WHAT WILL BE THE APPLICATIONS OF EXPERT SYSTEMS TECHNOLOGY FOR LAW ENFORCEMENT BY THE YEAR 2000?

As service demands on police departments continue to rise, and resources become more scarce, law enforcement executives must look to future technology as an opportunity to meet the challenges of a changing environment.

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EXECUTIVE SUMMARY

This study uses a "Futures Research" methodology to address the application of expert systems in law enforcement. An expert system is a computer program that will operate on a personal or larger computer. The program encodes the expertise of a human and imitates the reasoning process that the expert would use to solve a problem.

As police executives look for ways to manage their departments with constrained resources, the changes in computer technology and expert system programs may provide a way to increase investigation time and supplement training programs. Such programs have been used in law enforcement on a limited basis, but with the changes in computer technology, computers are becoming more sophisticated and less expensive. These factors could put expert system applications within the reach of the smallest police department.

Forecasting future trends and events that have relevance on the use of expert systems in law enforcement provides the foundation for developing a strategic plan to implement their use. This paper suggests that such a plan would include the use of expert system programs as a supplemental tool to criminal investigators. The programs would be used to match method of operation factors of crimes with known offenders. The study then provides an implementation plan that involves a transition management team that includes stakeholders--those persons who have an interest in the outcome of the project and can influence that outcome.

This study concludes that as technology advances, police administrators will have a great opportunity to include expert systems and other computer applications in their department operations. It also suggests that police executives may need to look to entrepreneurial opportunities to fund these projects as public budgets become more restricted.

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I N T R O D U C T I O N

"I wouldn't want to be a science fiction writer today because reality is leaping ahead of fantasy."

John Peers, President
Novix Inc., Silicon Valley

PROJECT BACKGROUND

Over the last decade, more and more police departments, large and small, have computerized at least some aspect of their operation. This computerization has largely been an attempt to manage the vast amount of information generated by departments but also is a result of the giant strides computer technology has made both in terms of advances in information management and bringing the cost of such technology within the reach of the smallest department. Historically, records keeping was not emphasized among U.S. law enforcement agencies around the turn of the century. Records were only being kept by the largest agencies; smaller departments retained no formal record keeping process outside of a wanted poster (Hernandez, A. 1986:51). In 1927, a committee was formed

by the International Association of Chiefs of Police to develop a uniform crime reporting system. In 1930, a small group of agencies began collecting crime data, and shortly thereafter, the Federal Bureau of Investigation began acting as a clearing house for criminal data. However, it wasn't until federal funding was supplied that states began using the Uniform Crime Report Program (UCR). States would eventually mandate local police departments to report crime information to the state, and the majority of states would soon use computers to collect and report crime statistics.

Computers allowed for the amassing of a large amount of information which prompted police agencies to collect even more data. The first attempt to go beyond storage and begin to use this information was the National Crime Information Center (NCIC). This allowed agencies to share information on stolen vehicles, as well as criminal histories. It also provided information access to medium size or smaller agencies that could not afford such computerization.

With the introduction of the microprocessor by the Intel Corporation in 1972, the future of law enforcement's computer applications began to change, though no significant use would be seen for perhaps five or six years. Around 1975, some of the larger California police agencies were computerizing their police records systems. Some agencies were introducing Computer Aided

Dispatching (CAD) and installing Mobile Digital Terminals (MDT) in police units. Later, individual officers were using their own personal computers to store information and come up with applications for apprehending and identifying criminals. By 1979, introductory courses on computers for law enforcement were springing up and were eagerly attended by officers and police managers who saw the obvious applications of this technology for law enforcement in the future. As the technology improved and actually became less technical and less expensive, police departments routinely began automating their records and communications operations. The next logical progression was to ask the question: "Now that we have all of this information, what can we do with it and how will it help us to achieve our primary mission of apprehending criminals?" Applications such as the La Rue Printrac system that matches fingerprint characteristics with known persons became an ideal marriage of already stored information (finger prints) with the available technology. The police were able to use advance computer technology and apply it to stored information and identify suspects of crimes.

What then, is the next advancement for law enforcement in using the information it has so carefully collected? What computer technologies of the future will be available to law enforcement within the next 5, 10 or 15 years that will allow us to use the vast amounts of information that we have collected on criminal activity? Can this technology be applied to all sizes of police

departments? The answer to this questions lies in the advances of the fifth generation computer language, artificial intelligence, and its by-product, expert systems.

This paper will address this issue from the perspective of the mid-sized police department. Though, as will be seen, the applications discussed will become increasingly available to all sizes of departments as technology advances.

TECHNOLOGY IN THE YEAR 2000

Police administrators of the future will be looking for more efficient ways of managing police information while dealing with declining, or at least, stricter budgets. Such factors as increased personnel costs, more state-mandated record keeping, limited workforce from which to recruit and other trends now, and in the future, encourage police executives to look to new ideas to accomplish their missions. Methods of sharing costs or regionalizing police services are being discussed today that would not have been thought of ten years ago. Technological advances in computers, artificial intelligence and expert systems may provide law enforcement managers with new opportunities to cut training costs, retain expertise and use criminal information. John Peers of Novix Inc.,which is based in the Silicon Valley, commenting on

future technology, said in a July 18, 1988 Fortune magazine article: "We'll see a minimum of ten times as much progress [in computer technology] in the next twelve years as we've seen in the past twelve years" (Bylinsky, G. 1988:92).

Peers' company recently developed the technology of putting a computer language on a computer chip that may revolutionize communications-signal processing. The same article suggests what Peers and others on the "high-tech frontiers" are predicting will occur by the year 2000:

* Computers that don't look like and act like computers will surround you; shirt-pocket and notebooklike devices that respond to handwritten and spoken queries and commands, maybe even gestures.

* In corporate research centers, supercomputers one-thousand times more powerful than today's will calculate electron interactions in molecules in order to create materials that never existed before.

* When you travel, you may carry along an electronic book that opens up to display text on two facing screens. The book's memory will contain as many as two hundred novels or nonfiction volumes; you just write the name of the one you want to read--and up it pops.

* Your doctor will check your heart by having you walk through a diagnostic machine rivaling Dr. Mc Coy's on Star Trek (Bylinsky.1988:92).

The untapped possible applications for law enforcement of the new frontiers in computer technology are endless. Applications of artificial intelligence and expert systems lend themselves directly to the criminal justice arena as the following discussions suggest.

Artificial Intelligence

The term "artificial intelligence" resulted when a group of scientists attended a workshop to discuss the concept in 1956. This early work centered on attempts to simulate neural networks of the brain. Later, instead of building a system based on numbers, scientists began to build a system on manipulated symbols. This symbolic processing is the cornerstone of artificial intelligence work today. Holsapple and Whinston define artificial intelligence as:

> "A field of study and application concerned with identifying and using tools and techniques that allow machines to exhibit behavior that would be considered intelligent if it were observed in humans." (Holsapple C. & Whinston, A.1986:12)

A great deal of growth in this area occurred in the 1970 s. Advances were made in the interpretation of visual input as well as English or natural language understanding programs.

Expert Systems

An expert system is a computer program that encodes human expertise. Efraim Turban provides this definition of an expert system: "Expert systems are computerized advisory programs that attempt to imitate or substitute the reasoning process and knowledge of experts to solve a particular problem" (Turban, E. 1988:321). An expert system contains specific human knowledge from a limited field. Information is stored into the computer in such a way that a nonexpert can use it by making inquiries in plain, everyday language.

Expert systems have been developed to capture a myriad of expertise in various fields. The system uses what is called an "inference engine" which is a program that can draw conclusions based on data. An inference engine provides reasoning power and is designed to solve a problem by applying expertise that is coded into the system, usually in the form of rules. It follows and selects important rules based on the data. One early example of an expert system is the Mycin program developed at Stanford University which uses the expertise of medical doctors. Rules derived from this medical expertise are used to reason backwards, from a list of symptoms, to a particular disease. In this way, symptoms described in natural language can be entered into the computer and the disease identified with some probability of accuracy. Today, expert systems can be found in fields such as management, mineral exploration, chemistry, oil exploration, and equipment diagnosis and repair, as well as the medical field.

The criminal justice area, and particularly criminal investigation, may lend itself perfectly to expert systems. This is because criminal investigations usually rely on the interpretation or the intuition of the investigator and not necessarily just facts. There are judgments that a detective makes that are based on his or her experience as an investigator. It is this judgement factor that is incorporated into expert systems that differentiate it from just a database management program. In the criminal justice area, an expert system could be used not only for investigations but also

for crime-solving based on method of operations, command decision making (as in a hostage situation), and training. The expert system does not take the place of the expert employee, but acts as a consultant or advisor to either an expert or a novice. There have been a few expert systems employed by law enforcement. In January of 1984, the King County Washington Police Department formed the Green River Task Force to apprehend a serial killer wanted for the murder of at least 27 young women. The case involved more than 2,000 suspects and 300,000 pieces of evidence. The amount of information the case generated was immense, particularly as the number of victims increased to 42. A decision was made to try to locate a computer system that could handle this information in an intelligent way, that could be queried in natural language, and that could have the abilities of an expert system. A company called Information Access Systems (IAS) from Boulder, Colorado, was selected as it had developed an expert system that used natural language. The system was called Judgement Space (J-Space). At the time the system operated only on a specific type of minicomputer and cost approximately $200,000, not including the labor cost, for a year's worth of data input. The system would make associations between different but related words as interpreted by the detectives(the experts). These relations were weighted in terms of how related they were; this then provided for a confidence or probability rating factor. The system was able to search narratives, reports, and notes of investigators with this same association and relationship ability. It did not have to rely

on key words or exact matches but could make "judgments" about whether a word or phrase was "related" to the subject inquiry based on the knowledge (expertise) of a detective. The system, because of a variety of factors, including funding, did not solve the Green River Murders, but it was a successful in organizing the information and was a step for law enforcement in terms of using expert system technology. Dr. Earlene Busch, president of Information Access Systems, who was instrumental in developing the Green River project, stated in a recent interview that this technology is a perfect application for criminal investigations because it uses that same systematic, relational approach used by a detective. Dr. Busch indicated that her company is involved in several projects with law enforcement agencies using this technology.

The same company, Information Access Systems, has installed a similar system with the Colorado Bureau of Investigation (CBI). Though this system is a demonstration system, it classifies data from teletypes across the nation regarding major crimes such as homicide, kidnapping, aggravated assault, robbery, rape, and arson. The amount of this type of information that flows into the CBI, or any agency, is tremendous. The quantity of information, and the demand on an already-burdened staff, does not permit the analysis level that this type of information requires. This program classifies data from teletype reports based on the modus operandi (MO) of the crime and offender. Once this information is stored,

a user can make inquiries in natural language. For example, if a particular description of a crime was typed into the system in natural language, it would be matched against the database. The system would provide a selection of 50 reports in order of similarity to the crime described. Therefore, the system makes judgments, based on the collected expertise of law enforcement personnel, about the crime or the criminal and identifies those cases it finds as similar. This is the same process a detective would go through in reviewing teletypes or reports, but it makes this first cut for the detective much faster, allowing the investigator to spend his/her time more efficiently. This knowledge base was developed by IAS through an interviewing process using CBI investigators as the experts.

In an interview with Inspector W. Grey Buckley of the Crime Information Center, Colorado Bureau of Investigation, he said the potential for this type of system on a regional, state or national basis is phenomenal. He indicated that the sample data that are currently in the system have come from actual crime warnings. He stated he is still amazed when he demonstrates the system and sees an investigation commander leave the room to call his/her department after a demonstration produces similarities to an actual case.

At the federal level, the FBI's Big Floyd system examines organized crime by tracking the movements and activities of suspected

criminals. Other federal systems include the profiling of serial killers through the Center for the Analysis of Violent Crimes and the Violent Criminal Apprehension Program. Other federal agencies such as the Drug Enforcement Administration, as well as the Internal Revenue Service, are looking into the ability of expert systems to profile criminal activity.

In their paper, Expert Systems in Criminal Justice, presented to the American Society of Criminology annual meeting in Montreal, November, 1987, Joan Jacoby and Edward Ratledge reported another law enforcement use of an expert system. This one is a joint project of the Baltimore County Maryland Police Department by the Jefferson Institute for Justice Studies in Washington D.C., in conjunction with the Devon and Cornwall Constabulary in Exeter, England, with funding from the National Institute of Justice. This system focuses on residential burglaries. Based on the knowledge and expertise of burglary detectives, the system identifies likely suspects based on the characteristics of the burglary and the behavior of the suspect, also referred to as the method of operation. The system will produce a list of suspects with a probability of their being the offender and notations about peculiar characteristics of the crime that will aid investigators in locating the suspect. The authors differentiate this system from profiling systems, stating

> Expert systems that target individuals such as those in the residential burglary project, differ from profiling systems because they identify suspects from a known list of offenders based on their behavior at the scene of the crime. In this

> respect, the characteristics of the offense do not produce an offender profile, but rather they are used to select the most likely candidates from a universe of candidates (Jacoby and Ratledge 1987:3).

