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WORKING SMART: APPLICATIONS OF EXPERT SYSTEMS FOR PATROL MANAGERS BY THE YEAR 2000

By

**Robert R. Henderson
Command College Class XIII
Peace Officers Standards and Training (POST)**

**Sacramento, California
February, 1992**

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**U.S. Department of Justice
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This Command College Independent Study Project is a FUTURES study of a particular emerging issue in law enforcement. Its purpose is NOT to predict the future, but rather to project a number of possible scenarios for strategic planning consideration.

Defining the future differs from analyzing the past because the future has not yet happened. In this project, useful alternatives have been formulated systematically so that the planner can respond to a range of possible future environments.

Managing the future means influencing the future--creating it, constraining it, adapting to it. A futures study points the way.

The views and conclusions expressed in this Command College project are those of the author and are not necessarily those of the Commission on Peace Officer Standards and Training (POST).

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EXECUTIVE SUMMARY

This study analyzes the development of expert systems and their possible use by patrol managers. It focuses on three questions: can such systems enhance patrol operations, will their use be affected by future training needs and can law enforcement managers be convinced to use them?

Chapter I - Futures Study

This chapter summarizes available literature and presents information gleaned from a number of personal interviews. Using a group of individuals representing a cross section of managers, educators and computer experts, it examines a number of trends and events that are likely to impact this issue. By examining the cross impact of seven key trends and five events, a likely future is developed and, based upon that future, three scenarios are presented that describe different agencies exposed to identical conditions: one unprepared but able to limp through the next decade, one totally unprepared for and devastated by the future and one that anticipates future conditions and prepares for them, enabling it to weather the next ten years relatively unscathed.

Chapter II - Strategic Plan

A strategic plan is developed, designed to carry a department toward the goals achieved by the agency described in the third scenario. The plan calls for significant department reorganization and development of a long term systems acquisition plan. Critical stakeholders are identified, their key assumptions mapped, and a strategy developed to maximize support and minimize opposition.

Chapter III - Transition Management

Since the strategic plan calls for substantial changes within the target organization, a means of managing the transition is presented. This part of the plan is designed to avoid chaos and keep resistance to a minimum during the period of change. A program is suggested based upon a strong project manager model combined with a group consisting of individuals representing a diagonal slice of the organization. Key players are defined and their areas of

responsibility assigned. Finally, specific methods to communicate information, provide training and establish an evaluation loop are discussed.

Conclusions

The study concludes that the use of expert systems by patrol managers will indeed enhance operations, and that future training needs are likely to increase the benefits of using such systems. The study also concludes that initial resistance by managers to such systems is a real possibility; however, it also suggests this resistance will naturally diminish over time, and that its disappearance can be aided by a number of measures outlined in the strategic and transition management plans.

INTRODUCTION

Provides background information regarding the need for improved archiving and dissemination of information. Presents expert systems as one means of achieving this, and outlines the steps taken to review their possible use by patrol managers.

CHAPTER 1 - FUTURES STUDY

Projection of the need for sharing expert knowledge among patrol managers by the year 2000, and development of future scenarios.

CHAPTER 2 - STRATEGIC PLAN

Presentation of a model plan for the Contra Costa County Sheriff's Department, defining methods for introduction of new technology and department-wide coordination of its use.

CHAPTER 3 - TRANSITION MANAGEMENT

Suggests a means of managing major organizational changes, minimizing resistance and stress that often accompany such change, and maximizing chances for successfully achieving goals.

CONCLUSION

A review of the issue of expert system use; what part such systems may play in future patrol management.

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INTRODUCTION

Introduction

In 1980, Alvin Toffler wrote of the demise of the industrial era and rise of information as the new power base. He described what he called "information pollution" and the need to make the work environment smarter. In 1984, John Naisbitt picked up on the same thread, referring to information as a "key resource that is not only renewable, but self-generating" as well. He also expressed concern over the sheer amount of information we are all exposed to and our lack of ability to properly control it, stating that "we are drowning in information but starved for knowledge". Tom Peters joined the increasing number of writers devoting considerable thought to this phenomenon in 1988 when he observed that the sharing of information was critical to good management.

Central to the writings of these and many other individuals is the belief that information is the key to organizational success, which will be measured not by production capabilities, but rather by the ability to collect, archive, retrieve and disseminate information in the most efficient manner.

Law enforcement certainly qualifies as an "industry" that must depend upon these capabilities. Consider the fact that almost everything a police agency does is based upon information gathered from myriad unrelated sources: citizens, its own officers, other police agencies, courts, state and federal agencies to name a few. Just coordinating the numerous sources of information is a Herculean task. Combined with the unbelievable number of different categories of information needed, the task sometimes seems almost hopeless.

The law enforcement community has begun to appreciate the need to make better use of information, but has yet to achieve significant improvements in anything other than information archiving. Kurt Hallmayer, an information systems manager and vice president of an international users' group for police and fire computer-aided dispatch and automated records management systems expressed a growing frustration that seems to be echoed with some regularity. He observes that law enforcement agencies are on the "fringe" of using computers to enhance operations, but have done little else to use the powerful tools now at their disposal.

He believes that agencies are earnestly trying to make better use of information, but efforts are often uncoordinated and diffused. Departments still purchase stand-alone systems that do not interface with one another, limiting dynamic data exchange, and individual units jealously guard their "turf," keeping knowledge to themselves. Expertise in a number of critical areas is often held by a few highly trained and experienced employees who take the knowledge with them when they "walk out the door" (Hallmayer 1991).

The concerns expressed by Toffler, Naisbitt, Peters and Hallmayer, as well as many others, raise a number of questions. How can police departments make better use of information? What role will automated systems play in improving how data is received, stored, retrieved? What can agencies do to disseminate knowledge among the greatest number of people? How can information processing be improved to increase both the quantity and quality of services? This paper explores a single facet of this complex issue:

Can expert systems be used by patrol managers to improve their decision making abilities by the year 2000?

Even concentrating in this one area creates too broad a subject to cover in one paper. Consequently, three key questions will be addressed:

Can such systems be used to enhance patrol operations?

Will training needs impact their use?

Can patrol managers be convinced to accept and use expert systems?

Methodology

To gain a clear understanding of this topic, a number of research methodologies were employed, including environmental scanning, interviews, literature review, group and panel exercises and alternative future structuring. The results of this research will be presented along with answers to the three questions posed.

To illustrate the practical applications of this research, one of the future scenarios will be selected as a target, and a strategy presented that is designed to achieve that desirable future. To make the proposal more realistic, the strategy outlined is tailored to the needs of a specific agency; however, the plan's true strength rests in its ability to be easily adapted to the needs of any department. Its mechanics are based on logical steps designed to identify a future issue, select a future goal and maximize the probability of attaining that goal through understanding and planning for each critical step.

Finally, the paper will address a key yet often overlooked element in any long term plan - how to get from "here to there." In more sophisticated terms, organizations do not easily nor automatically make major transitions in what or how they do things, and neither do the people involved. Major changes often

take considerable time to fully implement, and even longer to adjust to. How this period of transition is handled is critical and will have a significant impact on whether or not the plan is ultimately successful. Therefore, a format for transition management will be presented, again contoured to the needs of the target agency. Like the strategic plan, though, its strength lies in its ability to be modified to meet the needs of any organization.

Expert Systems

Before any of the research can be presented or any strategies outlined, one preliminary question must be resolved - exactly what is an expert system? If a review of the available literature on this subject does anything, it certainly alerts the reader to the fact there is no single definition that is universally accepted.

To some, expert systems represent one discipline in the larger field of artificial intelligence (AI) which is most easily defined as developing computers that emulate the human thought process. Others reject this definition, preferring to label them as simple, computerized decision-making programs.

Regardless of what side of this argument people in the field fall on, most agree that expert systems share certain common characteristics:

- They codify expert human knowledge in a way that allows the system to make decisions similar to those the expert would make in like circumstances.

- They are limited to one specific area of expertise.

- They can not only make a decision, but also describe how that decision was reached as well. In other words, they are self-auditing.

Whether or not expert systems represent a form of artificial intelligence has little practical impact on the topic of this paper. Determining if such systems have applications for patrol managers is more a question of what they do, not how they do it. For that reason, the question will be ignored. Expert systems will be considered, in this report, only in terms of what their shared characteristics are. These will be limited to the three outlined above.

