crime to a national reporting authority. So on a national level the crime rate may not be completely accurate. Issues with self-reporting aside, there is the issue of unreported crime. Murders are probably consistently reported—dead bodies are difficult to conceal. What about car burglaries? You probably know someone who has not reported a minor crime. Did he say, “it just wasn’t worth the trouble”? Or, “the cops can’t do anything anyway.” Now consider some very violent crimes. Because of the nature of crimes such as rape, domestic violence, and child abuse they go unreported. So for even the smallest jurisdiction, what is the true crime rate? How much crime is there? In an effort to judge our ultimate success, how true is the measurement? And in addition to not really knowing how much crime there is, there is research that indicates improvements in police performance may cause an increase in crime reporting. Sometimes crime really doesn’t go up; people just feel more comfortable reporting it. So we can measure if we are more efficient—that is to say, if our IT project made it easier for an employee to do something. We can measure some types of efficiency. For example, a typical efficiency measurement for a police officer is response time, the time between receipt of a call and arrival on the scene. In this case, efficiency would be measured by the speed with which police officers respond to the calls. In essence, we can measure activity.

But in addition to the difficulty in knowing exactly the output or goal, there is often a tenuous link between police activity and the goal. Therefore, in addition to not always knowing the desired result (did crime decrease?), we may not be able to follow the chain of outputs (faster response to call) and determine if a police activity actually contributed to the goal (crime decreased).

Let’s revisit the traffic violator. Suppose that a police department realizes that serious traffic collisions have increased along a specific stretch of highway. The department, by looking at the collision reports, determines that the primary reason for a majority of the collisions is speeding motorists. In response to this analysis, the police manager decides to deploy an officer on that highway for the purpose of enforcing the speed law.

Now for the sake of our example, suppose that the department does not have any speed-detection technology, like radar. The police officer has two basic choices: she can sit along the highway and estimate the speed of passing vehicles, or she can enter and exit the highway, trying to pace behind speeding vehicles. A well-trained and experienced officer can do either with a fair degree of accuracy. But compared to the technology available, both techniques are more time consuming than a radar gun.

So our hypothetical police department realizes that the police officer can only issue so many citations in a single day using the first two methods. The department, desiring to reduce traffic collisions by enforcing the speed law, decides that it should purchase a radar gun. Now the police officer is equipped with the latest technology and is now efficient because she is issuing better-quality citations and has the ability to issue more of them.

Essentially, efficiency is the ability to complete an activity using fewer inputs. Generally speaking, in this instance, the inputs were the police officer’s salary, equipment, and support systems. Presume that the cost per day of the police officer (all costs associated with deploying one officer) is $500 and that before the radar gun they were able to issue ten citations for speeding each day. The cost per citation would be $50. Now with the radar gun, the police officer is able to issue thirteen
citations a day. For simplicity, presume the cost of the radar equipment adds $10 a
day to the cost of the officer. So now the officer who costs $510 a day issues thir-
teen citations. Now the per-citation cost is lowered to around $38 per day. That’s a
fairly straightforward look at technology increasing efficiency, right? Well, no.

In this traffic violation example we are focusing on cost efficiency. But there are
several problems with this measurement. First, most things the government is sup-
posed to do are not by their nature efficient. Second, efficiency is not the ulti-
mate goal of government. Efficiency is using the least amount of inputs (resources)
to conduct an activity or process that moves the government organization toward
attainment of an ultimate goal. Recall, we didn’t want to issue more tickets; we
wanted to reduce traffic collisions. If we lose sight of the ultimate goal, we can
come up being efficient in the activity but ineffective in meeting our goal.

The real goal is **effectiveness** in the attainment of some goal. Did the number
of traffic collisions decrease? Is there a direct correlation between the activity of
issuing citations and the reduction in traffic collisions? Let’s be positive and say
that as the traffic enforcement increased, traffic collisions decreased. But several
questions remain. Was the decrease when the police officer issued ten citations
per day, or did it not decrease until there were thirteen citations per day. How
many would it take for motorists to understand that the speed laws were being
enforced. It is quite possible that the number of accidents would go down at five
citations issued per day. Perhaps that would be sufficient, meaning ten had no ap-
preciable difference and thirteen certainly did not.