The Applications of Expert Systems to Law Enforcement in the Future

The advancement of personal computer technology over the last five years has been tremendous. Today's personal computers, place at anyone's fingertips computer technology that was previously only available in machines that took up several hundred square feet of space and cost tens of thousands of dollars a mere ten years ago. In some cases, software advancement has outpaced the hardware development. It has become easier to use, less expensive, and in some cases redesignable by the user who has no programming knowledge. The personal computers of the 21st century will combine high-power processors and vast amounts of memory and will have the ability to communicate effortlessly with other computers. Currently, there is expert system software available, referred to as "shells", that is available off the shelf at prices ranging from $100 to $100 millon, depending on the application, the size of the database, and the complexities of the problem. All of this suggests that with the reduction in cost of personal computers, their increasing ability to communicate with each other, and the availability of expert system software, police agencies, regardless of size, may be able to take advantage of this technology. By the year 2000, as the technology continues to develop, police agencies may routinely be using expert systems to solve crimes, train personnel, and make strategic decisions based on the expertise of

personnel that may have left the agency years before. Jacoby and Ratledge's research indicates that the most important and useful features of an expert system are

* the high levels of expertise they provide to aid in problem solving;
* their predictive modeling power;
* their institutional memory; and
* their ability to provide a training facility for key personnel.

Though there are several applications for law enforcement, the features described above lend themselves to law enforcement in two particular areas: (1) The investigation of crimes and (2) the capturing of expertise to be used for the training of new personnel.

The Investigation Of Crimes

Expert systems are designed to be problem solvers. Coupled with the expertise of an experienced investigator, systems could be used to analyze method of operation data or other factors of a case. Homicide detectives develop methodical processes of investigating crimes as a result of the experience they obtained. But even the best investigators forget things or overlook the obvious. An expert system cannot overlook items. It looks at relations and allows the inquirer to ask "what if" questions of the data.

Expert Systems Used In Law Enforcement Training

Expert systems can be used in the police training classroom. Traditional training methods assume that each student has the same

level of knowledge, and the instruction level may result in not meeting all of the students' needs. Expert systems can evaluate the knowledge level of each student and design a program of instruction suited for that individual (Jacoby J. et al.1987:9). Additionally, a department could use an expert system to capture the expertise of an investigator or other key department member that may be leaving the agency. By capturing the way a major crime detective goes about investigating a case, the training or lag time between the expert leaving and his\her replacement becoming proficient can be cut dramatically (Waterman, D.1986:8). The system could be used to model training at all levels and reduce training costs.

The advances in computer technology and expert system software will make their application to law enforcement an easy transition and available to most departments regardless of size or budget constraints. Police administrators of the future will look for new, economical ways of managing police information. The quantity and importance of the data will necessitate the use of advanced technologies to interpret and act upon the information in a timely manner. Additionally, administrators will seek ways of keeping expertise within their departments as the workforce and the role of the police officer changes. Expert systems technology may address these needs and provide administrators with a valuable tool in meeting the challenges of policing in the next century.

FORECASTING THE FUTURE OF EXPERT SYSTEMS IN LAW ENFORCEMENT

Trends and Events

The question of the application of expert systems in law enforcement in the future has been discussed in the introduction of this paper. Scanning (which reviews available literature in terms of social, technological, economic, environmental, and political impacts on the issue) a futures wheel, and brainstorming by a panel of experts familiar with the issue were used to identify candidate trends and events which pertained to the use of expert systems in law enforcement.

A panel of law enforcement, community and computer professionals gathered to analyze and evaluate the suggested trends and events and offered further trends and events from their professional prospective. The group consisted of two police administrators with computer responsibilities in their agencies, a civil attorney, three computer professionals from the private sector, a city administrator, a management consultant, and a city councilman (see Appendix A).

Additionally, in order to prepare the group for this process, the group was provided current literature from the scanning process regarding the issue was and briefed regarding the subject matter. From a list of 25 trends and 15 events (see Appendix B), the group used the Nominal Group Technique (NGT) to distill the trends and

events, and their potential impact on the issue, to five trends and five events. The NGT was used to forecast and evaluate the trends in terms of their past and future levels, direction and velocity (refer to Table #1). The same method was used to forecast and evaluate events and their interval and cumulative probabilities. A cross-impact analysis was then used to determine the impact of events on events, and events on trends. Each trend was graphed to show the group's collective impression as to the level of the trend 5 years ago and 7 and 12 years from today.

Trends

1. CIVILIANIZATION WITHIN LAW ENFORCEMENT IS INCREASING

The cost of attracting and retaining qualified officers has increased over the last several years. Salaries and benefits, as well as the cost of training, have increased significantly. The workforce, too, is changing. The availability of a recruiting pool between the ages of 20 and 30 will be decreasing. Competition for these prospective employees will increase among the military, police and other service-oriented industries. Additionally, it has been discovered that it is not necessary to use costly sworn officers in some assignments such as traffic control, crime report taking, and other duties once done by the sworn officer. As crime issues, such as drugs, become more important to the public, the

emphasis will be to use sworn officers more in solving crimes and apprehending criminals and using civilian personnel in supporting roles, including management and administration. Trend Graph #1 represents the momentum of this trend in the future.

2. STANDARDIZATION OF TELECOMMUNICATIONS TECHNOLOGY IS INCREASING

One of the major stumbling blocks to police agencies sharing crime information is the inability of computer systems to "talk" to each other because of different telecommunication requirements. This trend suggests that the technology, and the various vendors' reluctance to agree to a common communications link, will change in the future. Once this factor is overcome, local, regional and county agencies will be able to freely access each other's databases and share crime and criminal information freely. This "sharing" ability may result in concerns from the public on how the information will be used and on the issue of privacy (refer to Trend Graph #2).

3. THE USE OF EXPERT SYSTEM TECHNOLOGY IS INCREASING

Largely due to the fact that personal computers have become more powerful while also becoming less expensive, artificial intelligence development has increased particularly in the

area of expert systems. In the artificial intelligence market, in terms of dollars spent, expert systems has increased from $76,000,000 in 1985 to $400,000,000 in 1988 (DM Data.1988). The use of this technology apparently will increase as programs become less costly and usable on any size or brand system. (refer to Trend Graph #3).

4. THE DEMAND FOR POLICE SERVICES IS INCREASING

It would seem that the role of the police is expanding in some areas and that the demand for police services is on the rise. Recent legislative changes requiring special action in domestic violence and missing person cases suggests that the police may become more involved in social service delivery. If this trend continues to rise, as suggested by Graph #4, policing costs will rise and some other services may suffer if budgets and manpower don not keep pace with the demand. The implications of this trend may strengthen the need to manage information more efficiently and use available technology to maintain expertise and reduce training costs.

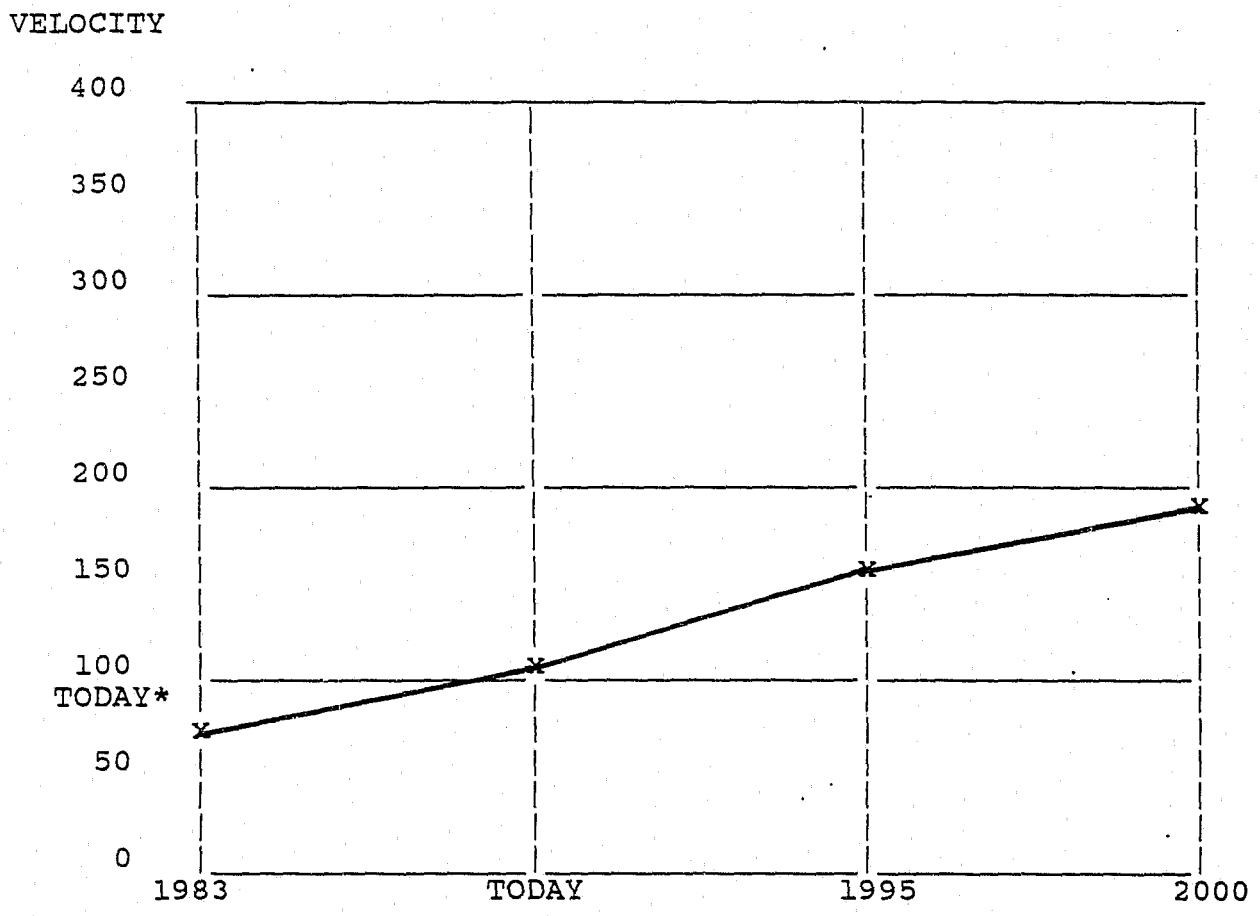
5. A CHANGE IN POLICING'S TRADITIONAL ROLE

The complexities of law enforcement have changed significantly over the last twenty years. Officers must be better educated; they must be able to interrelate with people of varying cultural back-grounds, provide sensitive crisis intervention

during domestic strife, recall volumes of legal rules instantly, operate sophisticated equipment, handle stressful situations, and react properly when using force. Police administrators are expected to be public administrators first and police officers second, and in some cases civilian managers are becoming chief execu-tives of police departments. City administrators, city councils and community leaders are looking for more fiscal and management accountability from police administrators, a fact that is requiring them to keep pace with not only new tech- nologies and city economics but leadership trends and fiscal accountability.

Police executives are becoming more educated in terms of over-all city government and less tied to the traditions of past police executives. Graph #5 suggests that this trend will continue, which will reinforce the opportunity for police administrators of the future to take advantage of computer technologies to effectively manage their departments.

