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The protection of the law extends to pedestrians of all types. Photo courtesy of Terry Herbig.

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The Acquisition of High Technology Systems by Law Enforcement

". . . police agencies throughout the world are entering an era in which high technology is not only desirable but necessary in order to combat crime effectively."

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EDITOR'S NOTE: This article has been excerpted from a presentation made by the author at the International Police Exhibition Conference in London, England, in September 1988.

The world's law enforcement executives and managers are today faced with making significant and difficult decisions regarding the acquisition of high technology. Some will silently allow central government engineers, programmers, and other specialists to make police technological acquisitions for them, with little or no law enforcement input.

The various departments around the globe are at different levels of technological deployment. Yet, police agencies throughout the world are entering an era in which high technology is not only desirable but necessary in order to combat crime effectively.

As applied to law enforcement, high technology can be divided into four historical phases. The first is the pre-high technology state of development. The next phase is first-generation technology, primarily computerized information storage, retrieval, and transmission. The third phase is second-generation technology, resulting in computerized pattern recognition, computer technology applied to problem identification and solving, and automated fingerprint identification systems, as well as noncomputer technological advances, such as lasers and robotics. The fourth phase is future technological developments, such as DNA identification, parallel processing, and artificial intelligence. This generation of high technology will, by no means, be the last to cross the law enforcement horizon.

A significant number of police agencies are still in the first or pre-high technology phase. Some have just entered the second or high technology arena. The few that embraced high technology early have used it for some time and are comfortable with it. A very small number of departments are presently in transition from the second phase of law enforcement high technology. They are once again experiencing the uncertainty and indecision common to generational transition as they move into the third phase of high technology. The law enforcement agencies that have entered phase four worldwide can be counted on one hand. The reason for this has to do with the

Deputy Superintendent Rodriguez

relative uneasiness so many police decisionmakers feel about high technology. Why is this such a common element at **all** stages of technological development?

FACTORS AFFECTING HIGH TECHNOLOGY DECISIONMAKING

The Rapidly Evolving Technological Environment

The rate of change in technology today is precipitous and accelerating rapidly. Just when most administrators believe they have a grasp on technology, it changes. By the time the latest hardware is in operation, it has been overshadowed by newer developments. The period between "state-of-the-art" and "obsolete or out-dated technology" is shrinking.

In the early part of this century, the Chicago Police Department installed a police call box system. This allowed the foot patrolman to communicate with his station and his supervisor with him. The call was from a fixed installation on a telephone line dedicated to police communications. This technology remained functional for over 6 decades and was still used in the early 1970's in a limited capacity.

In the United States, police radios were installed shortly after World War II. This technology is still the primary source of police communication almost 40 years later. Today, by contrast, some computers installed 10 years ago have become obsolete. This rapid rate of change exerts pressure on the modern administrator to make decisions regarding technology within a time frame unheard of in the recent past. Executives and managers must not only decide **what** to buy, but just as importantly, must decide **when** to buy. At what stage of development of a certain high-tech product or system should the modern executive opt to "buy in" to new technology?

The Personal Experience and Technological Knowledge of the Decisionmaker

Most of today's top law enforcement managers have achieved and excelled in a pre-high technology environment. However, they have no visceral feel for high technology, as do today's young professionals, and often feel inadequate and unprepared to make decisions regarding technology. In addition, the law enforcement environment is often not conducive to ready acceptance of new technological advancements. Resistance to change is often more formidable than in other fields or professions in the same high technology environment.

Historically, law enforcement presents an image of reliance on the personal/subject/investigative/evaluative techniques of the individual investigator. Reliance on technology tends to diminish this shared mystique and self-image of the police. This perception can result in a subliminal or even conscious resistance to change, especially as it relates to the adoption of technology.

Uncertainty as to the Future

Not only must today's police executives and managers become familiar with the technology available today, but they must also become knowledgeable as to what developments are under way or planned within the high-tech industry. In order to forecast with any

Leroy Martin
Superintendent of Police

accuracy what future high-tech needs will be, police administrators must develop a perception of what the relatively long term, as well as the immediate future, will bring in the way of technology.