Expert systems codify human knowledge. That is, they take the knowledge of human experts in a given field, and design a program that allows a computer to make decisions the experts would likely make if confronted with similar circumstances.

Just as humans are generally considered experts in a single field, expert systems are similarly limited. The massive amount of information required to codify expert knowledge in even a single field is so great, it would be impractical to attempt to combine data on different subjects. Therefore, such systems concentrate on one area.

Finally, expert systems are self-auditing. This reflects the need for humans to not only understand an answer, but to understand how the answer was derived as well if they are to have confidence in the conclusion reached. Expert systems accomplish this by maintaining a complete record on data considered and the selection process itself.

CHAPTER I

(FUTURES STUDY)

Chapter 1 (Futures Study)

A number of factors may have a significant impact on whether or not expert systems will be used by patrol managers before the end of the century. To assist in identifying those factors, particularly in terms related to the three areas of specific interest defined in the Introduction - system use to enhance operations, the impact of training needs on the level of expert system use and the acceptance of such systems by patrol managers - a number of research methodologies were employed including interviews, a review of available literature, structured group discussions, use of an informed panel and creation of a number of alternate future scenarios based upon the results of the research.

The initial research suggests a number of basic assumptions may be made. First, there appears to be some strong arguments to support a belief that expert systems can improve patrol operations in a number of important ways. Chandler and Liang, for example, argue that such systems can reduce costs, increase service levels, make better use of experts' time and capture esoteric knowledge for use by several people (Chandler, Liang 1990). Jerry Cameron, a police chief who has conducted extensive research into the use of expert systems by police agencies agrees. In an article on artificial intelligence and expert systems, he discusses advances in related technology that he believes will soon allow even the smallest agencies to provide better and more cost-effective services (Cameron 1990).

In an interview with William Sembrat, a Bay Area software guru with extensive experience with sophisticated government systems, Mr. Sembrat stated that, unless police agencies want to be completely inundated with information they cannot access or use, some form of advanced "...knowledge-based..." system must be employed (Sembrat 1991).

If such systems, then, appear to be a possible answer to problems involving operational effectiveness, what of other areas of concern? One such question revolves around the future need for training patrol managers. How much training will a manager need by 2001? How many subjects will he or she need to be proficient in, and how much time, overall, will the manager be away from actual operations in order to attend training? Judging by past experiences, it seems likely that, unless some source of providing managers with knowledge in some way other than through training is found, agencies will find themselves losing patrol managers more and more to the classroom. Lupe De La Garza, a training consultant for the the California Commission on Peace Officer Standards and Training (P.O.S.T.) notes that even basic academy training has increased by more than 300% over the past twenty-five years. He believes this trend will continue, and will likely reflect training needs for supervisors and managers as well (De La Garza 1991). It would seem that the use of expert systems, if properly designed, could save substantial training time and cost by replacing knowledge presently available only through formal training models.

Even if such systems would have a positive impact on operations and greatly reduce training needs, thereby allowing more efficient use of managers' time, making significant use of them may not be practical. A key ingredient to this issue is whether or not managers will accept their use. If managers resist using

expert systems as an aid to decision making, efforts to rely upon them are likely to be destined for failure, and such resistance is a very real possibility.

In discussing problems associated with teaching new technology to adults, Bernard Norton from the State Office of Education notes that even when working with a volunteer group in an adult school setting, there is often a subtle reluctance caused by a number of concerns ranging from fear of the unknown to uncertainty about what impact such technology will ultimately have on the individual; will it make his or her job harder or easier, increase responsibility or maybe even replace the individual (Norton 1990)?

Lawrence Meador and Ed Mahler also argue that resistance to new technology may be the reason so many worthwhile projects fail. They note that, "...choosing a strategy that fits your company's culture and structure has a lot to do with your chances for ultimate success" (Meador and Mahler 1990, 64).

How such issues combine to provide a more complete view of what the future may look like is the topic of the next section.

Analysis of Trends and Events

To understand how these different factors are likely to impact the application of expert systems by patrol managers, a panel of individuals (Appendix B) representing various aspects of the issue was assembled. Following a brief outline of the issue and sub-issues, the group was asked to identify trends and events that could or are having an impact on this issue using a consensus building method often referred to as a Nominal Group Technique (NGT).

Trends

The group initially identified fifteen significant trends (Appendix C) it felt were related to the issue. It was next asked to evaluate how valuable it would be to have a long-range forecast of each trend for planning purposes (Trend Screening, Appendix C), using a rating scale that ranged from a group score of 0 to 28. Based upon the group response, the following seven trends were selected for further analysis (Trend Evaluations, Appendix C):

T1- Funding

Considered the single most critical trend by the group, this defines the level of per capita funding for patrol services in terms of real dollars, using 1990 as the base year. The group gave this trend a rating scale value of 24. Figure 2 illustrates the group's view. Note that the group, as a whole, felt funding had been decreasing over the past five years. The median estimate suggests today funding is about two-thirds what it was in 1986. Present conditions indicate the trend will continue downward, troughing somewhere around 1996, then rising until, by 2001, funding surpasses current levels by a little more than 20%.

Another significant point is that, when asked what level of funding was both appropriate and realistically attainable, the group suggested funds should rise by 50% within the next five years, and double within the next ten.

T2 - Cost

This refers to the cost of technology itself, again expressed in terms of 1990 real dollars. This trend also received a rating scale value of 24, and was second in importance only to funding.

The group estimated the trend has been toward steadily declining costs over the past five years, with comparable technology today costing one-third less than it did in 1986. The median projection suggests it will continue to drop, but not at the rate experienced in the past. Over the next five years, it will drop an estimated 5%, with an additional 15% drop by the end of the ten-year period.

The group felt the drop would have a positive impact on the implementation of expert systems, but, as was the case with funding, it also felt additional cost reductions were possible, suggesting they could drop one-quarter by 1996, and nearly half by 2001.

T3 - Quantity of Information

This refers to the total amount of information available to a patrol manager; information the manager is expected to use in the course of his or her duties.

Of all the trends, the group estimated this one as having the widest range, nearly tripling since 1986, and expected to increase by about two-thirds more in the next five years. This was also considered extremely important, receiving a rating scale value of 24. Perhaps the most noteworthy point is the fact that, although almost every manager interviewed for this paper complained of information overload, the group's median desirable value for this trend exceeds the estimated five-year median of probable value by forty points, and the ten-year median by fifty! One explanation for this could be that managers don't truly feel overloaded with information; instead, they feel the organization of the information they have is overwhelming them, suggesting a better system for storing and retrieving data is desired.

T4 - Job Complexity

This trend represents a measurement of how complex the patrol manager's responsibilities are. In other words, is the manager's job becoming more or less difficult in terms of knowledge needed, variety of responsibilities and so forth. Not surprisingly, the group felt the manager's job was a third more complex than it was in 1986, and was likely to become even more so in the future. The rating scale value for this trend was 23, only slightly less than the first three.

Like T3 - Quantity of Information, one of the most interesting results of this analysis was the fact that the group felt the complexity of the job was rapidly increasing, yet their desire was for an even faster increase! Combined with the previous trend, the results might indicate the group felt both the quantity of information available and the complexity of the job are too limited by the methods employed for dealing with the data when compared with what the levels should and could be.

T5 - Manager Turnover

This trend examines how long a patrol manager, on the average, may be expected to remain in that assignment. Movement may be due to retirement, transfer, promotion or termination - either voluntary or involuntary. The trend is stated in terms of rate of turnover. An increase, therefore, would signify a faster rate of turnover, while a decrease would suggest the average term for a patrol manager was increasing.

The group estimate suggests managers are turning over at a much faster rate than before, up from 55 in 1986, with an expectation that the rate will continue to

increase, rising 50% more by 2001. While slightly less important than the first four trends, turnover rate received a high rating scale value - 22. The obvious impact of this trend, among other things, would be to greatly reduce the amount of time available for the development of patrol expertise, and a significant increase in the rate of training.

T6 - Acceptance of Technology

This refers to the level of acceptance of high technology by patrol managers - their individual willingness to learn and use advanced systems. The group felt that, if managers failed to embrace the use of expert systems, the possible benefits from implementation would be unrealized. As a consequence, the group rated this trend at a rating scale value level of 22. They also felt the trend over the past five years indicated a substantial increase in the acceptance level, doubling since 1986. The group felt this trend was likely to continue in the same direction, increasing another 52.5% within the next ten years.