TREND GRAPH #1

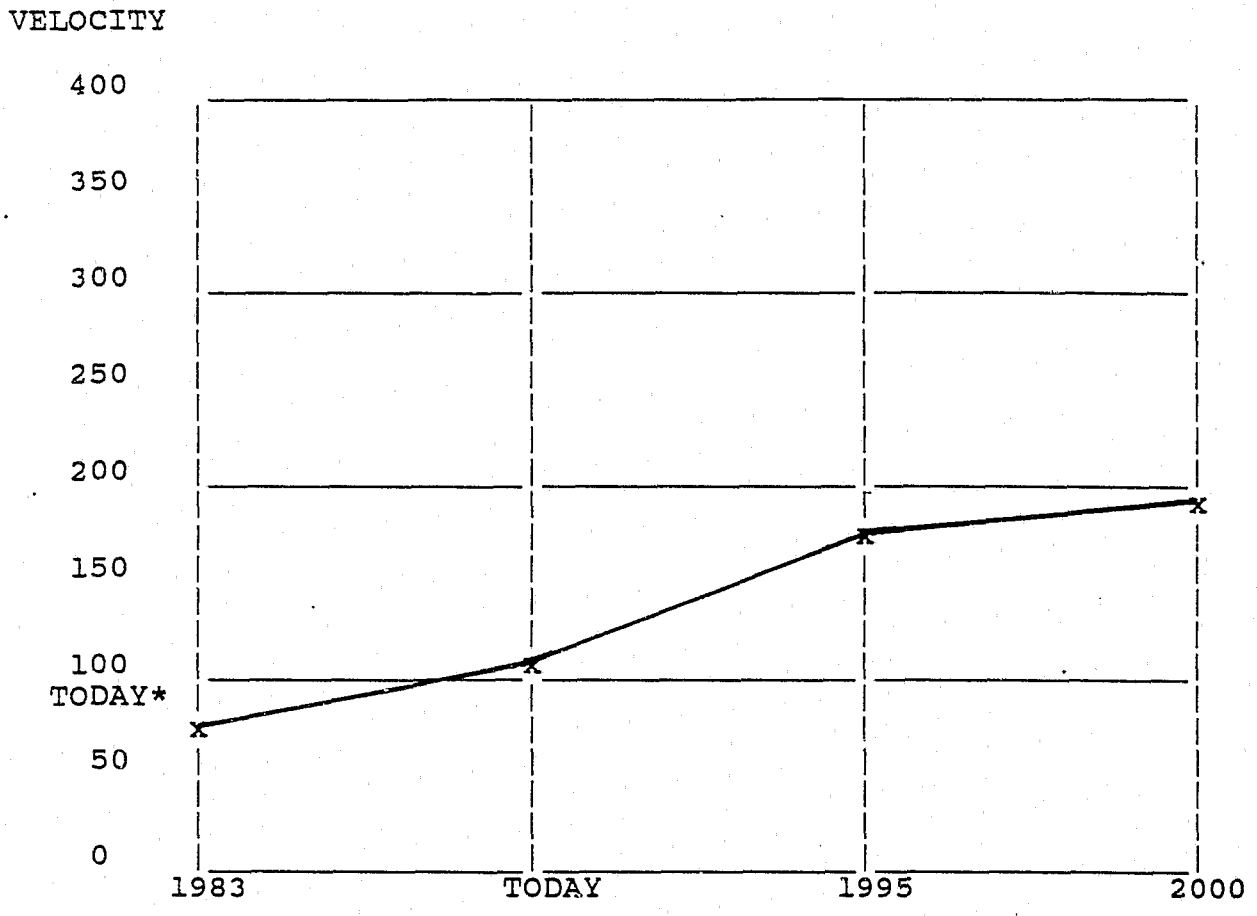


* The graph represents the level of the trend with the ratio for today = 100.

Trend 1. Civilianization within law enforcement is increasing

The group showed that this trend will continue to rise well into the next century.

TREND GRAPH #2

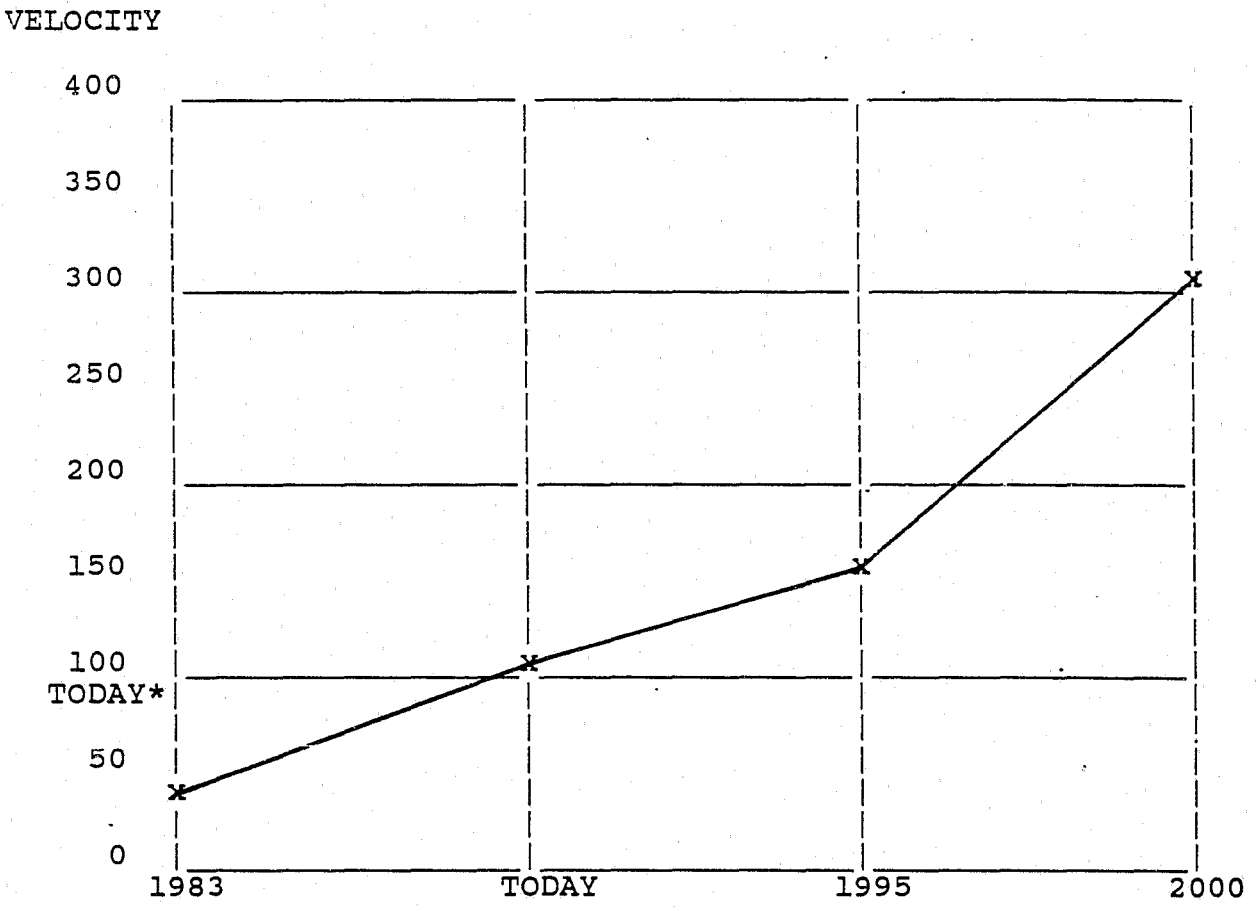


* The graph represents the level of the trend with the ratio for today = 100.

Trend 2. The standardization of telecommunications technology is increasing.

This was identified as a significant trend by the group and one that would continue to rise.

TREND GRAPH #3

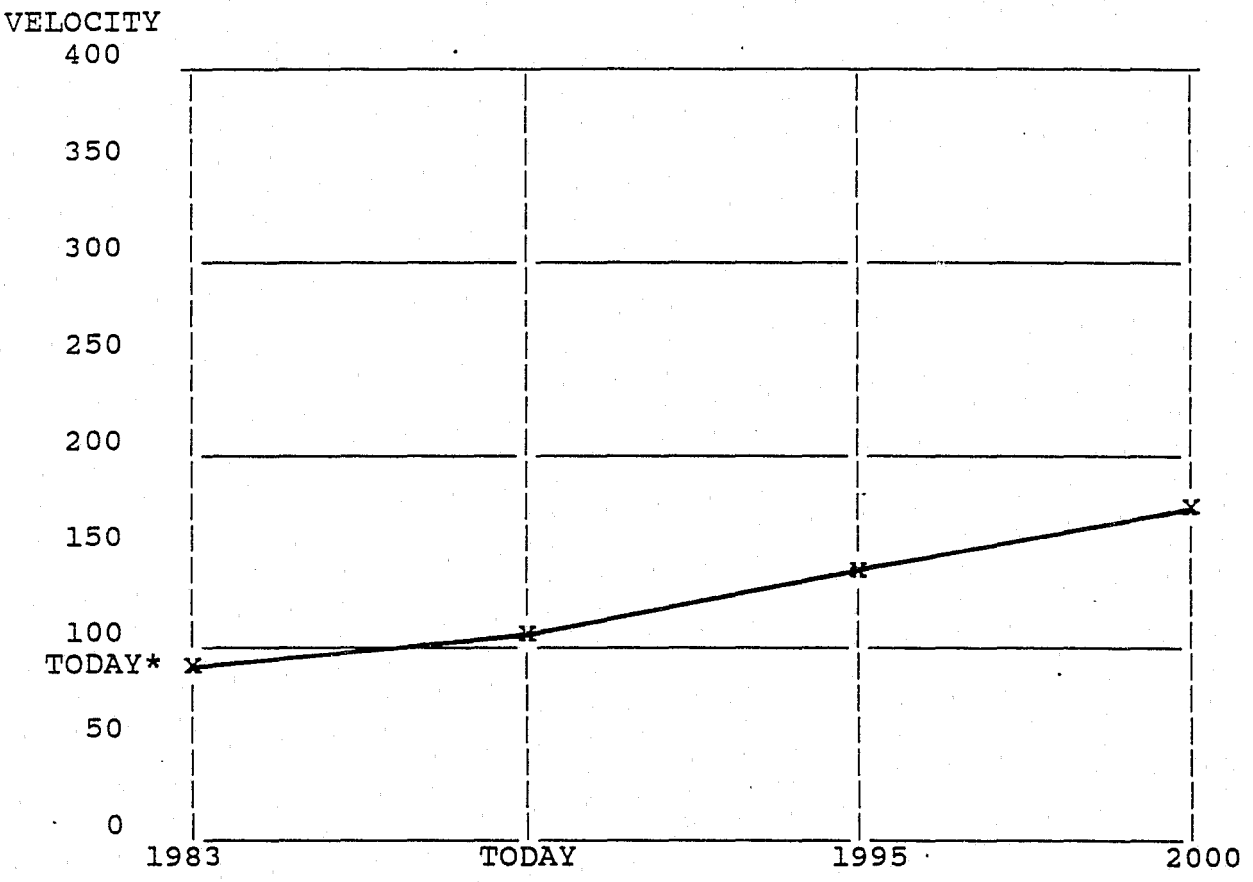


* The graph represents the level of the trend with the ratio for today = 100.

Trend 3. The use of expert systems technology is increasing

This trend was viewed by the group as increasing significantly.

TREND GRAPH #4

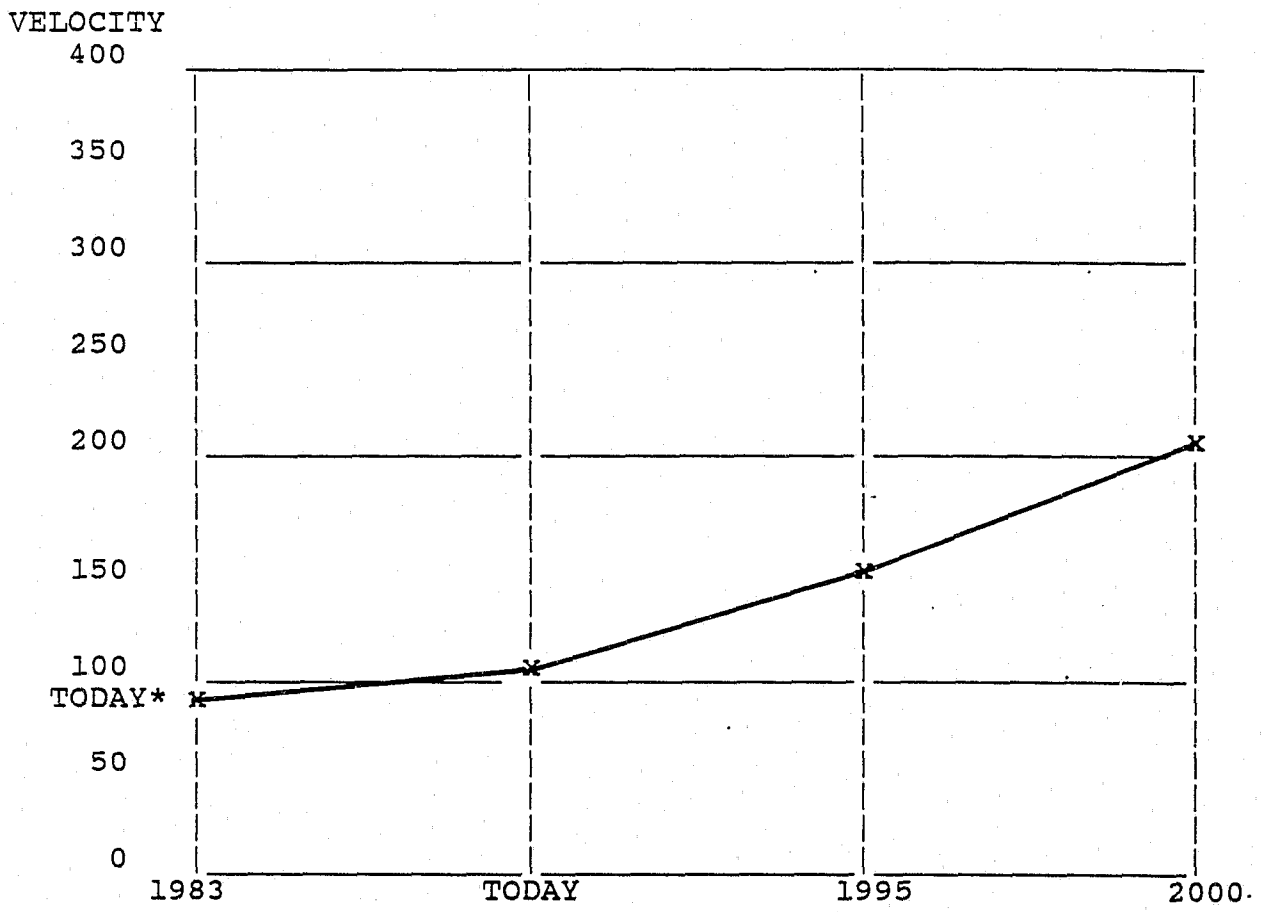


* The graph represents the level of the trend with the ratio for today = 100.