These numbers are fictitious, but the concepts are valid. The research linking
police activity (like issuing citations) to the goal (like reducing traffic collisions)
is mixed. Consider before implementing the radar the department may have put
up a sign that warned motorists of the radar enforcement. Did that cause people
to slow down? Did a major employer change their shift schedule, causing traffic
patterns to change? Or perhaps at the time the traffic collisions were measured,
there was some weather-related issue that was not fully taken into account.
Finally, what happens if the police officer’s efforts do directly result in fewer col-
lisions? Doesn’t that mean fewer speeding cars? Fewer speeding cars means
fewer citations in the future, increasing the cost per citation.

As we examine technology we will constantly ask two questions: Does this
technology impact efficiency, and does this technology impact effectiveness? Clearly
the concepts of efficiency (how well do we perform an activity) and effective-
ness (did we obtain our goal) overlap. They must both be examined because an
organization can be effective but not efficient, or efficient but not effective.

Let’s reconsider the traffic violator. A police department could respond to the
problem of an increase in traffic collisions by deploying every available police of-
ficer to the problem stretch of highway. We could use so many police officers that
every speeding motorist would be stopped. That would be effective in that traf-
fic collisions resulting from speed violations would decrease. But that would be
as impractical as it would be inefficient. In fact, that solution to the problem of
traffic collisions could result in unhappiness in other parts of the jurisdiction (an
opportunity cost issue) and very likely an unpleasant backlash from the mo-
torists. Effectiveness is possible (in the short term and with specific goals) at the
expense of efficiency.

Likewise, an organization can be efficient but ultimately ineffective. Think
back to the radar example. It is very possible that even though we are efficiently
issuing citations, the collision rate remains unchanged. Do you have a headache,
yet? Take heart; police managers nationwide are vexed by the problem of bal-
ancing efficiency and effectiveness. But as we shall see later in the text, there are
some very powerful technological solutions to determining what is the most efficient means to be the most effective.

Now we have looked primarily at being cost-effective and cost-efficient. The introduction of a new technology has benefits that are more difficult to demonstrate, but they exist and add to the overall effectiveness of an organization. In the radar scenario, the agency is likely to reap benefits that are outside the strict efficiency and effectiveness constructs. We must also examine technology and its “side” benefits for two reasons. First, managers and supervisors who introduce new technology must sell it to a number of stakeholders. Those stakeholders might be the other city government officials (the council, city manager, etc.), the community, and the line employees who must learn and implement the new technology. Second, a consideration of the benefits outside efficiency and effectiveness might give insight into the potential problems with the technology.

Let’s look again at the radar. Radar (the technical aspects of traffic enforcement technology, including radar, will be covered in Chapter Eighteen) is more accurate and has a longer detection range than a human. Speeding vehicles could be detected outside of other considerations (for instance, the race of the driver is likely to be unknown to the police officer). Also, radar enforcement is safer to the officer and the public than pacing a vehicle. These two technological edges could translate into greater public confidence and better morale of the police officers. Both are important and yet nearly intangible.

Is there a downside to radar enforcement? If the police officers begin to exclusively use radar, will they ultimately lose the skills associated with pacing vehicles and estimating speed? This, too, is a recurring theme with technology. We will see examples of technology replacing that which was once done by human beings, and the skill is lost. This can have grave consequences. Also, could the use of radar cause the officers to ignore other types of violations. We will see a recurring theme in the implanation of technology: instances of technology that was so easy to use, glitzy, or sexy that it distracted police officers from other tasks.

With the introduction or upgrade of every technology there is some kind of change. Technology is a natural change agent and thoughtful consideration of the potential organizational changes may help us head off, or at least minimize, unintended negative consequences. Questions about effectiveness and efficiency should be primary considerations when contemplating new technologies.

A few last words on efficiency and effectiveness—some equipment clearly makes police officers more efficient. That technology increases efficiency by reducing costs, as with the radar example. However, effectiveness can increase while efficiency decreases because advanced technology requires support personnel. This raises questions of whether IT shifts the cost of police operations from one thing, such as staff, to another technology. So maybe costs stayed the same, or if the technology fails, costs worsened. In a later chapter we will broach the effects of shifting costs.