This trend had one of the greatest gaps between estimates for the probable level as opposed to the desirable and attainable level, with the group believing the level of acceptance should be more than twice as high by 2001.

T7 - Training Costs

This reflects total costs associated with patrol-related manager training, including facilities, equipment and salaries - both the instructor's and trainee's. This total would naturally be affected by the amount of training required and the number of individuals requiring the training.

The group estimated that training costs were rising, having increased by nearly one-third over the past five years, and likely to continue to rise through the next ten, increasing 40% by 2001. The rating scale value assigned to this trend was 22.

The median group estimate for the desirable and attainable level would have the costs doubling by 2001. This may be attributed to a feeling that present training is inadequate, and that future training will also be under-funded.

Events

Using a similar method to that employed for trends, a total of twelve individual events were next identified that could significantly impact this issue (Appendix D). From this list, five were ultimately selected as the most important for analysis (Event Evaluation Chart, Appendix D):

E1 - State Mandates Computer Skills Training

This describes the probability that the state would add training in basic computer skills, including a class in the philosophy of computers, to the supervisor and manager courses now required by the California Commission on Peace Officer Standards and Training. The group felt that such training would be likely to significantly influence the level of acceptance of high technology applications by police managers.

The median estimates were that this event could occur as early as 1994, and that there was a 70% chance it would occur by 2001. Even the most

conservative estimate suggested at least an even chance of this event occurring within the next ten years.

E2 - FBI Offers System Certifications

Traditionally, courts, law enforcement agencies and the public have given substantial weight to the use and/or acceptance of various types of evidence and investigative procedures by the Federal Bureau of Investigation. This event would find the Bureau offering a program that reviews and, where appropriate, certifies specific systems.

The group found the likelihood of this very similar to that of Event 1, with a probability of 72.5% within ten years; however, the length of time until the probability first exceeds zero is greater than that for Event 1 - four years.

E3 - Legislation Exempts Use of Systems

Through this event, legislation is passed that limits law enforcement liability when actions are based upon use of an expert system. The group felt this would be an extremely significant event, but did not give it more than an even chance of occurring within ten years. Although some members of the group felt such an event could occur within five or fewer years, the median estimate of when the probability of this event happening first exceeds zero was eight years.

E4 - Voice Recognition Perfected

This event announces the introduction of accurate voice recognition software that allows direct interface with the computer through verbal language as opposed to the use of a keyboard. The group felt this event was extremely likely to occur within ten years, assigning it a probability of 90%! Although the

median estimate of when the probability would first exceed zero was relatively soon - two years - the group only assigned a 40% chance of the event occurring by 1996.

E5 - L.E.A.A. Funds Expert Systems Research

In this case, the Law Enforcement Assistance Administration (L.E.A.A.), or some similar federal agency, is reestablished and funded for the purpose of offering grants for local and state projects with the emphasis being placed upon research and development of expert systems with specific law enforcement applications.

The group felt there was little chance this event would occur by 1996; however, it did feel there was a 65% probability such funding could be available by 2001.

Cross Impact Analysis

Following selection and analysis of the individual trends and events, three members of the group (Appendix E) were selected to assist the author in determining if the individual events could have a cumulative affect on the issue. In other words, would the occurrence of one of the events impact the likelihood of another of the events occurring or change the path of a trend. The panel's conclusions are listed on the following page.

Cross Impact Evaluation (Consensus Data)

													IMPACT TOTALS	
**	E1	E2	E3	E4	E5	T1	T2	T3	T4	T5	T6	T7		
E1			+25		+5			+5	+10	-5	+30	+5	E1	7
E2	+25		+30		+10		-10	+10		-15	+25	+5	E3	8
E3	+20							+5	+5	-20	+20	+10	E3	6
E4	+25	+10			+15		-10	+10	-10		+20	-10	E4	8
E5	+15	+20	+5	+5		+5	-10		+5	-5	+10	-5	E5	10

IMPACTED TOTALS

E1	E2	E3	E4	E5	T1	T2	T3	T4	T5	T6	T7
4	2	3	1	3	1	3	4	4	4	5	5

** LEGEND

E1 Mandated Training

E2 FBI Certification

E3 Legislation Exempts System

E4 Voice Recognition

E5 LEAA Funding

T1 Funding

T2 Cost of Technology

T3 Quantity of Information

T4 Job Complexity

T5 Turnover Rate

T6 Acceptance of High-Tech

T7 Training Costs

The column on the extreme right of the chart (Impact Totals) show how many other events and trends each event impacts. The row near the bottom of the chart (Impacted Totals) indicates how many different events impact each event or trend. Note that all of the events are fairly strong actors; that, is, they tend to impact the likelihood of other events and trends occurring. Also of interest is the fact that, with the exception of T1- Funding, all of the trends are sensitive to individual events. In other words, the occurrence of any one of the events would be likely to impact the path of the trend, either decreasing or increasing the amount of change.

Possible Future Scenarios

After reviewing all of the research, and analyzing how the trends and events interact, three scenarios were created by the panel to outline what the future might look like. The first is based upon the most likely future as identified by the panel's median nominal estimate of trend and event likelihood. The second assumes a hypothetical future based upon a worst-case scenario in which the most negative impact of the anticipated trends and events is realized. The third suggests a future based upon the panel's normative estimate of what could and should be.

Scenario I - The Unprepared Survivor

July 10, 2001

The department has survived a hostile decade. Even though funding had begun to increase over the past few years, the devastating affects of the budget cuts incurred in the early nineties is still apparent. Few areas have suffered as

much as patrol services. Manpower reductions forced in ninety-one and nine-two have finally been restored, but increased demands for new and more sophisticated services have made patrol more labor intensive. Consequently, services that were cut during the lean years have never been restored.

Patrol management has been one of the hardest hit areas. Substantial increases in job complexity greatly increased the need for more and better training. Labor and time-saving technologies, such as expert systems, were not employed because of resistance to increased dependence on computers and other forms of automation that was never addressed by the department.

In an effort to make better use of its limited resources, the agency recently asked P.O.S.T. to conduct an in-depth review and to make suggestions regarding its organizational structure and operational methods. As a result of that study, the department has undergone substantial reorganization. It is now reviewing various methods designed to improve both the quantity and quality of work through the use of technology. It has also taken P.O.S.T.'s suggestion, and is applying for a federal grant to develop expert systems for use by patrol managers.

This has been a bleak decade. There is now some light at the end of the tunnel, but it will take a long time to recover from the effects of the last ten years.

Scenario II - The Victim Agency

July 10, 2001

The Board announced today that, effective January 1, the department would discontinue all patrol activities. Services after that date will be provided by adjacent jurisdictions under recently negotiated contracts.

The cessation of patrol activities was inevitable given the decay in services experienced over the past decade. Budget cuts starting in 1991 ultimately resulted in the loss of 15% of the patrol division's staff. Although the affects of the cuts could have been offset with proper planning and maximum utilization of resources, the department chose to continue a labor-intensive course which resulted in a reduction in services provided.

At first, only low priority incidents were impacted. Eventually, however, response to even serious, non-violent felonies was curtailed. As a result, public confidence plummeted and pressure on the department to resolve its problems increased. Its failure to effectively manage its resources became a point of daily contention in the local media. This made recruiting qualified candidates even more difficult, causing an average vacancy factor of 31% over the past two years. Finally, trapped in a hole too deep to extricate itself from, the department was forced to admit it could no longer provide an adequate level of service. From that point, its demise was merely a matter of time.

Many of the problems experienced could have been avoided if the agency had made a legitimate attempt at long-term planning. Instead, it failed to identify early warning signs.

Unlike a number of other law enforcement agencies, the department did not consider new methods of storing and accessing the mountains of data it was being forced to process. Training demands for managers became so overwhelming it was not able to keep up. Consequently, its ability to provide critical services began to disintegrate. It completely ignored trends toward greater use of technology - trends enhanced by rapidly decreasing costs and increased availability of law enforcement specific systems, and made no effort to streamline its operations.

Finally, it became the victim of its own inability to adapt to changes in its environment. The last straw was a multi-million dollar judgement against the agency for failure to provide appropriate response to a hazardous material spill which resulted in the death of eleven people.