Trend 4. The demand for police services is increasing

The group indicated that this trend would continue to rise.

TREND GRAPH #5



* The graph represents the level of the trend with the ratio for today = 100.

Trend 5. A change in policing's traditional role

A steady rise was seen by the group in this trend.

TABLE #1
TREND EVALUATION FORM

TREND STATEMENT	LEVEL OF THE TREND (Ratio: Today = 100)			
	5 Yrs. Ago 1983	Today 1988	Will be in 1995	Should be in 2000
1. CIVILIANIZATION WITHIN LAW ENFORCEMENT IS INCREASING	60 L 20 H 90	100	140 L 110 H 200	170 L 120 H 300
2. STANDARDIZATION OF TELE-COMMUNICATIONS TECHNOL-OGY IS INCREASING	20 L 0 H 80	100	160 L 100 H 300	150 L 150 H 1000
3. THE USE OF EXPERT SYSTEMS TECHNOLOGY IS INCREASING	20 L 0 H 80	100	160 L 100 H 500	300 L 140 H 1000
4. THE DEMAND FOR POLICE SERVICES IS INCREASING	90 L 60 H 100	100	140 L 100 H 200	160 L 100 H 300
5. A CHANGE IN POLICING'S TRADITIONAL ROLE	70 L 10 H 100	100	150 L 100 H 300	200 L 100 H 600

This table represents the panel's analysis of the trend's direction and velocity from a perspective of five years ago, 1983, seven years ahead, 1993, and twelve years into the future, 2000. The cells also contain the group's low and high ratings in these estimations.

Events

Events shape the course of history daily. They play an important role in how decisions are made and how policies are carried out. Events are chance occurrences that may involve technological development, resource discoveries, natural disasters or political unrest, et cetera. Any policy or strategic plan must include a discussion of events and how they may shape the subject issue in order to be better prepared if the event happens and also to learn what events may shape policy or affect the outcome of an issue. As a result of the Nominal Group Technique, five events were distilled from a list of fifteen and are listed here with a discussion describing the relevance of each.

1. MAJOR EARTHQUAKE

Of concern to any California resident is the most likely occurrence of a major earthquake in the Southern California metropolitan area. The recent Whittier, California earthquake served as an example of what impact even a relatively small and localized quake can have on law enforcement and all emergency service providers for a community. Computer systems would be severely affected by such a disaster. Valuable records could be lost, as well as vital links to other information systems. Many cities are storing tape copies of their systems off-site or in rented, secure vaults outside of California. Such an event would also affect a city financially, diverting funds away from projects in order to

repair roads and facilities.

2. MAJOR BREAKTHROUGH IN UNFORESEEN, COMPUTER-RELATED TECHNOLOGY

Technology is developing at a staggering pace. When new technology is developed for a particular application or field, it is often found that the technology has application elsewhere. A good example of this transference of technology is the computer. Originally used for mathematical computations, it is now part of everyday life. We see computers, some with voice output, at the market checkstand, the automotive repair shop, the doctor's office, and at the bank. We see computers making reports to the police, in tele-marketing, and in dating. There are technologies that presently have only been dreamed of that would revolutionize the computer revolution. Improvements in semi-conductor technology could place the facilities of the largest, most sophisticated present day computer on ones desk. A technological breakthrough could make law enforcement's access to systems less expensive and provide officers in the future with information systems that are as powerful as the largest personal computer of today, but wireless, voice recognizable, and worn on the officer's wrist.

3. MAJOR ECONOMIC CRISIS

A decline in the world, national, or local economic situation would result in a tightening of city funds, which would affect

public safety services. Such an occurrence may result in a redirection of police priorities. Very likely crime may increase and the police may see a sharp increase in demand for police services. The trend toward more social service delivery may give way for an emphasis on protection. Departments may establish service levels and communities may need to decide what level of police service they can afford. Additionally, in such a depressed economic environment, new technological development would not occur so fast, impeding the opportunity for new applications to law enforcement.

4. BINDING COURT CASE PROHIBITS POLICE FROM SHARING DATABASES

The collection of information on citizens by any government agency is always a concern. What is the government entitled to know? Where does government's need to know stop, and the a citizen's right to privacy begin? The security of these information databases is also a concern. What if one is corrupted by an unauthorized person accessing information? What if a criminal profile for an expert system uses inaccurate information from a shared database, and a person is wrongly accused or arrested? Legislation, or a court ruling prohibiting the collection or sharing of information by police agencies, would certainly impact the use of computers and expert systems in law enforcement and may prevent law enforcement from benefiting from new technologies in this field.

5. COURT DECISION MANDATES EQUAL POLICE PROTECTION ACROSS STATE

The California school system saw a major change in the way schools are funded and the level of education that is provided a few years ago. A court decision stated that all schools should provide the same level of education no matter what the economic base of the district was or where it was located. Such a case relating to equal police protection could cause a major change in California's law enforcement. Is it unreasonable for a citizen to have the same level of police protection and service no matter where he lives in the state? One result might be that all policing is under the state, creating a state policing system and eliminating local and county police agencies. The level of police service may decline depending on the emphasis placed on particular needs. On the other hand, police services would be standardized across the state. Communication networks, as well as computer networks, would also be standardized and may result in an organized system for sharing information. The cost of providing equal police protection would certainly impact the state's economic condition and may shift priorities from other programs and services.

As previously mentioned, the group discussed several other events but chose these as having the most impact on the issue. Table #2 depicts the impact of each event on the issue as well as law enforcement in general. The group's high and low responses have been recorded as well.

TABLE #2
EVENT EVALUATION FORM

EVENT STATEMENTS	PROBABILITY Year That Probability First Exceed Zero	PROBABILITY By 1995 0-100%	PROBABILITY By 2000 0-100%	NET IMPACT ON THE ISSUE AREA -10 TO +20	NET IMPACT ON LAW ENFORCEMENT -10 TO +20
1. MAJOR EARTHQUAKE	1968	70	80	- 1.6	- 2.6
	L 1900 H 1989	L 20 H 100	L 40 H 100	L-10.0 H+ 5.0	L-10.0 H+10.0
2. MAJOR BREAKTHROUGH IN AN UNFORESEEN, COMPUTER RELATED TECHNOLOGY	1983	60	90	+ 7.3	+ 6.1
	L 1980 H 2000	L 0 H 100	L 20 H 100	L- 5.0 H+10.0	L- 5.0 H+10.0
3. MAJOR ECONOMIC CRISIS	1983	50	65	- 6.7	- 4.0
	L 1929 H 1992	L 20 H 100	L 20 H 100	L- 5.0 H+10.0	L- 6.0 H+10.0
4. MAJOR COURT CASE PROHIBITS POLICE FROM SHARING DATABASES	1986	40	50	- 3.2	- 1.0
	L 1932 H 2000	L 0 H 85	L 0 H 100	L-10.0 H+ 8.0	L-10.0 H+ 8.0
5. COURT DECISION MANDATES EQUAL POLICE PROTECTION ACROSS THE STATE	1992	30	50	- 1.0	+ 1.2
	L 1978 H 2000	L 0 H 75	L 0 H 100	L-10.0 H+ 8.0	L-10.0 H+ 8.0

This chart evaluates the impact of events forecasted by the nominal group. The group estimated when the probability of an event happening first exceeds zero and then estimated its probability of occuring by 1995 and the year 2000. The fifth column shows how significant of an impact the event may have on the issue and the sixth column indicates the impact on law enforcement in general.

CROSS IMPACT ANALYSIS

The panel used a cross impact analysis process to understand the relationships among future events, as well as the impacts of events upon trends. Identifying such relationships will assist in developing insights as to what will influence the future. It is hoped that this will lead to more effective and informed policy decisions.

A cross impact analysis was used for this process. The events are noted in the left hand column, and the events and trends are recorded at the top of the form. The second column from the left is used for the probability estimate for each event by the end of the year 2000, as estimated by the panel. The following question was then asked: If E1 (Event 1) actually occurred, what would the new probability of E2 be at the moment of greatest impact? These figures are reflected in Table 3.

In order to identify which events are "actors" or events that cause change in the world as it relates to the issue, the number of cells going across the chart that have a change are noted. In this case, E2 (major technology breakthrough) and E3 (major economic crisis) are identified as events that should be the primary targets for policy action. E1 (earthquake) was also rated high but not as high as E2 & E3. In some cases it is difficult to develop a policy for an event such as an earthquake. What affect can a police

organization have on an earthquake? The answer: very little in terms of determining if it will happen or not. Policy here would be planning on what to do after it occurs.

Totaling the columns on the cross impact analysis form, reveals that Trends 2 through 5 are "reactors". They seem to be buffeted by the occurrence or nonoccurrence of the "actor" events. The "reactor" scores are high indicating a sensitivity to the "actor" events.

The events of "Major Breakthrough in an Unforeseen Computer Technology" (E2) and a "Major Economic Crisis" (E3) are clear targets for policy as they affect the direction of the events and trends. This impact suggests, particularly in light of the issue of this paper "the use of expert systems in law enforcement," that policy considerations should include the changing nature of computer technology. What may be "state of the art" now or into the short future may change considerably in a few years. Additionally, the economic situation may influence what developments are made and what agency resources may be available to incorporate those changes into action. California cities have been even more sensitive to fiscal management since the tax limiting initiative Proposition 13 passed several years ago. City departments, including the police, have learned to economize as well as search for more economical ways of providing police services. However, when viewed with the NGT panel's observation

that the demands for police services in the future are increasing (Trend 4), it is clear that any policy concerning the use of advanced computer technologies for the future must also include new funding sources outside of the traditional budget process. It is challenges like these that support the panel's observation that the traditional police administrator's role is changing (Trend 5) to one that must look at a broader view in order to manage police departments in the future.

The cross impact analysis points out one additional interesting factor. It would appear that the group (NGT) was very sensitive to the impacts of advances in computer technology. The group felt that such advances (Event 2) could influence whether a major economic crisis (Event 3) happened or not. If such technology was developed, it could reduce the probability of an economic crisis. The thought was that new technology would stimulate the economy and forestall a crisis. They saw the development of such technology as increasing the ability of sharing data amongpolice departments. This increased opportunity might also result in a greater chance of misuse and increase the probability of legislation prohibiting police from sharing databases (Event 4). The group saw a "Catch 22" in this area, in that if the economic crisis (Event 3) occurred before the new technology (Event 2), the probability of new technology would decrease to 28 percent from 85 percent because of lack of financial resources.

TABLE #3
CROSS IMPACT ANALYSIS EVALUATION FORM FOR THE YEAR 2000

> SUPPOSE THIS EVENT,
> WITH THIS PROBABILITY,
ACTUALLY OCCURRED...HOW WOULD THIS IMPACT EVENTS & TRENDS

		EVENTS					TRENDS				
		E1	E2	E3	E4	E5	T1	T2	T3	T4	T5
E1	79%		DEC. TO 60%	INC. TO- 70%	NO IM- PACT	INC. TO 50%	NO IM- PACT	INC. 31%	INC. 10%	INC. 71%	INC. 29%
E2	85%	NO IM- PACT		DEC. TO 43%	INC. TO 70%	INC. TO 51%	INC. 39%	INC. 65%	INC. 63%	INC. 10%	INC. 31%
E3	63%	NO IM- PACT	DEC. TO 28%		DEC. TO 30%	INC. TO 60%	INC. 50%	DEC. 27%	INC. 24%	INC. 58%	INC. 24%
E4	49%	NO IM- PACT	DEC. TO 84%	NO IM- PACT		NO IM- PACT	DEC. 10%	DEC. 70%	DEC. 28%	INC. 50%	INC. 20%
E5	48%	NO IM- PACT	NO IM- PACT	INC. TO 65%	NO IM- PACT		INC. 70%	INC. 60%	INC. 10%	INC. 46%	INC. 29%

Legend: INC. = Increase
DEC. = Decrease

E1=Event 1. Major Earthquake
E2=Event 2. Major breakthrough in an unforeseen, computer related technology
E3=Event 3. Major economic crisis
E4=Event 4. Major court case prohibits police from sharing databases
E5=Event 5. Court decision mandates equal police protection across the state

T1=Trend 1. Civilianization within law enforcement increases
T2=Trend 2. Standardization of telecommunications technology is increasing
T3=Trend 3. The use of expert systems technology is increasing
T4=Trend 4. The demand for police services is increasing
T5=Trend 5. A change in policing's traditional role

ANALYSIS OF CROSS IMPACT OF EVENTS ON EVENTS AND TRENDS

Events on Events

1. If a major earthquake...

THE PROBABILITY OF...	(from)	
A. Major breakthrough in unforseen computer related technology	85%	Decreases To 60%
B. Major economic crisis	63%	Increases To 70%
C. Major court decision prohibits police from sharing databases	49%	No Impact
D. Court decision mandates equal police protection across the state	48%	Increases To 50%

2. If a major breakthrough in an unforseen technology...

THE PROBABILITY OF...		
A. Major Earthquake	79%	No Impact
B. Major Economic Crisis	63%	Decreases To 43%
C. Major court decision prohibits police from sharing databases	49%	Increases To 70%
D. Court decision mandates equal police protection across the state	48%	Increases To 51%

3. If a major economic crisis...

THE PROBABILITY OF...		
A. Major Earthquake	79%	No Impact
B. Major breakthrough in unforseen computer related technology	85%	Decreases To 28%

C.	Major court case prohibits police from sharing databases	49%	Decreases To 30%
D.	Court decision mandates equal police protection across the state	48%	Increases To 60%

4. If a major court case prohibits police from sharing databases

THE PROBABILITY OF...