It is important to be aware that the environment in which these decisions are to be made is not static. It has a dynamism of its own. Our world is ever-changing and is doing so at a rapidly increasing pace. Society existed for 10,000 years with a primary agricultural base. Little more than 100 years ago, industry supplanted agriculture as the dominant means of producing wealth; already, the mass production industry is stepping aside to the informational society.[1]

Further complicating the administrator's dilemma is the object of law enforcement's efforts—society. What will society be like in 10 years? In 20 years? In 50 years? Today's administrator must try to determine what legal, economic, and other sociological developments can be logically inferred from today's trends. Many police executives and managers tend to shy away from the area of forecasting, thinking it of dubious value. However, the agency's future technological needs can only be estimated in terms of the agency's continuing mission, goals, objectives, resources, and the expected needs of the community served.

The Relative Immaturity of the High Technology Industry

What we presently conceive as high technology has only been with us for a few decades. Vacuum tube computers, such as Univac, which occupied whole rooms were considered a marvel less than 40 years ago. The micro-chip is a relatively recent innovation. The high-tech industry is still in the infant stage of development, and as with any infant, this lack of maturity presents problems of its own.

This is especially evident in the incredible, and often impossible, promises of vendors. In order to sell a system or product, some vendors intimate that their product can be made to deliver whatever is desired. This problem is partially caused by the proliferation of many companies trying to gain a foothold in the high-tech industry. In order to survive in high-tech's highly competitive atmosphere, there is an inclination to promise more than can be delivered now, in the hope that future development will enable the vendor to make good on the promise within a time frame acceptable to the customer. Because of this relative industry immaturity and the administrator's awe, the management principles that ordinarily serve as a foundation for other disciplines are not always distinct in the gray area of an emerging industry.

Prevalence of Multiple Correct Options

The high-tech industry is unique in that most decisions involve answers "not totally wrong," but a choice between alternative right options. This prevalence of multiple correct options can serve as a source of frustration for many administrators. No one system or computer is "the right one." The decisionmaker is really concerned with choosing the optimal system or determining which alternative gives the greatest rate of return for the resources invested.

CONCEPTUAL FRAMEWORK

The decisionmaking process appropriate to the acquisition of high tech-

". . . executives and managers must be careful not to abdicate decisionmaking responsibility on the premise of technological ignorance."

nology hardware and systems is, in fact, the same one used on a daily basis by administrators in other areas of police work. Basically, it consists of defining the problem or need, identifying available resources, and deciding how best to apply those resources to obtain the desired result.

Police executives and managers are comfortable applying this process on a day-to-day basis, while making decisions that affect the lives and security of both the citizens and police officers within their jurisdictions. These same administrators might decide—and convince their government and citizenry—that their force needs a new headquarters building. They will move forward confidently on a multimillion dollar project that involves determining the location by considering present and future transportation and local environmental conditions, designing a building to meet present and future needs and possible department configurations, and identifying and evaluating the many other elements necessary to bring the project to a successful conclusion. The agency, the government, and the community will be constrained by these decisions for 25 to 50 years.

When compared to a decision of this magnitude, one that is readily embraced by a police administrator, the acquisition of high technology should be reassessed by police decisionmakers, so that it can be placed in its proper perspective.

ALTERING THE MANAGEMENT PERSPECTIVE

Coping with the Rate of Change

Since high technology is changing at an ever-increasing rate, the determination of when to enter this continually more sophisticated and perpetual flow of products is an important one. But, modern executives and managers cannot afford to be intimidated by this rate of change. While we can learn by awaiting the results of the experience of others, there will never be a period of certainty when the correct decision becomes obvious. What is certain is that administrators cannot wait until the last stage of development of a product before buying it, because the last stage is obsolescence.