Our different points of view and our consideration of efficiency and effectiveness are representative of how we are going to explore technology. Another important question is how does technology fit into our model of policing? As was previously mentioned, the vast majority of local police officers work for an organization that practices some type of community policing. Therefore, we are going to use the most common model of policing as a lens through which to view technology.

Community Policing

As of 2000, 68 percent of the state and local police departments had a community policing plan. Moreover, because those agencies that reported a community...
policing plan tended to be larger, the agencies with a community policing plan employed 90 percent of the state and local police officers in the United States.\textsuperscript{43} More interesting, approximately a third of the state and local police departments nationwide reported that they had upgraded their technology to support their community policing efforts.\textsuperscript{44}

There are theories, and there are models. In essence, a theory is an effort to explain why something happens, whereas a model is a prescription of what we should do. Community policing is a model that is supported by a number of social and criminological theories. If you are looking for a standard, one-size-fits-all community policing model, you won’t find it. Although the models are as different as the communities wherein they are practiced, there are several core elements to most community policing models.\textsuperscript{45}

As the text progresses we will see how technology has the potential to significantly enhance an agency’s community policing efforts. As with life, it’s not all roses. Some technologies have the potential for working against our efforts at community policing. We will find that these pitfalls might be avoided with an understanding of technology.

The United States Department of Justice (DOJ) Community-Oriented Policing Services (COPS) offers some general guidelines concerning community policing. According to the DOJ, community policing has ten core elements that fall under three distinct categories of elements—organizational elements, tactical elements, and external elements.

The first of the organizational core elements defines a department that is completely involved in the community policing effort. This means that from the agency head to the newest police officer, everyone practices the community policing model. This is a fairly practical element because, as we delve deeper into community policing, it will become clear that if everyone isn’t practicing the model, some elements just won’t realize their full potential. Now most criminal justice practitioners realize that the evolution toward community policing will take place incrementally in organizations. Some agencies may at first devote only a certain part of their organizations to total community policing. But as we examine community policing, it will be fairly clear that the full potential of the model can’t be realized until it is an organization-wide philosophy.

The next organization element specifies that decision making and accountability be decentralized, allowing employees at all levels to make decisions within their areas of responsibility. This should have the effect of increasing interaction with the community, enhancing problem solving, and improving the quality of police service. However, this is counter to many bureaucratic cultures where it is safer to ask than act. Moreover, we will see that as technology improves and supervisors and managers have more real-time information, the
tendency may develop for managers and supervisors to supercede line employees' autonomy.

The third organizational element is that police officers and other personnel are assigned to specific geographic boundaries. In community policy it is key that long-term relationships develop between the police officers and the community. Moreover, police officers assigned to specific areas on a long-term basis will probably gain a greater understanding in the geographic area or community they serve.

The use of volunteers is relatively straightforward. Volunteers can open the door to forming positive partnerships; open new lines of communication between the community and the department; and perform some police services, freeing up police officers for other tasks.46

Enhancers, the final organizational element, are primary technologies that enhance a department’s community police. Enhancers would be technologies that improve the efficiency and effectiveness of a department’s community policing.

Recall our earlier conversation of strategic versus tactical information. Organizational elements are essentially the strategic components of community policy. As we examine information technology in a strategic sense, we will see many of the systems described in the following chapters can enhance a department’s organizational or strategic community policing efforts.

The next set of elements are tactical elements. As with tactical information, the tactical elements are oriented toward the line employee and immediate actions. The first of the tactical elements is enforcing the law. Public safety is the paramount goal of law enforcement. How an organization measures its effectiveness at reaching the goal of public safety varies from agency to agency. One of the means for attaining increased public safety is enforcement of the law.

The second tactical element, like the first, is a tool for increasing public safety: crime prevention. It is far better to prevent a crime than to arrest a violator. Crime prevention targets the root causes of crime and disorder in two ways: education and problem solving. Typically, crime prevention education centers on teaching the community how to reduce the likelihood they will become victims of crime. Traditional crime prevention education concerns things like what you can do in your home to reduce the likelihood that you will be burglarized. The second method of crime prevention, problem solving, is also the third tactical element.