A.	Major Earthquake	79%	No Impact
B.	Major breakthrough in unforeseen computer related technology	85%	Decreases To 84%
C.	Major economic crisis	63%	No Impact
D.	Court decision mandates equal police protection across the state	48%	No Impact

5. If a major court decision mandates equal police protection...

THE PROBABILITY OF...

A.	Major Earthquake	79%	No Impact
B.	Major Breakthrough in unforeseen computer related technology	85%	No Impact
C.	Major economic crisis	63%	Increases To 65%
D.	Major court case prohibits police from sharing databases	49%	No Impact

EVENTS ON TRENDS

1. If an earthquake occurred...

THE DIRECT IMPACT ON THE TRENDS WOULD BE...

A.	Civilianization within law enforcement increases	No Impact
B.	Standardization of telecommunications technology is increases	Increases 31%
C.	The use of expert system technology is increasing	Increases 10%
D.	The demand for police service is increasing	Increases 71%
E.	A change in policing's traditional role	Increases 29%

2. If a major breakthrough in an unforeseen technology occurred...

THE DIRECT IMPACT ON THE TRENDS WOULD BE...

A.	Civilianization within law enforcement increases	Increases 39%
B.	Standardization of telecommunications technology is increasing	Increases 65%
C.	The use of expert system technology is increasing	Increases 63%
D.	The demand for police service is increasing	Increases 10%
E.	A change in policing's traditional role	Increases 31%

3. If a major economic crisis occurs...

THE DIRECT IMPACT ON THE TRENDS WOULD BE...

A.	Civilianization within law enforcement increases	Increases 50%
B.	Standardization of telecommunications technology is increasing	Decreases 27%
C.	The use of expert systems technology is increasing	Increases 24%

D.	The demand for police service is increasing	Increases 58%
E.	A change in policing's traditional role	Increases 24%

4. If a major court case limited police sharing data...

THE DIRECT IMPACT ON THE TRENDS WOULD BE...

A.	Civilianization within law enforcement increases	Decrease 10%
B.	Standardization of telecommunications technology is increasing	Decreases 70%
C.	The use of expert systems technology is increasing	Decreases 28%
D.	The demand for police service is increasing	Increases 50%
E.	A change in policing's traditional role	Increases 20%

5. If a court decision mandating equal police protection occurred...

THE DIRECT IMPACT ON THE TRENDS WOULD BE...

A.	Civilianization within law enforcement increases	Increases 70%
B.	Standardization of telecommunications technology is increasing	Increases 60%
C.	The use of expert systems technology is increasing	Increases 10%
D.	The demand for police service is increasing	Increases 46%
E.	A change in policing's traditional role	Increases 29%

SCENARIOS FOR THE FUTURE

The following scenarios are alternative futures based on the analysis of trends and events discussed previously in this paper. These scenarios are written from a perspective of the year 2000 looking back, using three models:

*Exploratory or Most Likely to Occur--This model uses a surprise-free variation and looks at the most likely outcome based on what we know today.

*Normative or Most Desirable--This model takes an ethical stand and seeks to show that future developments can be linked to the past--using the desired and attainable variation, it assumes the outcome is good and can be achieved.

*Hypothetical or Worst Case--This is an alternative future developed by manipulating elements of the data impartially so as to explore a "what if" future.

Scenarios offer an opportunity of bringing together the hard and soft projections made through forecasting and trend and event analysis. They also provide a forum to ask additional "what if" questions that lead to other futures research.

Scenario 1 - Most Likely To Occur - Circa 2000

Economic conditions continue to provide for a positive outlook for the nation. California continues to be central in the development and expansion of the Pacific rim. High technology continues to be the cornerstone of this growth, since the development of the high-temperature superconductor in 1996 by a small company in Irvine, California. Many suggest that Orange County may be the new "silicon valley". This advancement facilitated the development of the one billion-transistor chip which has made computers smaller, less expensive and more reliable.

In spite of this new technology, the use of advanced applications of computers has not reached a significant level in police departments as previously hoped for. Cities continue to operate frugally and have not advanced in terms of a willingness to pay for new technology. There have been some advances in the use of expert systems in local police departments but largely as a result of a few enterprising officers getting together to solve a crime much in the same way that the personal computer was first used in police departments in the late 70 s.

Police departments have been regionalizing in terms of sharing information between their existing computer systems as a result of improvements in telecommunications. Sharing databases has proved to be a good way of sharing crime and suspect information among agencies. However, there is a growing concern that sharing is an imposition on the privacy of citizens, and there is support for

claims that the police know more about their citizens than they need to. There have been several recent attempts to legislate what information can be shared by different police agencies. But since crimes of violence have continued to increase, the general public does not wish to hamper the police any more than is necessary.

The demographics of California, particularly the Orange County area, has continued to change toward earlier predictions of increases in Hispanics and Asians. As Hispanics and Asians increased their representation in the state, law enforcement was afforded a new recruitment base for potential officers. The late 80 s and early 90 s proved to be a difficult time for attracting men and women to law enforcement careers. A low California unemployment rate, coupled with a comparatively low wage and a scarcity of 18 to 25 year olds in the workforce, meant that potential employees were looking to other positions. Police departments are now reflecting the cultural and ethnic make-up of their communities, and the strides made by Hispanics and Asians has afforded law enforcement a new employment pool while increasing compensation to reflect a competitive wage with private industry.

The traditional role of the police has also changed. The role of the police at the beginning of the 1990 s had turned to one of more social service. The police were involved in providing domestic violence counselling and referrals after responding to calls of

family disturbances. Almost all large departments, and many medium and small departments, have bureaus devoted to domestic violence crimes and counselling, as well as sophisticated missing person bureaus to address missing and kidnapped children.

This change has resulted in the specialization of the uniformed, sworn officer. These officers are now specialists, used for responding to serious crimes in progress and felony follow-up investigations. The use of civilians and paraprofessionals throughout all sizes of departments is now common place .

Scenario 2 - The Worst Case - Circa 2000

The major earthquake that was feared for so many years finally occurred in the latter part of 1996. Centered in the Riverside/San Bernardino area, the shock claimed thousands of lives and devastated property for a hundred-mile radius. Emergency crews worked around the clock to rescue survivors, but police, fire and city officials were helpless as their prior planning underestimated the total destruction of communications and emergency facilities caused by the quake.

Even though it has been four years since the quake, rebuilding is still slow. Foreign investors, fearing severe aftershocks, have pulled their investments from California, leaving the state in a poor financial condition to rebuild. This situation, combined with the failure of the stock market to recover completely after the 1996 California earthquake, has left counties and particularly

cities with major economic shortfalls while trying to rebuild their infrastructures after the quake. Orange County's hope of becoming the new silicon valley has all but perished as new computer technological development has come to a standstill due to the economic situation, the threat of additional tremors, and the inability of cities to rebuild in a more timely manner.

The role of the police has changed significantly over the last eight years. At the change of the decade (1989-90), police departments began to change from their traditional role of enforcement and protection. As crime had decreased, departments focused their attention on social service programs such as domestic violence counselling. Many sworn officers had been replaced by civilians and paraprofessionals. Sworn or armed officers were only used for the occassional dangerous situations. By 1996, most departments were 70 percent civilian or more. When the earthquake struck that same year, there was a shortage of officers to protect citizens from robbers and looters who were roaming the streets. Citizens began fearing for their safety and asked for more police. It is rare now to find a police department with greater than 15 percent civilian staffing. Social service programs once supervised by the police have all been abandoned. The police have reverted to strictly an enforcement and protection role as crime has increased dramatically as a result of the severe economic conditions of the area. Due to the financial situation of the local cities, ideas of using the new, emerging computer technology

has all but died as police are too busy dealing with increased street crime, killings and gangs. Many communities are asking the state for equal police protection as local governments become less able to provide adequate protection.

Scenario 3 - Most Desireable - Circa 2000

The date is March 5th, 1998, and the police department representative is about to make a presentation. This presentation involves a review of the current role of law enforcement in society and a discussion regarding the new applications of computer technologies being used by the police.

The police representative, a civilian public relations specialist, indicates that the role of the police changed shortly after the turn of the decade (1990). Municipal police departments began providing more social services, such as programs to house and feed the homeless, detoxification centers for public inebriants, and counselling centers for domestic violence situations. The police department became the community's focal point for providing social services and changed its role from strictly enforcement to one of total community service.

The spokesperson leads the group on a tour of the police department which is representative of most mid-sized police agencies in California. She begins the session with a stop at the police information desk. She explains that anyone wishing to make a crime

report stops here for assistance. Inside the lobby area of the room, one immediately notices how quiet the area is. There are no telephones or officers manning the counter. There are seven cubicles, however, each containing a computer monitor and a keyboard. The monitors are interactive in that they display information but also receive voice and video images.

We see a man in his late forties who seats himself at a terminal. As he logs on with his Social Security Number, the terminal performs an analysis on his fingerprints as he touches the keyboard. The video monitor records the man's image and checks it against its database. The computer matches the man as a local citizen who has made reports before. The machine greets the man by name through a voice emulator and displays pertinent information regarding the man on the screen.

A menu appears on the screen asking Mr. Larson what services he needs. Mr. Larson is here to report a burglary to his home while he was on vacation. He selects the burglary report function and a report screen appears. The computer prompts Mr. Larson for answers to questions about the crime. The questions that follow depend on Mr. Larson's response to the previous question.

At the conclusion of his report, Mr. Larson pushes the "final" key. The computer begins to analyze the information given regarding the crime. It first looks at the method of operation and determines

the classification of the crime. The computer then matches the method of operation of the crime, how it occurred, against already reported crimes, as well as known offenders who use a similar method. The system also checks a license number, through the Department of Motor Vehicles, of a suspicious vehicle seen by Mr. Larson in the neighborhood. This communications link is possible because law enforcement agencies in California have standardized their computer communication protocols so that information can be shared easily.

Having the facts of the case, including a description of the stolen property, the method of operation, and the name of the registered owner of the suspicious vehicle, the computer begins to make logical assumptions about the case and who may have committed the crime. It also makes suggestions about what steps may be taken next in the investigation. The spokesperson explaines that the computer received it's knowledge base from the expertise of many detectives from the department. The system suggests that the pawn shop system be checked in case any of Mr. Larson's property was pawned. Mr. Larson is in luck, his television was pawned at a local pawn shop.

The system then assigns the case to a detective with a probability factor for solving the crime. The system then prints a copy of the report for Mr. Larson with the assigned detective's name and phone number. As Mr. Larson steps away to leave, he glances at his watch

and remarks that eight minutes to make a police report is too long. The guide remarks that the department is working with the telephone company to install video phones in about 20,000 households in the city. By using their touchtone phones, citizens will be able to make the reports by telephone from home.

The tour group stops by the jail to see an arrestee being processed. Prior to starting the booking, however, the jailer receives a call that a prisoner is ill. Taking his portable terminal, the jailer talks to the ill prisoner, asking him questions regarding his symptoms, and typing them into the computer. Shortly, the system provides the jailer with a diagnosis and what action to take. The system suggests he may have a heart condition. The jailer presses the "send" key, and the paramedics are notified to respond. A hardcopy of the analysis is also transmitted to the paramedic unit.

Meanwhile, the jailer begins to process an arrestee by having him face the video monitor in the hall. The interactive video monitor records the arrestee's image and checks it against the database. A few seconds later, his identity is confirmed by a match on his video image and from a scan of his fingerprints.

An officer sitting at a desk in the jail looks puzzled. He has just finished dictating his report into the computer system. The terminal has notified him that there is insufficient legal probable

cause to arrest the suspect he has just brought to the jail. The terminal prints out a release form and provides the officer with the name and number of an on-call deputy district attorney if he wishes to discuss the case further.

As the tour and presentation is completed, the police spokesperson indicates that the use of expert systems in the department has not taken the place of human decision making. The system only acts as an intelligent assistant for police personnel. She further states that the system is used for other functions of the department including training, strategic decision making, modeling of police response to disasters and budget planning. She points out that the simulation training regarding the police response to earthquakes was invaluable when as a relatively moderate quake hit the area last year. The department was much better prepared because of its ability to include "what if" scenarios in its training. The guide concludes the session, stating that changes in technology and their applications to the law enforcement function has allowed the department to deal with the increase in demand for services over the last 10 years.