In order to diminish the risk inherent in deciding when to purchase, executives and managers must determine whether it is worthwhile to forego the benefits available today in anticipation of even greater benefits becoming available tomorrow. Some of the benefits of postponing purchase can include learning from the experience of others, obtaining more sophisticated equipment, and the expectation of the availability of future resources, etc.

One cost of postponement might be a higher monetary expenditure. Then again, advances may realistically diminish them; this has been the trend for over 2 decades. Loss of potential benefits available today, foregone agency experience and expertise, and frustratingly, judgmental error in trying to acquire the "ultimate product" are other cost factors.

Conversely, the benefits of purchasing in the present include having an operational system in place and obtaining the desired result immediately, taking advantage of today's usually lower costs, the internal and external prestige of being a leader in the field, developing a better understanding of future needs, and having an "in-place system" upon which to build.

In determining when to buy, the administrator must bear in mind that all systems or products eventually become obsolete. The best scenario, if possible, would be to purchase high technology that answers today's needs and simultaneously serves as a nucleus upon which to build the system that answers tomorrow's needs.

Developing Personal Experience and Knowledge

There is no substitute for experience and knowledge. While it is not necessary, or even very desirable, for police executives and managers to become experts in high technology, it is incumbent for every administrator to become familiar with the basics of high technology as applied to police operations. This perspective can be set by taking an historical look at law enforcement technology—where it has been and where it is today. As stated earlier, high technology in the field of law enforcement can be viewed in four phases.

The first, or pre-high technology phase, may actually be a misnomer. In their day, both the integration of the automobile into police work and the adaptation of radio communications were technological innovations. Although they seem commonplace today, yesterday's administrators were making decisions not unlike those demanded today.

The second phase has been identified as the integration of the first generation of computer technology to police work. This stage is primarily concerned with information storage, retrieval, and transmission. This phase can be exemplified by networking remote computer terminals, both stationary and mobile (in vehicles), which can

"What must be determined is how today's needs will evolve into tomorrow's needs and what technology will be available to meet these needs."

access and input information stored in a mainframe computer bank. Examples would include Chicago's "hot desk" system, which informs the inquirer if an individual has an outstanding arrest warrant, a valid driver's license, or other pertinent enforcement information of value to the police officer. This system is interfaced with the FBI's National Crime Information Center (NCIC), which provides the same type of information on a national scale and in parts of Canada.

The third phase, involving second-generation law enforcement technology, concerns itself with computerized pattern recognition, such as an automated fingerprint identification system. This includes the direct read/digitized transmission of fingerprints, computer-aided dispatch systems, and a myriad of systems for developing computerized crime patterns and geo-coding crime information. This phase includes noncomputer advances, such as laser technology in crime scene processing, robotics (especially in regard to bomb removal), use of cellular phones, the development of psychological profiles, and numerous other scientific advances.

The last phase is concerned with future technology or technology which is on the horizon. An example would be the DNA identification process being pioneered in England. Others include the advent of parallel-processing and some forms of artificial intelligence.

It is not necessary for police executives and managers to become experts in technology. Expertise and guidance are available. Some countries have organizations dedicated to furthering law enforcement automation. In the United States, the National Institute of Justice does a commendable job in setting standards and guidelines, disseminating information, and assisting in funding.

The administrator must, however, become personally familiar with the general area of high technology. The important thing is that executives and managers must be careful not to abdicate decisionmaking responsibility on the premise of technological ignorance. The skills and experience developed as administrators are what is needed for successful decisionmaking. Administrative accountability is not diminished because the executive and manager has a limited understanding of technology. It is necessary to understand the potential, not the rudiments, of the technology. Administrators should use the same business principle approach they use in other areas of police operations.

Demystifying the Future

After familiarizing oneself with today's technology, the administrator must attempt to determine what developments are under way or planned by industry. This can only be done effectively by establishing a liaison to determine in which direction industry is moving. This need not be a personal liaison; an executive and manager need only have knowledgeable personnel on staff. Their function would be to make industry aware of law enforcement's needs, as well as getting a grasp on what industry believes is possible in the way of technology. Administrators should apply the same degree of enthusiasm to gathering information of technological advances as they apply to gathering or networking information on crime, criminals, and factors contributing to crime.