The deaths were attributed directly to the department's failure to make use of inexpensive expert systems available for critical incident command that were used by surrounding agencies. The real irony of this incident, from the Board's perspective, was the fact that, had the department used such a program, it would not only have likely saved a number of lives, it would also have protected the department from such a large award as a result of 1998 legislation limiting liability when actions are based upon the use of a certified expert system.

Scenario III - The Advantages of Preparation

July 10, 2001

In looking back over the past decade, no one could deny that the department had faced a number of major problems; however, through careful planning, it has been able to go through this period relatively unscathed.

Early in the decade, it had asked P.O.S.T. to conduct an organizational audit with recommendations regarding structure and operational design. Based upon that review, the agency had taken a number of critical steps to streamline operations. One of the greatest impacts has resulted from the introduction of a number of labor-saving computer systems designed to assist managers in making many of the complicated decisions they face today.

A paperless report system and "smart" record program replaced the old systems, freeing both officers' and supervisors' time. An interactive voice recognition program was introduced in 1996, allowing citizens to make telephone reports without human intervention. The use of such knowledge-based systems has also been employed by patrol managers to ensure appropriate response to hazardous materials spills, deploy personnel and analyze criminal patterns. As a result, service cuts seriously considered in the early nineties were avoided.

Many of these systems were initially resisted by department members. Fortunately, federal funds supporting their use encouraged administration to develop a strategy which eventually overcame the resistance. One of the most productive strategies was the introduction of mandatory computer training for all supervisors and managers. Once these individuals lost their fear of new technologies, and realized how much computers could assist them, they moved from being reluctant users to some of the strongest advocates.

Even though several patrol positions were lost for a short time, proper planning had resulted in no layoffs. This kept the department's reputation sound

in recruiting circles, making the job of attracting good applicants relatively easy, especially when compared to problems experienced by surrounding agencies that had massive layoffs.

Good, strong planning, combined with a number of labor-saving changes have helped the department through some tough times. Today, its service level is better than ever, and it has the support and confidence of the community. In fact, a number of adjacent communities have approached it to discuss the possibility of providing them with contract law enforcement services, replacing their own departments.

CHAPTER II

(STRATEGIC PLAN)

Chapter 2 (Strategic Plan)

In the last chapter, a number of factors were identified that suggest at least some use of expert systems by patrol managers to enhance operations and decrease training costs is likely and reasonable. These same factors also presented a significant question - how can such systems be successfully integrated into on-going operations?

A general answer to this question was presented in Scenario 3, which described some of the successful actions taken by an agency to allow it to emerge from the next decade as a strong, organizationally sound department. This chapter will suggest more specific ways to achieve the kind of success touched upon in that scenario by presenting a means of reviewing emerging technology, particularly in the area of expert systems development, coordinating department efforts and ensuring that appropriate use of such technology is successfully implemented.

Using the Contra Costa County Sheriff's Department as a model, a plan will be presented that includes a mission statement designed to support appropriate use of expert systems, analysis of environmental factors - both internal and external - likely to impact the plan, identifying individuals and/or groups (stakeholders) that are critical to successful implementation of any strategy and suggested policies designed to support this effort.

Department Background

Contra Costa County is located just east of Oakland in the San Francisco Bay area. It has a culturally and economically diverse population. The Sheriff's Department provides patrol services to a quarter million people in both the unincorporated area and a number of contract cities.

The department provides a full spectrum of patrol services including a number of specialized functions such as marine patrol, off-road vehicle enforcement and abandoned vehicle abatement, although several of these have been the victim of recent budget cuts. Beats are patrolled by single, one-officer cars as a rule, and most tend to cover large areas. Patrol operations are divided into eight areas - four contract cities and four station houses - each with a command level officer in charge. Area commanders, in turn, report to a division commander located in the central area of the county.

Each area manager has incident command responsibilities for his or her area and is subject to call-out at any time. One manager is on call at all times, on a rotating basis, as a back-up in the event the area manager cannot be reached.

Over the past several years, patrol staffing has become a serious problem, with a number of positions in jeopardy this year alone as a result of a two-plus million dollar budget reduction faced by the department.

Patrol management, on the whole, is sound but few of the managers have significant exposure to use of advanced technology in patrol operations. Mandatory training is kept fairly current, but there is little left over for optional training and, because of the scarcity of classes, a period of several months often elapses before a manager receives formal instruction in a number of critical areas.

The department implemented its first computer-aided dispatch system two years ago at the same time it installed a second generation automated records management system. Technology levels and degrees of sophistication vary tremendously from one division to another, and there is little coordination between the various divisions where automation issues are concerned.

Recruiting efforts are excellent, allowing the department to maintain a relatively small vacancy factor, but long-term retention has been identified as a possible problem in the future.

Significant future concerns include management of hazardous materials incidents - Contra Costa County has large concentrations of petrochemical companies, and contains one of the busiest hazardous materials transportation corridors in the country - response to natural disasters, such as earthquakes, and increases in gang activity and violent crimes. The department is also concerned with maximizing use of limited resources and improving overall operational efficiency.

Mission Statement

An essential element of any strategic plan is a written statement that clearly defines the underlying assumptions and focus of the plan, providing a platform upon which all related actions may be judged. In order to support a plan designed to enhance operations and decrease training costs by use of appropriate technology, and to gain acceptance of that technology by department members, the following micro-mission statement is suggested:

The department is committed to providing the best possible patrol services to the community. It recognizes the imperative to utilize available resources, including advanced technology, in that manner which will most effectively and efficiently satisfy both daily needs and those occasional situations which require special responses.

The department will promote appropriate use of such technologies through a coordinated planning, review and training process that responds to both present and future needs, always bearing in mind that its greatest purpose is to support the collective good of those it has sworn to serve.

Situation Analysis

Emerging and/or continuing trends and events, at least through the year 2000, will likely have an adverse impact on the department's ability to provide

unlimited patrol services in the near future as it has attempted to do in the past. This will create the need to adjust priorities and to maximize use of available resources by developing an organizational apparatus that can anticipate and adjust to changing needs, and that ensures that limited personnel and funds are utilized in the most efficient manner. Using the panel identified in the last chapter (Appendix E), key factors, both external (environmental) and internal (organizational) likely to impact the department's ability to develop and implement a strategic plan were identified.

Environmental Factors

There are a number of positive elements present that represent opportunities to enhance plans. These include:

- **State Commission on Peace Officer Standards and Training**

This agency supports long-range planning and use of new technologies. It can provide assistance through management consultation services and advanced officer training. It is able to sway local jurisdictions through both positive incentives (funds) and sanctions.

- **Media**

The media is generally responsive to significant changes in law enforcement agencies. It may be used, therefore, to disseminate information and gain community support for new programs and ideas, and to solicit community input and assistance, or to simply educate the public regarding issues of importance to the agency.

- **Private Organizations**

Service clubs and other private organizations, such as the Contra Costa Council (a county-wide association of businesses) have both the expertise needed for organizational planning and development and experience with the use of advanced technologies. Many have also demonstrated a willingness to assist public agencies.

- **Emerging Technologies**

Newly developed technologies, particularly in the areas of data processing, records storage and decision-making matrices, may aid in improving both efficiency and effective use of available manpower.

- **Increased Pressure to Maximize Efficiency**

Pressure from virtually every quarter - from taxpayer associations to experts on organizational theory and/or computer technology to other public agencies competing for finite resources - may act as a positive catalyst, forcing the more conservative elements of the department to "budge."

- **Greater Exposure to Alternatives**

A relatively closed system for so long, the department's exposure to non-traditional concepts from outside the realm of law enforcement is creating a much greater knowledge of and comfort with alternative systems and methods, and an atmosphere where support for experimentation with and acceptance of new technologies is increasing; certainly much more than was previously the case.

- **Changing Public Awareness**

Public comprehension of problems facing the department is increasing. This may create strong support for major changes including use of advanced technology.

There are also a number of possible threats to successful implementation of a plan. They may include:

- **Funding**

Public funding overall is poor to disastrous and likely to sink even further during the nineties. Funding priority has traditionally favored personnel over equipment in the past. In a bleak budget period, this could seriously impact efforts to purchase new technology.

- **Community Apprehension**

Increased community awareness is a two-edged sword. Major changes in either the type or method of traditional service provision may create a backlash of opposition. The loss of patrol positions may also raise fear in the community over its level of protection, forcing a greater share of available resources into funding more personnel rather than the acquisition of labor-saving systems.