THE STRATEGIC PLAN

The paper will now address the strategic management process for decision making, planning, and policy consideration. This process results in a strategic plan that was initiated from what we know about the issue, the uses of expert systems in law enforcement, in

terms of the present, and what we can forecast about the situation in the future through the use of a scenario-defined world.

As stated previously and for the purpose of this paper, the organization described here is hypothetical. It is referred to as the "organization" or the "department". It is representative of a mid-sized California police agency and is described as a result of input from many other organizations as well as research material.

This objective deals with developing a strategic plan in order to implement a viable policy regarding the issue of the use of expert systems in law enforcement. Prior to developing a strategic plan, an organization must evaluate its own capabilities, strengths and weaknesses, both internally and externally. A situational audit provides the framework for evaluating the competence of an organization. The more competent an organization, the more likely it will be successful in implementing change. The framework for this analysis starts with the SMEAC (Situation, Mission, Execution, Administration, and Control) model. Beginning with Situation, a situational audit is conducted using the WOTS-UP (Weakness, Opportunities, Threats, Strengths and Underlining Planning) model. This model aids in finding the best match between environmental trends and internal capabilities. The analysis then proceeds with the other components of the SMEAC model.

SITUATION

Environment

The organization has enjoyed a strong reputation among other law enforcement agencies for quite some time. As one of the five largest departments in the county, it has continually provided the criminal justice community with leadership, innovation and cooperation. Additionally, it has a strong support base from its citizens and continues to provide excellent service to the community.

Financially, the city is solid as a result of strong fiscal management that has insisted on now significant budget increases in the last five years. Operational expense increases have been kept at a minimum, and major capital purchases are only approved through the capital improvement planning program. This financial climate does not set an inviting stage for the introduction of new technology to the police department. However, the city and the department are beginning their third year of a five year computer project for the police department. Additionally, city management is receptive to new and innovative ways of financing new technology or programs, so opportunity for change does exist.

Demands for increased police services on the department have been significant. State legislated programs for missing persons, domestic violence, and more detailed statistical reporting has had an impact on the department. This factor is consistent with the

nominal group's forecasted trend of increased demand for police services. These external demands have influenced the department's move toward computerization as well as more efficient use of personnel by civilianizing some positions. These factors also support the group's forecasted trends toward increased civilianization and the use of computer technology.

Trends

During the futures study, the nominal group identified five trends that pertained directly to the issue of the use of expert system technology in law enforcement. The data generated from the analysis of these trends and their relationship to events shows their impact on the issue. The following is an analysis of these trends and their identification as an opportunity or a threat to the organization.

1. Civilianization Within Law Enforcement Increases

An Opportunity

Police executives have begun to realize that as costs for police services continue to rise, alternative and less costly means of providing services must be found. Civilianization has granted the organization an opportunity to provide, in some cases, more services at less cost. The use of civilians in police computer systems projects has been successful and will provide another opportunity to support the field and staff officer, allowing them to concentrate on those duties their classifications were designed.

2. Standardization of Telecommunications Technology is Increasing An Opportunity

The collection and electronic storage of data by law enforcement agencies is increasing significantly. Law enforcement stands to benefit greatly from these databases if they can share the information. The stumbling block to free communications has been the inability of all computer systems to communicate with one another. A change in technology that would allow free communications between computer systems would enhance law enforcement's ability to pool resources and information in order to solve crimes, identify offenders, and provide an effective network for statewide crime analysis.

3. The Use of Expert Systems Technology is Increasing An Opportunity and a Threat

Expert system technology offers law enforcement an opportunity to uses personnel more efficiently, provide "state of the art" training for its personnel, and retain the knowledge of department experts. Viewed as an opportunity, this technology can improve investigative quality, make better use of a sworn investigator's time, and be a cost benefit to the department. Viewed as a threat, some may feel that the system will take jobs away from workers, displacing employees. If not monitored carefully, an agency can become too dependent on the computer system and stop relying on personnel to solve more complex problems. If relied on too much,

fundamental training for personnel may stop because "the computer will do it." This reliance results in a loss of expertise upon which to build in the future. There was an example of this over-reliance in the insurance industry. A computer system was developed in an insurance company to underwrite of insurance policies. A panel of company insurance experts provided the knowledge base for the system. After the system was in place for several years, the company found that insurance agents no longer knew how to do underwriting because the computer always did it. The company initiated a training program to re-educate its agents.

4. The Demand for Police Services is Increasing

An Opportunity and a Threat

This trend is challenging law enforcement as an opportunity and a threat. Viewed as an opportunity, police agencies are changing toward more service-oriented programs. Communities are more supportive as crime, and the ability of the police to deal with it, is a major concern. Because of increased demands with little increase in budget, police administrators are becoming more in tune with fiscal management, looking for unique opportunities for funding. Viewed as a threat, some administrators see this as a time of manpower cutbacks, reduced support services, and low wages which does not attract the most qualified personnel.

5. A Change in Policing's Traditional Role

An Opportunity and a Threat

This trends suggests that the traditional role (of the police as the officer in uniform with the gun and the stick who arrests robbers) is changing. It is changing to one of a social services care provider that assists with the homeless, provides crisis intervention during domestic quarrels and other social service programs. Some see this change as an opportunity for the police to be totally involved in the safety and social welfare of the community. Others see it as a threat that weakens the image of a strong police force that is needed to maintain order.

Although each of these trends can be looked at as an opportunity or a threat, the department's leaders view them as opportunities for police management to be innovative and meet the challenges of a changing profession.

Resources and Capabilities

Following an environmental assessment and an analysis of the trends as opportunities or threats, an analysis was made regarding the department's capabilities and resources to meet the demands of change that recommended policies may suggest. A discussion of that analysis follows.

Resources

As with many departments, manpower is viewed as a problem area. The department has had a significant problem in maintaining adequate staffing levels for the last two years. The shortage is greatest in the uniform patrol division. The addition of a full-time recruitment officer and the streamlining of the application process has assisted in this area. Financial constraints continue to be present. City-wide restrictions on spending and increasing capital budgets continue to restrain administration's future planning. However, management's entrepreneurial view of relying on itself to find new sources for innovation can overcome this situation. Officers' skills were rated high with management scoring somewhat lower. This indicates a need to increase additional training and career development programs. Technology was rated as high for the department, and as a tool of choice by most of the those who responded. This high rating for technology suggests that the department has weathered the transition period of introducing computers into a manual environment and that it will be receptive to the introduction of new technologies and applications.

Capability

The analysis showed that "top managers" are viewed as seeking related and novel change or a strategic/flexible mode. The "organizational" climate suggests that the department provides a climate that rewards innovation and new ideas and provides

incentives for those who wish to participate in change. The "organizational competence" of the organization rests with middle management who are viewed as the "make it happen" part of the organization.

Strengths and Weaknesses

This situational analysis has resulted in an assessment of the department's strengths and weaknesses. This evaluation is essential in preparing a strategic plan. The identification of the organization's competence and its present position to take advantage of opportunities results in a match of what the department does best and what the best opportunities are in its environment. This knowledge prepares the administration for developing policies that will be successful.

Strengths

The organization's strengths lie in two specific areas: (1) Management is willing and eager to explore new opportunities in technology and ways of managing the department more efficiently. Management is considered competent and able to provide direction and leadership in a changing environment. (2) The department has hurtled the learning curve regarding computers. The use of computers in the department is accepted and encouraged as setting the stage for the introduction of new technologies.

Weaknesses

The city's financial posture restricts traditional funding sources for any technological advances in the police department. Funding sources will need to come from other than the general fund. The financial climate also suggests that not only initial funding but also continued maintenance of the project will need to come from a new source.

STAKEHOLDER ANALYSIS

It is important to recognize that any strategic plan or policy can affect many organizations, individuals and interests. It is equally important to attempt to anticipate these stakeholders' concerns when developing a strategic plan so as to recognize, as early a possible, their importance and place in the plan. Some stakeholders do not appear important at first glance, but may play a significant part in gaining acceptance for a plan. Such stakeholders are referred to as "snaildarters" and are identified in this analysis. The following stakeholders have been identified as being important to the issue of using expert system technology in the police department. Assumptions have been made about the stakeholder's importance and certainty on the issue. A discussion of the stakeholders and the assumptions follows. Table #4 plots the analysis of stakeholders and assumptions.

Stakeholders and Assumptions

1. Police Chief--Supportive

A. Wants to improve service to the community, recognizes the need to economize on personnel costs, and sees the use of computers as a means of saving costs

B. Supports new technology and is open to looking to new sources of funding

C. Will approve temporary reassignment of personnel in order to implement new project

D. Will act as buffer and resource in convincing city manager and council of merits of the project

2. City Manger--Mixed

A. City manager will be concerned with costs and funding source

B. Will support change but suspicious of computer technology and city's high investment in equipment that has a short state-of-the-art expectancy

C. Project will need to pay for itself and maybe even provide funding surplus before he supports it fully

3. Department Employees (Sworn & Civilians)--Mixed

A. While supportive of change and technological advances, some employees are concerned that computers may replace jobs, though this has never been the case

4. Citizens--Supportive

A. Citizens see use of new technology as a way of providing additional service

B. Citizens feel sworn officers should be in their neighborhoods more often and support anything that may free offices time

C. Citizens have seen successes with Cal-ID system and other police technologies and view it as a benefit

D. Citizens would not favor an increase in general fund for this change but might support user fee increases

5. City Council--Mixed

   A. Has been under criticism for not increasing police staffing--may look at this as opportunity

   B. Does not want to increase city spending or debt

   C. Would support unique funding sources for project if it didn't impact general fund

6. Media--Mixed

   A. Would be supportive depending on fiscal impact

7. Courts--(Snaildarter)--Mixed

   A. Court tests on use of expert systems to establish legal probable cause not substantiated yet

   B. Sharing of information between departments or the police gathering possible offender files may become a court issue

8. American Civil Liberties Union--(Snaildarter)--Opposed

   A. Have opposed any increased file gathering by police as invasion of privacy

   B. Will be watching carefully how police gather criminal record information and share it with other agencies

   C. Will be concerned about misuse of authority and information

9. Police Union--Mixed

   A. Will be supportive if convinced jobs are not in jeopardy

10. Surrounding Police Departments- Supportive

   A. Hoping to share resources and information of larger agency

B. Can take advantage of no up front development costs

C. Will have an opportunity to increase own departments service level at a reasonable cost

11. District Attorney--Supportive

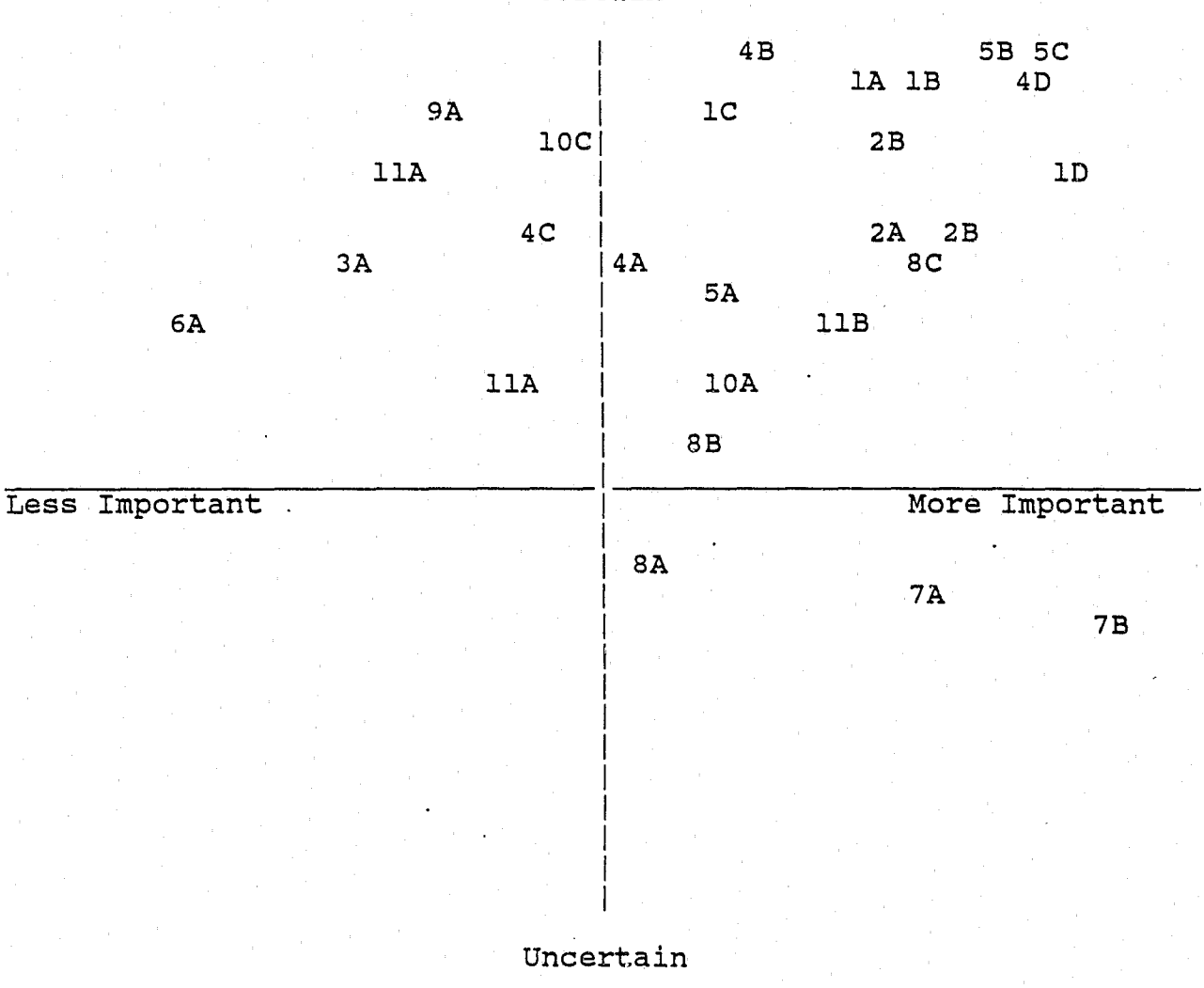
A. Would hope to share resources

B. Would look to question of admissability of probable cause based on analysis by an expert system

The following table represents a plotting of the stakeholders assumptions. This graphic display assists in recognizing the importance of each stakeholder's position on the issue of using expert system technology in the police department and the confidence in the of the stakeholder's position on the issue.