There generally is little problem determining what is needed today. Areas that would profit by automation or the application of high technology are usually highly visible or pointed out by personnel at all levels. What must be determined is how today's needs will evolve into tomorrow's needs and what technology will be available to meet these needs.

What is necessary is to determine present short-term needs and future long-range needs and to understand how they interrelate. It is also important to understand how the technology acquired today can be used or adapted to meet tomorrow's needs. Today's needs are generally self-evident, but tomorrow's needs remain an uncertainty. However, by becoming knowledgeable about present trends and sociological forecasts, they can be anticipated with a reasonable degree of accuracy.

In the area of law enforcement, Special Agent William L. Tafoya of the FBI's Training Academy at Quantico, VA, recently applied a sophisticated forecasting method, the Delphi technique, in an effort to determine the scope and role of American law enforcement into the 21st century. Briefly, the Delphi technique was developed by Olaf Helmer and Norman Dalkey in 1953 at the Rand Corporation in Santa Monica, CA. Devised to address a specific, highly specialized military problem, to quote SA Tafoya, "It is a structured group process undertaken in a way that maximizes the likelihood of reaching consensus and identifying dissensus. The principal characteristics of the method are: 1) Anonymous structured exchanges between members of a panel of 2) experts who are furnished with 3) controlled feedback

and 4) statistical group response between iterations of propositions posed by a moderator using a series of questionnaires." [2] The important thing about the Delphi technique, however, is the anonymity of responses. This enables law enforcement experts to express their views freely without fear of any of the negative consequences of conventional group dynamics, and yet, receive timely feedback and input from other experts on that panel.

SA Tafoya applied this technique to the area of law enforcement by developing chronological forecasts using a panel of law enforcement management experts during a 15-month study. This panel reached a consensus that in the United States, the following events, among others, would occur near the times given:

1) By 1990, computer-related crimes will increase in number by more than 50 percent over the 1984 rate.
2) By 1995, community involvement and self-help (e.g., community policing) in local policing will become common practice in more than 70 percent of the Nation.
3) By 1995, university/professionally conducted research will have a direct and positive influence on the development of crime reduction strategies.
4) By 1995, acts of political terrorism in the United States will increase in number more than 50 percent over the 1984 rate.
5) By 1997, state-of-the-art high technology will be routinely used in crime reduction.
6) By 1999, urban unrest and civil disorder (of the 1960's and 1970's variety and magnitude) will take place throughout America.
7) By 2000, computer-based instruction will become the standard for training in more than 70 percent of all police agencies.
8) By 2000, more than 70 percent of the "invasion of privacy" law suits will successfully demonstrate inadequacies of and inaccuracies in police computerized files.
9) By 2000, crimes committed using high technology will become so complex the police will be unable to do more than take initial reports.[3]

These consensus forecasts show a positive correlation with concerns voiced during the 36th annual convention of the Atlantic Association of Chiefs of Police held in St. John's, Newfoundland. While the discussion centered on problems pertaining to Canada, they are similar to expected occurrences in the United States and other countries. Among the developments foreseen are:

1) The development of a national strategy to curtail the supply and demand for illicit drugs.
2) Labor conflicts will become violent. "Unemployment and labor disputes in days to come will produce more violent reaction and will require police intervention."
3) Citizens will take action themselves through frustration and a perception of inadequate protection.
4) The standardization of information exchange through automation will present greater opportunity for information theft. Protection of private information will be a challenge for the police.
5) Overall crime will decrease with the reduction of the 18-30 high crime group. However, the general population will be older and the perception and fear of crime will increase.
6) Citizens will be more critical of, and will want to be more involved in working with, the police.[4]

The similarity of these Canadian findings with the conclusions of SA Tafoya's study tend to corroborate the likelihood of these developments taking place in the United States, Canada, and other cultures in parallel stages of social and technological development. Developing countries could also use the Delphi technique to forecast events in their countries as well. But, no matter what stage of development a country is in, it can be expected that high technology will play an even greater role in police services.