- **Courts**

Just how much law enforcement agencies may depend upon computers for information, advice or any other benefit may well be decided by the courts, which seem prone to "legislate" not only what services are provided but how as well. At the very least, courts will influence both the level and kind of liability

resulting from dependance upon such systems, affecting how, when and under what circumstances they are used.

- **Special Interest Groups**

For every group that favors increased use of labor-saving technology, there is at least one that opposes it. Such groups may pressure elected officials and administrators in an effort to block its use.

Organizational Factors

Internally, the organization also has a number of either supportive or opposing factors that must be considered. On the positive side:

- **Administration**

The administrative level is fairly stable, having been in place for several years on the whole. Even though there is a strong probability a new sheriff will be elected within the next few years, it is likely to be someone presently within this group. This kind of environment lends itself to long-term planning.

- **Newer Cadre**

A substantial increase in size over the past decade has loaded the organization with newer people from entry to middle management level. As a whole, this group is less tied to the status quo, demands a greater say in policy formation and is more prepared to accept new ideas than its predecessors.

- **Organizational Durability**

The department's ability to survive great adversity is well documented. The overall structure is resilient. While not as strong an industry leader as it once

was, it is able to play "catch-up" extremely well when it comes to accepting growing trends in the law enforcement community.

Significant weaknesses that must be addressed include:

- **Command Staff**

As a whole, the command staff is competent and well educated; however, its exposure to advanced technology is limited. This, in turn, limits the group's general understanding of how automation may be used to improve operations, making it dependant upon recommendations from staff that it often cannot fully interpret. This critically weakens the group's effective decision-making capabilities.

- **Organizational Structure**

Although resilient, the present structure does not lend itself well to strategic planning. Top management is aware of the needs in this area, but major changes have been slow in coming due to fiscal and other constraints.

- **Lack of Inter-Divisional Cooperation**

As is so often the case in organizations, different needs/priorities seem to drive various components of the department. As a result, individual divisions tend to be parochial in their approach to several areas of mutual concern, including automation, causing a lack of coordinated planning which, in turn, precludes deriving maximum benefits.

Combining all the strengths, weaknesses, opportunities and threats, a picture of how to formulate an appropriate plan can begin to emerge; however, several more steps are still needed.

Stakeholder Analysis

Another key element of any plan is the identification of individuals and groups that are potential friends or enemies; those likely to have both the will and power to actively assist or oppose plan implementation and success. Understanding who these stakeholders are, anticipating their probable positions and developing a strategy that will effectively utilize support while minimizing opposition will greatly enhance any plan's chances of success. The following list, although not complete, identifies the major stakeholders; those in the best position to either help or hinder a plan, and identifies a number of assumptions regarding each stakeholder's position:

1. Sheriff

- a) The present funding crisis will likely continue, requiring changes in either what or how patrol services are provided or both.
- b) Labor-intensive methods are more costly and, therefore, to be avoided if possible.
- c) Will be receptive to internally generated ideas, realizing that, unless the department acts first, external forces are likely to dictate what, when and how changes will occur.

2. Assistant Sheriff - Field Operations

- a) Favors traditional, proven methods, but is not afraid to take risks when he feels they are warranted.
- b) Supports use of advanced technology, but is concerned that its acquisition is often the result of a desire for a new "toy" rather than the answer to an identified need.

3. Patrol Division Commander

- a) Has been "burned" by previous automation efforts that did not work as advertised, so will look at any new system with a jaundiced eye.
- b) Does not believe personnel can be replaced by automation, so will resist any plan he feels will reduce staffing levels.
- c) Strong loyalty to the Sheriff and Assistant Sheriff will ultimately cause him to make every reasonable effort to successfully implement programs they support.

4. Patrol Managers

- a) Will have significant concerns that individual decision-making prerogatives would be diminished by the use of expert systems.
- b) Believe the need is minimal since they are confident in their present collective ability to provide satisfactory expertise.
- c) Will feel any increased automation may lead to further staffing cuts; a trend they adamantly oppose.
- d) Bad experiences with poorly planned and/or supported automated systems have made the group reluctant to depend upon new ones.

5. Line Personnel

- a) Management use of expert systems may also decrease their own discretion in responding to an incident.
- b) On the positive side, such systems may increase consistency between managers - a long-standing area of complaint.

6. Deputy Sheriffs' Association

- a) If it can control the process, it will be beneficial to the membership.
- b) Substantial organizational changes may provide an opportunity to increase its power.

7. Board of Supervisors

- a) Any alternative to cutting services will be worth reviewing.
- b) Public sentiment favoring increased use of automation and other forms of advanced technology will make it difficult for them to oppose cost-effective changes unless there is substantial opposition.

8. Other County Law Enforcement Agencies

- a) Have vested interest in a number of joint-jurisdiction programs. Any service changes will impact and, therefore, be of interest to them.
- b) Depend upon the Sheriff's Department for mutual aid. Since they, as a whole, have embraced the idea of increased use of advanced technology, they will also encourage its use by the department.

9. Service Area Population

- a) Service cuts are bad, so will endorse reasonable alternatives.

b) Is becoming more aware of and comfortable with advanced technologies, and is demanding more sophisticated services which utilize them.

10. Other Division Commanders

a) Since Patrol operations have an impact on them, will want a voice in any radical changes in service provision and delivery method.

b) Will actively fight any changes that they feel will reduce their respective share of the department budget.

c) Will resist any changes they feel reduce their ability to acquire new systems for their own respective divisions.

Once identified, these assumptions were filtered by the panel through a process designed to determine how important each is to the development of a strategic plan and, based upon that review, alternate strategies were considered. This was achieved through the use of a Critical Assumption Map (Appendix F).

Development of Alternative Strategies

The next step in developing a long-term plan is to review all the research (environmental scanning, trend-event analysis, stakeholder analysis), measure it against the desirable goals established in Scenario III and the mission statement and devise a set of actions that will help move the department in the desired direction.

To accomplish this, the panel was asked to identify possible strategies. As a first step, the group developed two key assumptions:

- Use of expert systems and other advanced technology is beneficial and desirable as a means to improve operational efficiency and reduce training costs and time.
- Since both what patrol does and how it does it affects a number of divisions, patrol applications of advanced technology must be determined by a consensus of all groups and individuals affected.

With those assumptions in mind, several alternative strategies were considered:

1. Create a Strategic Planning Group

Drawing from managers, supervisors and line personnel from throughout the department, create a single body to review and coordinate possible acquisitions of new systems. Charge this group with ensuring new acquisitions are compatible with existing systems. Direct it to actively research use of expert systems to assist in management decisions in patrol and related areas of the department and to make appropriate recommendations.

This approach would probably draw fairly strong support - at least initially - since it would give a number of diverse interests a voice. However, it would also likely require more time than other alternatives due to the size and composition of the group. In addition, the presence of so many diverse and possibly opposing views could lead to substantial compromise, reducing the possible benefits. Finally, technical knowledge of various group members would be suspect, leading to the possibility of adverse impact.

2. Contract Consultant

This strategy would have the benefit of providing an objective analysis of department needs, and would most likely take less time than alternative 1. It is also likely that a professional consultant would have more knowledge and expertise.

Use of a consultant might meet resistance from the assistant sheriffs and managers who could feel it represents an attack on their personal prerogatives. The Sheriff may also be hesitant to accept this method since it could limit his control of the outcome as well. Other stakeholders would likely stay neutral until they were able to study the recommendations and how they will be personally impacted.

3. Create a Technical Services Bureau

Present data processing and technical support services are distributed throughout the department. This makes coordination difficult if not impossible. To remedy this, combine all related personnel in one unit, charged with reviewing emerging technology for appropriate department applications, including Patrol, and making recommendations regarding system designs. Such a unit would provide consistency and systems compatibility department-wide.

On the negative side, division commanders would likely resent losing direct authority over personnel, and might feel such a group would not give adequate weight to automation needs unique to their individual divisions. Such a unit might also lack balance since most of the department's technical staff is non-

sworn. This could create significant resistance by sworn stakeholders as a group.

4. Implement Changes Gradually

Adopt expert systems and other advanced technologies gradually, in planned stages only. This approach would minimize disruption of on-going operations and would limit confusion. It would also provide adequate opportunity to train affected personnel and to integrate each new system into the organization slowly.

This alternative's strengths are also its weaknesses. One thing certain about using a slow approach is that it's slow! Major changes that are the cumulative result of small projects take considerable time. Managers might also chafe at being forced to wait for new acquisitions while higher priority systems were implemented one at a time.