TABLE #4

Stakeholders Assumptions



Stakeholders

1. Police Chief
2. City Manager
3. Department Employees
4. Citizens
5. City Council
6. Media
7. Courts
8. ACLU
9. Police Union
10. Other Agencies
11. D.A.

MISSION STATEMENT

The mission statement serves as a reference for the organization to ensure that it remains on the right track in actually performing the goals it originally set out to achieve. The mission statement for the hypothetical department of this paper is as follows:

The police department provides for the equal protection and safety of all who enter its city limits through a law enforcement organization that has developed a long-range strategic plan for the effective, efficient and safe policing of the community. It is an organization that is responsive to the changing needs of its environment and is dedicated to planned excellence that encourages and assists in the professional and career development of all of its employees. The organization is committed to alternative strategies and policies to implement the uses of expert systems technologies into its operations to enhance its service to the city and the law enforcement community.

EXECUTION

Alternative Strategies

A policy delphi is a process designed to examine policy issues. It serves as a supplement to the committee approach to policy development. It is comprised of a small group of persons, not all

from a police background, knowledgeable of the issue and diverse in background and approach. This group gathered after reviewing the futures material and the material resulting from the strategic planning process. They also individually prepared a policy alternative in advance of meeting and each was evaluated by the group for feasibility and desirability. Suggested policy alternatives were distilled to three. Each was evaluated in terms of pros and cons and a discussion of stakeholders reaction to each policy followed.

ALTERNATIVE STRATEGIES

Strategy Number One

After acquiring a small, inexpensive expert system program that will run on an existing personal computer, the department will begin a pilot program. A civilian community service officer will be responsible for the project. A knowledge base will be developed by using the expertise of a homicide detective. The resulting system will be used on a limited test basis for one year. A determination will be made at that time whether expansion of the project is feasible.

Pros

This alternative would allow the department to begin experimenting with a limited expert system. There would be low investment in terms of software costs, and no increase in hardware costs since an existing personal computer would be used. There would be little

threat to employees because it would be on such a limited scale.

Cons

Expert systems have been tested elsewhere. That information is available, thus negating the need for this limited testing. A limited test like this may not show the potential applications elsewhere and results would be slow in coming.

Stakeholders Reaction to this Strategy

City Manager- Feels that this is a safe approach with little financial risk; will support because of little money involved.

Employees- They would not feel threatened with this because of its limitations; would support.

Police Chief- Would support as a foot-in-the-door approach but favors a larger scale project.

ACLU- Would not consider this approach too serious; would be watching for any profiling of potential suspects for civil rights issues.

Strategy Number Two

Contract with a computer systems vendor to develop an expert system, customized to the department's needs. Budget for the project through the normal budgeting process. Reassign existing personnel to work on the project, and target training and investigation as project areas.

Pros

This approach would result in knowledgeable people and the vendor in developing a system that fits the needs of the department. It will lessen the research and start-up impact on department resources as the vendor would be responsible for the implementation.

Cons

Past experience has told police administration that it would be unlikely that this project would be funded through the normal budgeting process as other needs may have a higher priority. Developing a customized system will not aid in sharing the information with other departments or making the technology available to other departments.

Stakeholders Reaction to this Strategy

Police Chief- Would support but knows the reality of city management not approving such a project through the normal budget process.

City Manager- Would oppose this project as too great of an impact on the city budget.

Police Union- Only concern would be what impact it would have on general budget and monies available for salary increases after implementation.

Citizens- Citizens would support project but would be concerned about increased spending by city; would want to know if this put more officers on patrol in the neighborhoods.

Surrounding-Departments Would be concerned that development would only fit one department and that technology wouldn't be transportable or useful to other agencies; may result in reluctance to share information.

Strategy Number Three

The department would apply for a state-of-the-art grant from the state criminal justice council for the development of a regional law enforcement expert system to be used in the investigation of felonies and the identification of major offenders. The system would be located in the department but other agencies could have access through a telecommunications network link. The department could fund operating costs by contracting data entry or analysis services to other agencies.

Civilians would be assigned the project, relieving sworn officers for field assignments.

Pros

This strategy would have a low cost impact on the department and the city. It would provide an means of sharing agency databases on a regional basis. It would allow any size department to have access to the technology. By targeting felonies and felons, results, if successful, would gain publicity, thereby helping support other applications of expert systems in the department.

Cons

Restrictions of some sort accompany grants; the impact of which is unknown; grants usually require matching funds by the agency, and funds would need to be budgeted for this.

Stakeholders Reaction to this Strategy

City Manager- Would probably support depending on amount of matching funds required; would be concerned about council's long-term obligation to grant and other agencies

Police Chief- Would support

Surrounding-Departments Would support depending on costs to them; would be very supportive at opportunity to share databases and resources of larger

department; would support regional concept

Citizens- Would support regional concept as a way to to get more policing for less cost

ACLU- Would not support sharing of databases and would be concerned about privacy issues and information shared--who has access, etc.

Courts- Would be supportive but not a factor until the first case comes to trail regarding expert systems used to identify a suspect

Recommended Strategy

Of the three strategy alternatives, the panel felt that #3 was the most viable and incorporated most of the data from the futures analysis. This alternative did include reference to the forecasted trends of increased use of expert systems, the increasing use of civilians in law enforcement, and the uses of standardized telecommunications links. Though not specifically mentioned, the two remaining distilled trends, increasing demands for police services and the changing role of the police, are implied in the policy. The policy addresses five goals desired by the panel to implement a strategic plan for using expert systems within the department: (1) The use of expert systems in solving crimes and

identifying suspects; (2) Developing a system that can be used by any size agency; (3) Using a system that allows for the sharing of law enforcement databases; (4) Obtaining a funding source other than the general fund for the project; (5) Develop a plan that will provide income to pay for on-going operating costs of the system. The panel also felt that this initial application should focus on a specific aspect of crime solving rather than try to immediately address the many uses of expert systems. As a result, the panel chose the use of the system in identifying methods of operations for felony crimes and known offenders.

The panel further discussed whether obtaining a grant to fund the project was preferable. The panel preferred finding a vendor that was willing to fund the project while using the department as its test site, in exchange for the department sharing any revenues received as a result of after-development sales. This partnership could result in paying for operating costs and ensure the department's ability to obtain future enhancements. The components of the recommended strategy were restated as follows:

1. Engage in a cooperative agreement with an expert system vendor to develop a system that targets method of operations factors for felony crimes and known offenders. In the event a vendor could not be found who was willing to participate in this project, applications would be made for the appropriate state grant.

2. The system would be a regionalized project, sharing databases and output with other agencies.

3. In return for using the department and its expertise, the vendor would share revenues for any sales made of the product after development. These funds would pay for the department's operating expenses and would ensure future enhancements.

4. The department would utilize existing civilian personnel to administer and run the project.

This resulting strategic alternative was viewed against the previous stakeholder's assumptions. The assumptions associated with strategy 3 agree with this new alternative.

ADMINISTRATION AND LOGISTICS

This section addresses the method that will be used to implement the selected policy. It addresses the action steps and resource requirements that will be needed to support the transition plan that will follow.

To implement this project, a committee will be developed comprised of the police chief, city manager, city finance director, a chief of police representing the surrounding city police departments, a senior police investigator from the department, a representative

from the district attorneys office, a citizen member of the police/community council, and a representative from the police department's computer services unit. Others may be asked to join the committee as needs or issues arise. The project will be referred to as The Expert Systems in Policing project or ESP.

A minimum budget allocation will be requested as start-up funding for the project. It is hoped that this investment can be repaid as the system is developed.

Sufficient office space has been located within the police department to supply the preliminary needs of the project committee. Hardware in this location is sufficient to begin the project. It is anticipated that if an outside vendor is used for development, on-site physical resources will be used at a minimum. As a backup to using an outside vendor for funding, preliminary inquiries will be made with the Office of Criminal Justice Planning as to the application for grant funding. A detailed development and implementation plan will be made with timelines and performance criteria included.

COMMAND AND CONTROL

This section ensures that adequate feedback and monitoring of the project occurs. The ESP committee will develop monitoring procedures to ensure that the project progresses on time and that all issues are addressed. It will be the responsibility of the

committee to monitor, review and control the project in order to achieve the stated goals. Periodic progress reports will be completed by the committee and forwarded to key stakeholders, thereby ensuring open communications.

Once this project reaches the point where regionalization is apparent, this committee may be restructured to include representation from the other user sites. Depending on the success of this project, it could become a county-wide or even a state-wide system. Should this occur, a restructuring of the committee will be necessary to encompass changing needs.

TRANSITION MANAGEMENT PLAN

Thus far, this paper has focused on the future of the use of expert systems in law enforcement, identified trends and events regarding the issue, evaluated alternative strategies on achieving this goal, and presented a strategic plan for implementation. The paper will now approach the final process of developing a transition management plan. The transition management plan will be used to implement the strategic plan by identifying the critical individuals or groups that are necessary to implement change. The transition management plan will be used to assess the key players known as the critical mass, readiness for and commitment to the plan. A description of a management structure used to ensure a successful transition will also be discussed.

The successful management of the period of time from when a strategic plan is formed to when it is implemented is critical, and it is dependent on management's ability to assess the organization's or key group's strengths and weaknesses. In the case of this study, the key group or critical mass is the initial development committee discussed during the strategic plan portion of this paper. The committee, known as Expert System Project committee (ESP), is a group of individuals representing key areas of responsibility or power regarding the implementation of expert system technology in the police department. The group has been a policy-making body and will now be responsible for the implementation of their policy and strategic plan.

Great care will be taken in creating a sense of team spirit and nurturing among the group. It is possible that the nature of this project could cause stress among group members and difficulties for them in terms of how their superiors react. Steps will be taken to reduce this stress by emphasizing the goals of the project and offering stability and purpose in terms of where the group is going and what it is to accomplish. Roles will be clearly defined and, as will be seen later, responsibilities will be assigned and clearly understood. Feedback and assessment from all team members is encouraged and attention will be given to not only how they will manage the present system during transition but also how management will develop after the change. This communications will take a lot of the mystery out of the project and forestall fears some may have

over unclear expectations. This particular management structure was appropriate to this project because the plan does not call for major change that will disrupt operations significantly. It was determined early on that this plan would provide an opportunity for the department, and other surrounding agencies, to embark on new territory for law enforcement in general and their agencies in particular. Its success can only enhance the environment of each agency and area represented by the committee.

The Critical Mass

As stated previously, the critical mass has been identified as the department's chief of police, the city manager and finance director, a chief of police representing the surrounding departments, a senior police investigator, a deputy district attorney, a department computer services manager and a citizen.

A "Readiness Assessment" of this group was completed in order to more clearly identify the groups ability to deal with change and flesh out the group's goals. This process will also be used to build agreement among the group toward the desired plan. Readiness assessment is the early step in developing an action plan and identifies potential sources of resistance to change. The formula used for assessing readiness suggests that it is likely that change will occur when the level of dissatisfaction with the status quo is combined with the existence of clear goals and a perception that

there are viable first steps available for achieving goals. This assessment follows as Table 5.