In the opinion of some criminal justice scholars and practitioners, problem solving is the centerpiece of community policing. There are a variety of reasons for this opinion. For instance, it is ultimately more efficient and effective to fix a problem than the alternative of repeatedly responding to the symptoms of a problem—the calls for service. In addition to potentially minimizing repeated calls for service, problem solving efforts are very likely to create new partnerships and bonds between the community, the police, and other service providers. This is because an in-depth look at most problems reveals that the problem solving method (observe, hypothesize, experiment, conclude) as a means to remedy or mitigate community problems. For police officers the scientific method is often restated as the problem solving model SARA (Scan, Analyze, Respond, and Assess). Source: Bair, et al., “Advanced Crime Mapping Topics,” 8.
police cannot solve the problem without the community and other service providers. If the police officers are going to solve problems, they will have to force new relationships; seek input, advice, and assistance; and work with a variety of community members and service providers. Again, the alternative is the cycle of calls for service.

As we explore technology, we will find that a wide variety of the technologies have the potential to significantly enhance problem solving. The final category of core elements is external elements. By external we mean external to the bureaucracy of the agency—not external to the community police model. External elements are core to the success of the community policing model. The first of these elements is the public. As discussed, the partnership with the community is key and integral to the community policing model. The second external element consists of other agencies and organizations that provide service in the community. It doesn’t take long for a new police officer to realize that many of the calls for service he receives and many of his observations about community disorder are not at their root solvable by the police alone. In reality, the police officers are often ill equipped to solve these problems. As was mentioned, involving other agencies and organizations in the problem solving process is essential for the success of community policing. Here, too, technology can play an important role.

Figure 1.5  A Look Ahead: In future chapters, after we have gained a basic understanding of computer information technology, we will explore how technology is being used as an enhancer to the community policing model. We will find that some technology is being specifically designed and/or adapted for community policing. In this photograph, a computer program has been designed to provide a convenient method of tracking community situations and problems that may or may not relate to criminal activity. The designer’s premise is that the specific identification of problems is inherent in community policing. Each problem is identified by a common name and is tracked from the date the problem was originally identified. This software involves detailing the exact definition of the problem, identifying a coordinator and a specific strategy to be implemented regarding the problem, and tracking each activity performed in conjunction with the defined strategy.

Permission for screen capture provided by Crimestar Corporation.
This was a very brief overview of a complex and important issue. The purpose of the review was to provide us with some common ground from which to learn about police technology. You may bring other ideas about community policing to the text, perhaps practical experience or another, more in-depth class of the subject of community policing. As you read about police technology, you are encouraged to compare the information from those other experiences with the technology.

**Situational Crime Prevention**

The primary focus of most state and local police agencies is the prevention of crime. One of the common operational strategies used by police agencies to prevent crime is called **situational crime prevention**. Later in the text, knowing about situational crime prevention will become important to us. There are three parts to situational crime prevention. First, police activities are directed as specific forms of crime. The more specific the targeting, the more successful situational crime prevention is likely to be. Second, police agencies are looking to prevent crime by changing the environment. Alternatively, this is referred to as hardening the target or increasing offender effort. It could be something as simple as adding lighting in a park to discourage loitering and associated crimes, essentially making it more difficult for the offender. The final tactic of situational crime prevention is to increase the likelihood that the offender will get caught. This is generally referred to as increasing offender risk. Later in the text, such as in Chapter Twelve on crime analysis, the application of situational crime prevention will be obvious. But as you read about other technologies, ask yourself these questions. Does it specifically direct police activities at a certain crime? Does it increase offender effort? Does it increase offender risk?

**Fragmentation**

Think about our traffic violator again. Remember that as our police officer issued a citation, she might not know that the violator had just committed a more serious crime in another jurisdiction or that the violator was wanted by the court of another jurisdiction. The fact that many adjoining and overlapping law enforcement jurisdictions cannot communicate on the radio or readily exchange data is called a lack of interoperability (we will look at interoperability issues in depth in Chapter Eleven, Information Exchange). Interoperability is caused by a phenomenon known as **fragmentation**.