5. Mandate Computer Training For All Managers

As a first step in gaining the support of a critical group, provide mandated computer training for all managers. Initial training would be elementary, focusing on philosophy of computer uses, present and anticipated capabilities and benefits.

By exposing managers to advanced technology, ground-level support could be increased. Unfortunately, such training would be time-consuming and, quite probably, expensive.

6. Support Regional Projects

Encourage regional automation projects that would share system costs among a number of agencies. Through economies of scale, this might allow scarce department resources to be better utilized. It would also enhance inter-department communications and, as a side benefit, cooperation. This would decrease individual agency control over system design and use - a factor that both administrators and managers might be sensitive to.

7. Acquire Only Those Systems That Can be Fully Supported

Organizations often rush to acquire new systems before understanding or committing to the levels of support needed to make the system work effectively. This can lead to inadequate maintenance, improper training, a lack of supporting policies and procedures and other problems that will result in diminished benefits. It may also sour members of the organization against use of such systems, increasing resistance. This danger can be decreased through limiting acquisitions to those that can be fully supported and operated in the manner intended.

8. Seek Alternative Funding

New funding sources may be available through grants, experimental agreements with manufacturers (Beta site systems) and other methods. All possible avenues for acquiring new systems should be explored.

Selecting Policies

After identifying the major alternatives, the panel was asked to consider all the various factors - stakeholder positions, environmental and organizational conditions, desired results - and to select those strategies or combination of strategies it felt would best support plan implementation, and to state them as policies. The group recommended the following:

- 1) Combine responsibility for all data processing and technical services in one unit, charged with servicing existing systems and providing technical review and advice on possible new acquisitions.
- 2) Create a strategic planning team, including representatives from the technical services group, managers and training staff. Charge this group with reviewing needs and recommending both acquisitions and priorities and with identifying funding alternatives.
- 3) Provide in-house computer training for all managers. Mandate P.O.S.T. certified advanced training for specific managers identified by the planning team as critical to future systems acquisition and operation.
- 4) Request assistance from P.O.S.T. in obtaining expert consultation to help identify long term service needs and related training and liability issues.
- 5) Limit system acquisition to those that can be fully funded and properly supported.

6) Develop a time table for purchase and installation of identified systems that ensures each will receive necessary resource allocation and support.

The combined affect of these policies should aid in moving the organization toward automation with minimum disruption to operations.

CHAPTER III
(TRANSITION MANAGEMENT)

Chapter 3 (Transition Management)

Thus far, this paper has suggested a likely future, outlined its possible impact on the target organization and proposed a number of strategies designed to assist the department in achieving a desired goal. That goal has been defined as making use of appropriate technology, including expert systems, to enhance operations and reduce training needs. Before the strategies can be effectively implemented, however, one final ingredient is necessary - a transition plan.

Movement from one set of conditions to another necessarily requires a period of adjustment during which changes are implemented, new relationships formed and basic organizational norms replaced. This is a critical period for the organization. If managed effectively, the transition can be relatively short and painless. If managed improperly, at best the changes can be tedious and traumatic. At worst, the goal will not be achieved at all. The latter condition can often be worse than maintaining the old status quo would have been.

To avoid major disruption, and provide the best possible atmosphere for orderly and successful change, a number of key elements are necessary. Goals must be clearly stated and understood by all. Both the "what" and the "why" of every change should be explained. Stakeholders need to be given the opportunity to understand how the changes will affect them, what their new role will be and what assistance, if any, is expected from them in implementing the changes. Substantial resistance to any major changes should always be anticipated as well, suggesting any transition plan should include a strategy for reducing opposition.

Using the strategic planning panel, the group was asked to define the major differences between existing department operations and those that would be created by implementing policies selected in the last chapter. The group defined the differences as:

- 1) Moving from a basically manual means of providing patrol services to one that is more dependant upon automation.
- 2) Moving from labor-intensive methods to more efficient, less costly approaches.
- 3) Moving from subjective, personalized decision-making, dependant upon individual experience and knowledge, to a more objective, uniform approach.
- 4) Moving from a system that values and rewards managers for independent actions and initiative to one that supports coordinated, team efforts.

To complete this transition, the group developed transitional strategies including:

- 1) Gaining the support of key stakeholders.
- 2) Establishing a transition management structure.
- 3) Assigning areas of responsibility.
- 4) Developing a plan to gain general support for the proposal.

Key Players

In the previous chapter, several major stakeholders were identified. While all of these individuals and groups are important, support of some is more critical to

successful implementation than others. This smaller group, often called the critical mass, was identified and certain assumptions made regarding where each will initially stand and where they must ultimately be moved to. Each of these individuals or groups, also referred to as "actors," must assume a role as someone who either lets, helps or makes change happen.

1) Sheriff

Will block until he has full knowledge of the plan, understands its benefits and is confident opposition will be minimal. It is believed a straight-forward, comprehensive explanation of the proposal will gain his endorsement for the project. His commitment as a "make change happen" actor is necessary to ensure active support of other stakeholders.

2) Assistant Sheriff - Field Operations

Will initially block for similar reasons, but will support if the Sheriff does. He is also sensitive to the need to foster a progressive image for the department. This individual must also be a "make change happen" actor since he was selected by the panel to serve as project coordinator. He is also necessary because he can convince a majority of the division commanders, including the Patrol Division Commander, to accept the proposals.

3) Board of Supervisors

Will begin from a publicly neutral position, but will quietly block until they know the political ramifications. Since they have substantial power through the budget, they must be moved to at least a "let change happen" position. This may be accomplished through a demonstration of strong public support and presenting them with first-hand information outlining potential savings and

service improvements. The Sheriff is in the best position to gain this group's needed level of support.

4) Deputy Sheriff's Association

This group has taken a public stance in the past favoring a review of types and methods of patrol service delivery. They will, consequently, be forced to support the project. In fact, they will want to be viewed as a driving force that is part of the "make change happen" group. Such a role could alienate several managers. The Association, therefore, should be moved to a "help change happen" position. The Assistant Sheriff has a good relationship with the organization's board. He can be used to convince them to take a slightly more passive role. The Association, in turn, can be used to gain support from line personnel.

5) Patrol Managers

This is a fiercely independent, divided group. While some might be swayed by other key actors, many must be individually convinced of the positive merits of the proposal, and must ultimately be convinced each new procedure benefits them. As the end users of new systems and methods, this group is in the perfect position to cause the plan to fail due to lack of support. The best approach with this group is a set of individualized strategies designed to influence each manager. Some may be swayed by a personal approach from the Sheriff and/or Assistant Sheriff. Some may require training and exposure. Others may never be convinced. The panel determined that, for planning purposes, at least seventy-five percent of this group must be in the "let change happen" or better field.

6) Service Area Population

This group will likely contain elements that will both support and resist drastic changes in patrol services. As a whole, it will likely start from a neutral, "let change happen" position, and will remain effectively neutral unless it feels threatened. Involvement and education are the best tools to ensure no major opposition.

Appendix G lists the six critical mass players, and illustrates both the initial and desired role each must play.

Management Structure

One of the key elements of any organizational plan is the management structure selected to oversee implementation. In this case, three forms of management structure should be mixed together.

Project Manager

The Assistant Sheriff-Field Operations should be appointed as the overall project manager by the Sheriff. This is suggested for several reasons:

- 1) This is an enormous project with several facets that will need coordination on a high level. Since the responsibilities of his office would preclude the Sheriff from assuming this role, the Assistant Sheriff is the most logical choice.
- 2) This structure will assist in capturing the interest of the Assistant Sheriff who is a "hands-on" manager.
- 3) He has a strong personality; something needed to gain the support and ultimately control of the command staff.

4) He is an experienced negotiator than can and will use any method available, including power positioning bargaining if necessary.

5) He is a well known figure to many of the stakeholders that will be used to advance the plan, including the Board of Supervisors, media representatives and community leaders.

6) He is the person most likely able to control the level of involvement of the Deputy Sheriffs' Association Board, a critical element of the plan.

7) He is the immediate supervisor of the Patrol Division Commander - a critical mass player that must be moved to a supportive position from what will almost certainly be an initial stance in opposition.