TABLE #5

Readiness Assessment

KEY STAKEHOLDERS CRITICAL TO THE CHANGE EFFORT	READINESS			CAPABILITY		
	HIGH	MED	LOW	HIGH	MED	LOW
1. Police Chief	X			X		
2. City Manager			X		X	
3. Finance Director			X		X	
4. Police Chief representing area agencies	X				X	
5. Department Investigator	X			X		
6. Deputy District Attorney			X		X	
7. Department Computer Svs. Manager		X		X		
8. Citizen	X			X		

This assessment shows that a few key decision makers have some reservations about the project. The department's police chief, the outside agency chief, the investigator and the citizen were rated high in readiness and capability. This indicates that they are prepared for change and ready to make it happen. The finance director, city manager and district attorney are rated as low in readiness and medium in capability. The district attorney's (DA) role in this process is less clear because her expertise will be most useful in evaluating any privacy or civil rights issues that may occur as well as the admissibility of evidence obtained because of the system. The DA's rating may change once her role is more clearly understood, and she views that role as important. The rating for the city manager and the finance director are predictable in that they are still waiting to see if funding sources, other than the city, come through for the project. They are capable once this matter is cleared up. The computer services manager is rated as medium in readiness and high in capability. This is acceptable, for he too is waiting to become part of the project and clarify his role.

COMMITMENT PLANNING

To determine the key players' current level of commitment to the plan, an analysis of their commitment was made. Table 6 depicts the result of that analysis with a discussion that follows.

TABLE #6

COMMITMENT LEVEL CHART

ACTORS IN THE CRITICAL MASS	BLOCK CHANGE	LET CHANGE HAPPEN	HELP CHANGE HAPPEN	MAKE CHANGE HAPPEN
Department Chief of Police			Today---------->x	
City Manager		Today---------->x		
Finance Director		Today---------->x		
Chief of Police Rep. other agencies			Today---------->x	
Department Investigator		Today---------->x		
Deputy District Attorney		Today------>x		
Department Computer Svs. Mgr.		Today---------->x		
Citizen			Today---------->x	

The Commitment Level Chart (Table 6) is consistent with the Readiness/ Capability Assessment found on Table 5. The indicators

of support, as well as concern or possible opposition, held true from the Readiness/Capability Assessment to the Commitment Level Chart.

The City Manager and Finance Director

The city manager and finance director need to move from a position of blocking change to at least letting change happen. Their position, again, may be from their financial concerns regarding the project, but their support is crucial to the project. Steps will be taken to ease their concerns and move them toward support.

Department Police Chief

The department's police chief will be crucial in making this change happen. He sees this project as an opportunity to break new ground in computer use and also provide additional services to the community and department at low or no cost. He will be instrumental in influencing the city manager and finance director and alleviating their financial concerns.

Department Investigator

The investigator will be very important in making this project happen. The investigator is a little more reluctant and perhaps suspicious of computers being used in solving crime or using his expertise; but he can be encouraged to make the changes happen once he sees the benefits. The investigator's influence on other investigators and officers of the department will play a major role

in gaining their support and acceptance of the changes.

Police Chief Representing Area Agencies

The chief representing the area agencies appears committed to the project and will ultimately make change happen. Keeping him informed and a part of the project will be important as he will market the project not only to other agencies but to his city government people as well. Their feedback to the city manager will aid in strengthening his support.

Citizen

The citizen's support will also be necessary but one can see that he is already supportive of the change and will help it happen.

Deputy District Attorney

The deputy district attorney's position is that of a resource. He will be supportive in developing the new technology and will help with legal issues as they arise. He will move from a position of letting change happen to helping it, and, depending on the projects success, he may take a more active role and make it happen.

Department Computer Services Manager

The department computer service manager, too, is waiting for opportunity and will help change happen initially and then move into full support to make it happen once his role is clear. His support is important because the city manager will rely on his

objective evaluation of the feasibility of the project, its costs, and its chances for success.

This analysis points out two important factors regarding the planning process: (1) No amount of planning will be useful unless the key players accept or approve of the results; (2) Some of the key individuals must take ownership of the changes and play an active role in implementation and making change happen.

MANAGEMENT STRUCTURE

The committee of the above-mentioned stakeholders will be formed into a task force in order to implement the strategic plan. Consideration has been given to what type of management structure is required for this project. The type or style of management will greatly affect the process and outcome of the project. Consideration was given to the amount of authority committee members should have in order to garner support and keep the project moving. Consideration was also given to the credibility of the leaders and their openness for change. A need exists in this project to persuade rather than direct. The key individuals involved in this project represent significant stakeholders and important people in their own right. Additionally, the members of the committee are responsible to a variety of other authorities and inputs to which any management style used must be sensitive.

There are several management structures that can be used in leading a project like this one. One example is the appointment of a project manager who is directly responsible to a chief executive and has been exclusively assigned to the project. As such, the person enjoys the authority and power of the executive officer in order to affect the changes necessary. Another management structure option calls for the chief executive to be the project manager (in this case the department's chief of police). In this example, the head person is directly responsible for coordinating the change. Another option, and the one found to be most appropriate for this project, is the creation of a group consisting of representatives of key stakeholders. In this instance, change is managed by a group who represents major constituencies involved in the change. This would be the same key critical mass as described previously that made up the Expert Systems Project committee. This management structure was found to be most appropriate because of the nature of this project and its susceptibility to failure due to misinformation among the key stakeholders. Since the strategic policy came from the stakeholders They will feel some ownership for the policy and help make it happen. The key to this project will be communication.

IMPLEMENTATION PLAN

The ESP committee will oversee, monitor and control the implementation of the program. In order to ensure that the members

of the committee understand their roles and responsibilities, a method has been chosen that works well to support implementation and relieve some of the tension and uncertainty involved in change. This process is called "Responsibility Charting" and works to clarify role relationships in an effort to reduce ambiguity and adverse reactions to the plan or actions of the plan. It allows for a better understanding of the different roles involved and a better appreciation of their points of view. It also clarifies who is responsible for a decision, action, or task and restricts that responsibility to one person for each. A responsibility chart for this project follows. Table 7 identifies the ESP actors and some of the tasks or decisions that will need to addressed. The tasks and decisions listed are not inclusive but serve as an example of the responsibility charting process.

TABLE #7

RESPONSIBILITY CHART

	ACTORS							
TASKS	Dept. Police Chief	City Mgr.	Finance Director	Area Police Chief	Dept. Inv.	Comp. Svs. Mgr.	Citizen	Dep. DA
Initial Design Proposal	R	A	S	I	S	S	I	I
Outside Vendor Request for Proposal	A	S	S	I	I	R	I	I
Funding Source	S	A	A	I	I	I	I	I
Progress Reporting	S	I	I	I	I	S	I	I
Implement Shared Database System w/Area Departments	A	I	I	R	S	S	I	S
Establish Budget	R	A	S	I	I	S	I	I
Obtain State Grant if Necessary	R	A	S	I	S	S	I	I

R = Responsibility (Not Necessary Authority)
A = Approval (Right To Veto)
S = Support (Commit Resources Toward)
I = Inform (To Be Consulted)

The responsibility chart reflects the fact that the department's chief of police is responsible for initiating much of the action of this project and for controlling its direction. Budget concerns remain the responsibility of the chief but must be approved by the city manager and the finance director. In the areas where a key stakeholder is specifically affected, the need for that person's support is noted. The department investigator is generally informed of the tasks except where he is specifically involved in the initial design. His input and support is very important and is therefore included in the process. The importance of keeping the surrounding area chief informed is obvious, as is the need for his support when the time comes to share databases.

The responsibility chart is useful as it provides for a new understanding and appreciation of people's roles and their attitudes regarding those roles.

Managing Anxiety and Uncertainty During Transition

As previously stated, change has a tremendous effect on any organization. It can be managed but must be done with care. The manager must understand the dynamics of change and transition. The recommended approach that is for this project is one of openness or a holistic management approach. This approach would be used during the negotiation process with each stakeholder. It is a position that attempts to understand all parties' perspectives and

tries to turn that into a policy or strategic plan that would create a win-win situation for all.

Several methods will be used to manage a successful transition. The group has agreed upon the concept that the use of expert systems in law enforcement can be used to supplement investigations and provide for a greater use of personnel. The groups or organizations they represent have committed their support to the project which will help relieve some apprehension the stakeholders may have had. Additionally, steps will be taken to set up the transition management team (ESP) that will manage the change, while existing management will continue with on-going operations. Also a feedback process will be included to keep all parties informed and on task so that misunderstandings and competing agendas are at least reduced if not eliminated. Group members have seen successes with similar projects and, therefore, their expectation of success is high and their roles clearly defined.

CONCLUSION

This paper has focused on the future application of artificial intelligence expert systems to law enforcement by the year 2000.

The first section of this paper discussed a scenario of possible futures that used expert system technology in daily police operations. An expert system program models human reasoning and is

able to reach conclusions that an expert would. It receives this ability by modeling the human expert. For law enforcement, this application translates into the ability to capture and retain the expertise of key organizational people and apply that expertise consistently to the operations of the department. It can increase service to the public by maximizing employees' time and providing a greater amount of information to the department.

The second objective of this paper discussed in a strategic plan with alternative policy strategies. This plan called for the development of a project that would use an expert system to investigate felony crimes and offenders, a system that can be used by any size department, and a system that allows departments to share databases. The plan also called for the project to be funded either by grant or by entering into a partnership with a private vendor. An analysis was then conducted regarding the reaction to the policy by key stakeholders who are affected by the policy and have influence on its outcome.

The paper's third objective addressed the transition process-putting the plan to work. The transition process takes the issue from the present to the desired future. This process was accomplished by identifying those individuals, known as the critical mass, critical to the implementation of the desired policy. These key stakeholders were then evaluated regarding their readiness and capability for change and commitment regarding what

was needed to implement the policy. The group's levels of participation in the process were identified through a responsibility charting process. The transition process was completed with recommendations for a management structure that identified management roles, leadership roles, the importance of team building, and control systems.

This paper has produced a guide that has forecasted the implications of new computer technologies for law enforcement in the future. It has examined the possible future and has developed a plan to implement that future, structuring a management approach to administer and implement change. It has shown that the technology is available and has application to law enforcement. But it has also shown the political realities that a police administrator must face. Police administrators today, and particularly in the future, must be tuned into the financial conditions of their cities and look for new opportunities of funding to create new programs to meet the public safety needs of their communities. An underlying factor in this analysis has been the questions of "How much does it cost?" and "Where are you going to get the money." This topic alone could generate a new study regarding the entrepreneurial police executive of the future.

Forecasting the future through trends and events showed that law enforcement will be faced with many challenges over the next twelve years and into the 21st century. The policing role is changing.

The role of the sworn officer will be more specialized and civilians will be used to a greater extent, performing support duties that today are associated only with police officers. The police will be asked to provide more and more services in the future, the nature of which will be much more social service oriented.

These trends and changes in law enforcement will challenge police executives, in small and large departments, to be innovative and look for ways of maximizing their existing and potential resources. Computer technology will play a key role in the police organization's ability to maximize resources in the future. As technology continues to evolve, law enforcement will find opportunities to apply that technology to its operation. This paper presents a scenario of the not-too-distant future where police departments utilize expert systems to model the investigative processes of detectives, provide interactive training for officers and other personnel, and assist in making decisions about planning for police executives. The cost of such systems is declining and will be within reach of any size department within the next 10 years. The future of law enforcement, and the challenges facing police executives of the future, can be at once exciting and threatening. However, by examining the future, by looking forward from the present in a systematic and objective way, administrators will be better prepared to meet those challenges and manage change successfully.

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APPENDIXES

APPENDIX A

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APPENDIX B

Candidate Trends and Events

Trends

1. Cost of personal computers is declining
2. Fewer people are entering law enforcement profession
3. The use of expert system technology is increasing
4. Public safety spending is staying constant or decreasing
5. Use of computers in law enforcement is increasing
6. Union membership is declining
7. Civilianization in law enforcement is increasing
8. Increase in demand for police services
9. Police service demand is changing to more social services
10. Cost of police training is increasing
11. Computers are being used in training function
12. International interests in data exchanging is increasing
13. Civilian career paths are developing in law enforcement
14. Expert systems are being used as a training tool
15. Standardization of tele-communications is increasing
16. More private/public partnerships-privatization
17. Ability to assimulate data is increasing
18. Amount of information generated by police is increasing
19. Sharing of databases
20. Traditional role of police is changing
21. Increased population growth in Orange County
22. Increased minority population in Orange County
23. Increased use of private security systems
24. Privatization of public services increasing

25. Increase concern for protecting computer data

Events

1. Police computers are liked statewide
2. Police department regionalize
3. Police retirement age lowered to 45
4. Computer training mandated by state commission on police standards
5. Illegal drugs legalized
6. A serial murderer is captured by police using an expert system
7. State-wide expert system uses method of operations to identify criminals like CAL-ID fingerprint system
8. Energy crisis occurs
9. Major economic crisis occurs
10. Major earthquake occurs in Southern California
11. Major breakthrough in unforeseen computer related technology
12. Nuclear terrorist act
13. Legal privacy issued raised in sharing of police databases
14. Binding court case prohibits police from sharing databases
15. Court decision mandates equal police protection across state