Most of the governments around the world have centralized law enforcement. However, the founders of the United States feared a strong central government, so many police functions and authorities were invested in numerous fragmented and semiautonomous law enforcement agencies. Today this has resulted in an overlapping and fragmented law enforcement scheme. Although a federal law enforcement system having authority over all state and local agencies would probably provide better efficiency, fear of abuse of authority has resulted in strong resistance to such a centralized law enforcement system in the United States. Criminal justice is intentionally fragmented in order to maintain the checks and balances essential to our democracy. This fragmentation also serves to protect the privacy of incriminating information about the people who come in contact with the criminal justice system. Finally, some people believe that criminal justice is fragmented because of institutional paranoia; agencies don’t want other agencies to know what they know and thereby be in a position to challenge their decisions.

As we know (from our traffic violator), this fragmentation has led to agencies maintaining their information in different and incompatible databases.
have different radio types and frequencies, so information exchange is stymied. But fragmentation has also retarded technology in law enforcement. Most technological advances and applications to law enforcement come from the private sector. With seventeen thousand agencies, all with different needs and standards, the market for law enforcement technology is insufficient to attract some private firms. Equipment and technology acquisition are completed on an agency-by-agency basis. Because state and local agencies acquire new technologies at different rates, they also develop expertise at different rates. The problem of fragmentation is often most severe when agencies with contiguous or overlapping jurisdictions obtain incompatible technologies. These incompatible technologies severely hamper information sharing. Fragmentation of local policing is the source of many of the obstacles to technological application.52

Most criminal justice practitioners realize that the system performs IT functions poorly primarily because each agency enters crime information repeatedly and separately from one another. Moreover, if information sharing were improved, all levels of the system could make better, more informed decisions.53 As we look at various aspects of police technology, you will see examples of fragmentation and efforts to improve the information environment.

Chapter Summary

You should have an understanding of how this textbook was designed. The learning objectives, key terms, and discussion questions should assist you in determining if the learning experience was successful. Throughout the book, we will be looking primarily at information technologies because the primary function of a police officer usually involves information gathering. Moreover, we will look to see if information technology has tactical or strategic value—can it be used for immediate decision making or for long-term purposes, or both?

Points of view are generally helpful in understanding all the ramifications of a technology. We will ask ourselves, how does the line employee (whether sworn or nonsworn) view his technology? What are the issues for the supervisor or manager? We will also view technology against the backdrop of efficiency and effectiveness, community policing, situational crime prevention, and fragmentation. With every technology, we should ask if it makes us more efficient in our use of resources. Does it add to our goals, thereby making us more effective? How does it enhance our community policing? Does it add or detract from situational crime prevention? How has fragmentation affected it?

One of the most important things to carry from this chapter is the concept that by becoming more knowledgeable and educated, we can be better end users, supervisors, leaders, and street cops.

Discussion Questions

1. As you go about your daily activities, can you think of a situation wherein someone provided you with tactical information that required immediate action? Strategic information that you used to plan? Information that was both tactical and strategic?

2. This textbook is primarily concerned with information technology. Is information technology the primary technology you use? What other types do you use?

3. Efficiency and effectiveness are important considerations in all walks of life.
Can you describe a situation wherein someone was efficient yet ineffective?
How about effective yet inefficient?

4. Of the core elements of the community policing model, which do you think
   is the most important? Why? Which is the least important? Why?

**Key Terms**

- **Call for Service**
- **Legacy System**
- **Strategic Information**
- **Community Policing**
- **Problem Solving**
- **Sworn Employees**
- **Effectiveness**
- **Self-Initiated Activity**
- **Tactical Information**
- **Efficiency**
- **Situational Crime**
- **End User**
- **Prevention**
- **Fragmentation**
- **Stakeholder**

**End Notes**

1. As of August 2003, the suspect, Timothy McGee, awaits trial for murder in Los Angeles, California.
6. Heffernan, “Fourth Amendment Privacy Interests.”
12. See note 4 above.
15. See note 7 above.
17. See note 7 above.
18. See note 9 above.
22. See note 20 above.
25. Huey, “Policing the abstract.”
28. See note 7 above.
34. See note 31 above.
35. Coe and Wiesel, “Police Budgeting.”
37. See note 35 above.
38. Shafritz, *Public Policy and Administration*, 2426.
40. See note 35 above.
41. Nunn, “Police Information Technology,” 221.
43. See note 7 above.
44. See note 7 above.
48. Ibid.
50. See note 29 above.
51. Ibid.
53. See note 29 above.