Diagonal Slice

Various facets of this plan will impact different areas and levels of the Department. Common sense, therefore, dictates that all these areas and levels be involved. Two groups, in particular, are extremely important:

1) Middle managers tend to move more often within the organization than command staff does. They also have more control of day-to-day operations. As a consequence, they are in a position to severely undermine changes. A single manager, if sufficiently motivated to do so, could conceivably create major disruptions at the most basic level. By including this group in the early stages of planning, it may be possible to get immediate buy-in from a number of managers. Careful selection of individuals, to include informal leaders of this cadre would increase the chance of success. This group also possesses considerable expertise and valuable knowledge of the workings of the Department.

2) Line staff is also in a position to seriously jeopardize successful plan implementation. Like middle managers, early involvement of this group might gain needed support. Also like middle managers, this group possesses considerable knowledge but at a different level. They possess tremendous experience regarding how things "actually work" at the implementation level, and have had the most contact with and, one can assume, the greatest understanding of the community at a very fundamental level.

Constituency Representatives

This group may be pivotal. Members of each critical mass group, carefully selected for both expertise and philosophy, should be included to provide valuable insight into the needs and desires of their various areas. Such a group could also serve as a communications conduit, keeping individual stakeholder groups informed, diminishing resistance that can surface simply as the result of uncertainty caused by a lack of information.

Combining these three management structures should provide strong, centralized leadership while utilizing the substantial expertise available in various levels of the agency. Finally, it should provide an avenue for input from each affected area, aiding in convincing the critical mass players, as well as other stakeholders to support the project.

Technologies and Methods

Responsibility Chart

A preliminary stage of the plan, the chart, in its traditional role, identifies and assigns specific areas of responsibility. In this case, it could also serve to curtail

several players' penchant for maintaining too much personal control. It could also relieve substantial anxiety among key players by clearly establishing, up front, what each individual will be held accountable for. Additionally, it could provide a rough outline describing the process for those not familiar with such projects. The suggested division of responsibilities for this plan would be:

	Plan Development	System Prioritizing	Funding	Personnel Selection	Vendor Selection	Communications	System Integration	Plan Management	Consultant Selection	System Selection	Training	Evaluation
Sheriff	A	A	S	I	A	I	A	A	A	A	A	A
Ast. Sheriff	R	A	R	A	A	A	A	R	R	A	R	A
Patrol Cmdr.	S	A	I	S	S	S	S	S	S	S	S	S
Board of Sup.	I	I	A	I	S	I	I	S	S	S	I	I
Committee	R	R	R	R	R	R	R	S	S	R	S	R
DSA	I	I	I	S	I	S	I	S	I	S	S	S

R - Responsibility
A - Approve
S - Support
I - Inform

Communications Tree/Special Newsletters

Establish a communications tree to ensure that virtually every affected member of the Department has access to someone capable of answering questions about the plan: what it is intended to do, how and when it could impact the individual and at what stage the plan is. This could be supplemented by a periodic newsletter that would describe on-going and planned future efforts

and confirm, in writing, the answer to questions raised by individuals through the "tree."

Employee Surveys

These would serve two purposes: provide a means of accessing the tremendous experience and knowledge possessed by Department members, and give everyone a sense that they are part of the process, not just an unwilling recipient of its affects.

Community Questionnaires

Sending questionnaires to every member of the service population would be much too cumbersome; however, one could be sent to key community activists, identified groups that represent the diverse interests of the community and to a random sample of the population. This would serve to broaden external input and, hopefully gain community support - a factor in gaining support from the Board of Supervisors.

Community Meetings

This technique would provide direct contact with citizens, giving them a sense of what is really occurring and, hopefully, alleviating any fears while providing a forum for input. From a combination of these meetings and the questionnaires, the Department may be able to establish what the community identifies as critical service areas, providing direction regarding how to prioritize projects.

Evaluation

Plan performance should be periodically matched against goals to ensure expectations are being met. Routine evaluation will also aid in identifying areas that need modification - something needed in almost every strategic plan ever developed. After all, strategic plans are, by definition, long-term. Since our environment is constantly changing, most long-term plans need occasional "tweaking" to accommodate those changes. In this case, evaluations can best be performed by the "diagonal slice" committee.

Training

This should include at least three types:

1) General training for all affected members of the Department to make them comfortable with and knowledgeable of organizational changes that may impact how they conduct day-to-day operations. It should, at the very least, explain new avenues of communications, changes in command structure, areas of responsibility and an overview of how services will be impacted.

2) Supervisors and managers are likely to have significantly different roles and responsibilities as greater use of automation occurs. If successful in patrol, this increased use of new technology will likely spread. These groups should fully understand how this might affect them, particularly since many of them will eventually filter through patrol anyway.

3) Specific user training will obviously be necessary as each new system is acquired. This should involve training for both those that will directly use the system and command staff that should understand what the specific system will do.

The combination of these techniques, like the management structure, is designed to provide maximum input from those affected, creating a general feeling of involvement, encouraging universal buy-in. It also provides a means of keeping impacted individuals informed, reducing anxiety that change almost always causes. Finally, through training, it should teach the new methods and techniques that will be required, and provide a means of identifying and responding to both anxiety and resistance, thereby increasing the likelihood of success while reducing the negative impact on individuals, operations and the service area population.

CONCLUSION

Chapter 4 (Conclusions)

How can police departments benefit from the enormous amount of information available? How can they impart the most knowledge for the least cost to the greatest number of managers, thereby empowering them to the greatest degree possible? This paper has presented one possibility - the use of expert systems by patrol managers.

Systems already in use or presently being developed will almost certainly improve patrol managers' ability to access information, and to use that information to make better and faster decisions regarding resource allocation and appropriate incident response.

Advances in technology will likely make such systems readily available, relatively inexpensive and highly dependable. This will make them attractive to administrators. Increasing exposure to and comfort with automated systems and other forms of sophisticated technology will also likely make such systems more attractive to managers. These factors will probably be supported further by reduced funding, greater job complexity and higher manager turnover rates, all placing increasing demands on training and, consequently, the search for alternatives to formal training courses. Once again, expert systems may meet at least some of this need.

As at least a partial answer to the three sub-issues identified in this paper, consider the following:

The research presented suggests patrol operations can be greatly enhanced by appropriate application of expert systems. There appears to be a strong probability that they can reduce overall operating costs, increase service levels and provide an avenue for the sharing of expert knowledge currently available to only a select few.

In response to the question of the impact of training needs, it seems likely that, if anything, such concerns will increase the likelihood of employing expert systems. Future projections indicate training needs will dramatically increase during the next decade. Replacing costly and time-consuming classroom instruction with expert systems that require little formal training would very probably reduce costs and would certainly free managers' time, allowing more attention to actual supervision of operations.

Finally, in answer to the question of whether or not managers could be persuaded to use expert systems, it seems likely that resistance will not be as strong in the future as it might now be, and that any resistance experienced could probably be overcome through the right strategy.

Summarizing these issues, it appears almost certain that the answer to the original question is yes - there will be legitimate applications of expert systems for patrol managers by the year 2000. The remaining questions then become how such systems can be effectively introduced into existing operations and what their specific uses will be.

As a first step toward answering these questions, a desirable future scenario was described and transformed into an operational goal. An actual agency was

selected to act as a model for the development of a strategy that could achieve that goal, and a controlled avenue for change or transition management plan was presented that could assist in achieving the goal with the least resistance and disruption to the organization, and the greatest probability of success.

All of these steps are designed to illustrate how a crucial issue can be reviewed, projections of future conditions made, strategies worked out and plans successfully implemented. In working through these steps, an individual agency can answer the final question of what applications will work for them. Trying to answer that question more specifically at this point would be impossible. That issue could, by itself, easily be the topic of another report.

This paper will end, therefore, on a more general note. No one is likely to argue that police work isn't steadily becoming more complex, requiring more and more expertise in an ever-increasing number of areas. Maintaining expert knowledge in all these areas is becoming next to impossible for even the largest agencies. Smaller departments simply cannot keep pace.

One possible solution to this dilemma is the use of expert systems to provide expertise in critical areas, available to a number of key people within the organization. Such systems certainly seem beneficial for patrol operations. As an article in a recent edition of Law Enforcement News points out, "no agency is too small to lead the pack" (Law Enforcement April 30, 1991, 1). Through the use of expert systems, even the smallest agency can maintain in-house expertise in areas such as manpower deployment, critical incident management and hazardous materials response.