Compensating for the Industry's Immaturity

As stated earlier, many administrators have been led to expect incredible and impossible returns on their technology investment. This is not only because many managers are adrift on an ever-changing sea of technology but also because many high technology people are themselves uncertain as to their systems' abilities and potential. There has been an avalanche of computer products and companies. The

". . . it is vitally important that today's forward-looking law enforcement administrator maintain a conceptual view that continually relates to past, present, and future."

competition between these products and companies has led to confusing claims and promises. The executive and manager can clarify the situation by dealing with only reputable companies with an established track record.

The same cost/benefit analysis used for other investments should be applied to high technology. The administrator should see solid performance measures before investing and must demand cost justification and measurable benefits in understandable terms. More importantly, executives and managers should tell the industry what is needed and desired. Once this is known to the industry and resources are applied to accomplish what is needed, it would be unusual for the industry not to deliver in a reasonable amount of time.

Rethinking Multiple Correct Options

Instead of serving as a source of frustration, the prevalence of multiple correct options can be looked upon as a challenge. While a product or system, once acquired, may prove to not meet fully ever-changing requirements in a dynamic environment, it would be unlikely that the soundly acquired nucleus of a system, purchased with tomorrow's needs and technology in mind, could not be modified as required. What is important is that the first step be taken and that a general direction be established which can be followed and extended by the acquiring agency.

CONCLUSION

It is extremely important that administrators become personally aware of and involved in evaluating their personnel resources. Those who are engaged in the agency's computer and other technological programs are of particular concern. Wherever possible, the administrator should strive to make certain that the agency is employing the best available talent in this area, and most importantly, that they are personnel who can relate law enforcement needs to "state-of-the-art" technology. To the chief executive officer, this must be a continuing vigilance.

Administrators must develop innovative approaches to acquiring the most advanced expertise available, so that sophisticated knowledge in some of the more difficult decisionmaking areas of technological acquisition is properly used. It has been the experience of the Chicago Police Department that the finest and most experienced experts in the private sector are more than willing to participate in these processes, when approached in the proper manner. As an example, in the department's highly successful acquisition of an automated fingerprint identification system, a private sector overview committee was enpaneled. These experts from the private sector were called upon to offer insight, advice, and evaluation at all the major steps in the acquisition of this costly, highly sophisticated technological system.

The department is presently well into the design and acquisition of a computer-aided dispatch system. Expectations are that the communications system will be completely revolutionized which, only a few short years ago, was called one of the most advanced in the Western Hemisphere. The design is presently being formulated with the expectation that it will be a stepping stone to a period of policing in which computerized reporting will be effective and operational. One of the first elements in this process was the search for and appointment of an appropriate private sector oversight committee. Again, these experts were extremely willing to participate and provide their collective expertise.

Finally, no matter what techniques are used, it is vitally important that today's forward-looking law enforcement administrator maintain a conceptual view that continually relates to past, present, and future. Such executives and managers must have the ability to "create a vision" or "project an image." This conceptual perspective must be based on acquired knowledge of law enforcement, total experiences and learning regarding technology, and evaluation of the intelligence information garnered regarding the trends of technology for the future. All of these factors need to be syncronized with evaluations based upon experience, intelligence, and research regarding the future needs of law enforcement.

Throughout this continuing process, police administrators must be prepared to "plug in" modifications where necessary, based upon expected changes in the technological trends and the sociological directions of the agency's constituency. Looking at these problems from an anticipatory perspective will prove to be of assistance in the acquisition of high technology systems.

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Footnotes

[1]Alvin Toffler, *The Third Wave* (New York: William Morrow, 1980).

[2]William L. Tafoya, "Into the Future . . . Looking at the 21st Century," *Law Enforcement Technology*, September/October 1987, pp. 16-60 and 82-86.

[3]Ibid.

[4]"Criminal Justice," *The Americas*, vol. 1, No. 1, February/March 1988.