Expert systems may not be a universal panacea for all the problems facing law enforcement today, but it seems clear they represent a very viable means of accomplishing a number of desirable goals, and can readily be adapted by patrol managers to help in critical decision making.

APPENDIX A

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APPENDIX B

Members of Futures Group (NGT)

Note: At the request of some of the members of the group, anonymity has been ensured.

Member # 1

Mid-level manager of large law enforcement agency. Extensive experience in graduate level research on budgets and use of advanced technology by law enforcement agencies.

Member # 2

Human resource manager for Fortune 500 company. Additional experience in management of data processing company. Expert user of specialty software applied to personnel issues.

Member # 3

Instructor for critical incident response courses. Published in field of tactical incident command. Graduate of U.C., Berkeley with degree in mathematics. High emphasis on computer science. Several years experience with record management systems. Designed first program to assist police officers in writing search warrants.

Member # 4

Instructor in law enforcement-related topics including criminal law and report writing. Extensive experience in recruiting and training personnel, and in use of geo-based computer systems.

Member # 5

Data base manager for multi-million dollar record management/management information system. Background in communications and software applications. Member of a number of national and/or international computer user groups focused on computer-aided communications or the maintenance of relational data base systems.

Member # 6

Information systems manager. Major areas of expertise include telecommunications equipment and computer hardware. Also has minor programming experience with both micro and mini-computers.

Member # 7

Senior crime analyst for large law enforcement agency. Educational background in public administration with experience in record management systems and computer-aided dispatch. Programming experience with both micro and main frame systems. Substantial experience in long-term planning for law enforcement agencies using computer-generated data.

APPENDIX C

Selected Trends

Note: The following trends were selected by the group as ones likely to impact the issue of whether or not expert systems are employed by law enforcements agencies.

- T1 - Level of law enforcement funding
- T2 - Cost of technology
- T3 - Level of high-tech literacy among law enforcement personnel
- T4 - Percentage of law enforcement funding spent on the acquisition of new systems
- T5 - Law enforcement training costs
- T6 - Demand for better, more sophisticated services by law enforcement
- T7 - Complexity of patrol managers job
- T8 - Acceptance of high-tech systems by law enforcement personnel
- T9 - Quantity of information available
- T10 - Development of expert systems for medical uses

T11 - Development of expert systems for military uses

T12 - Regionalization of police services

T13 - Average longevity of patrol managers

T14 - Number of mandated law enforcement responsibilities

T15 - Level of liability (law enforcement malpractice)

Trend Screening

CANDIDATE TRENDS IN RANK ORDER		FOR PURPOSES OF STRATEGIC PLANNING HOW VALUABLE WOULD IT BE TO HAVE A GOOD LONG-RANGE FORECAST OF THE TREND?*				
No.	Trend	Critical **4	Very Helpful **3	Helpful **2	Not Very Helpful **1	Worthless **0
T 1	Level of Law Enforcement Funding (Real Dollars)	16	6	2		
T 2	High Tech Costs	12	12			
T 3	Quantity of Information	12	12			
T 4	Job Complexity	12	9	2		
T 5	Rate of Turnover For Patrol Managers	8	12	2		
T 6	Acceptance of New Technology by Law Enforcement Personnel	8	12	2		
T 7	Training Costs	12	6	4		
T 8	Number of Mandated Responsibilities	12	6	4		
T 9	Expectations of Law Enforcement Expertise	8	9	4		
T 10	Regionalization of Law Enforcement Services	8	6	6		
T 11	Liability	8	6	2	1	
T 12	Development of Expert Systems For military Use		9	6	1	
T 13	Development of Expert Systems For Medical Use		9	4	2	
T 14	Percentage of Total Funding Spent on Advanced Technology		6	4	3	
T 15	High-Tech Literacy In Law Enforcement	4		10	1	

* Panel Total For Each Category

64

** Score Times Number of Estimates

Trend Evaluation

TREND STATEMENT (abbreviated)		LEVEL OF THE TREND** (Today = 100)			
		5 Years Ago	Today	* 5 Years From Now	* 10 Years From Now
T 1	Funding Level	145	100	95 150	122.5 200
T 2	Cost of Technology	150	100	95 75	80 57.5
T 3	Amount of Information Available	37.5	100	140 180	165 215
T 4	Job Complexity	75	100	130 140	152.5 175
T 5	Turnover Rate	55	100	125 132.5	150 160
T 6	Acceptance of New Technology	50	100	127.5 150	152.5 200
T 7	Training Costs	77.5	100	117.5 150	140 175

** Panel Medians

5 Years
From Now

"will be"

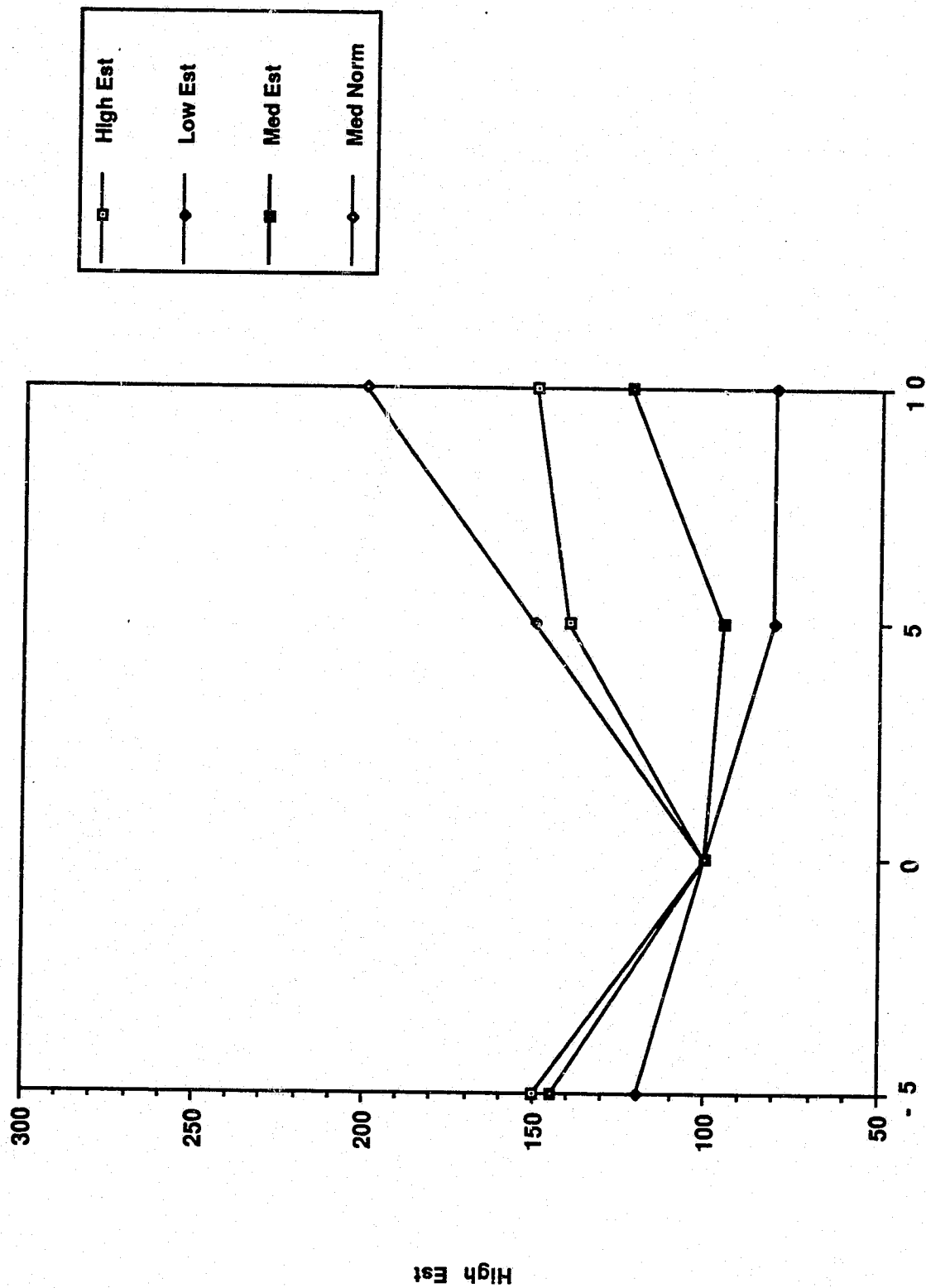
"should be"

10 Years
From Now

"will be"

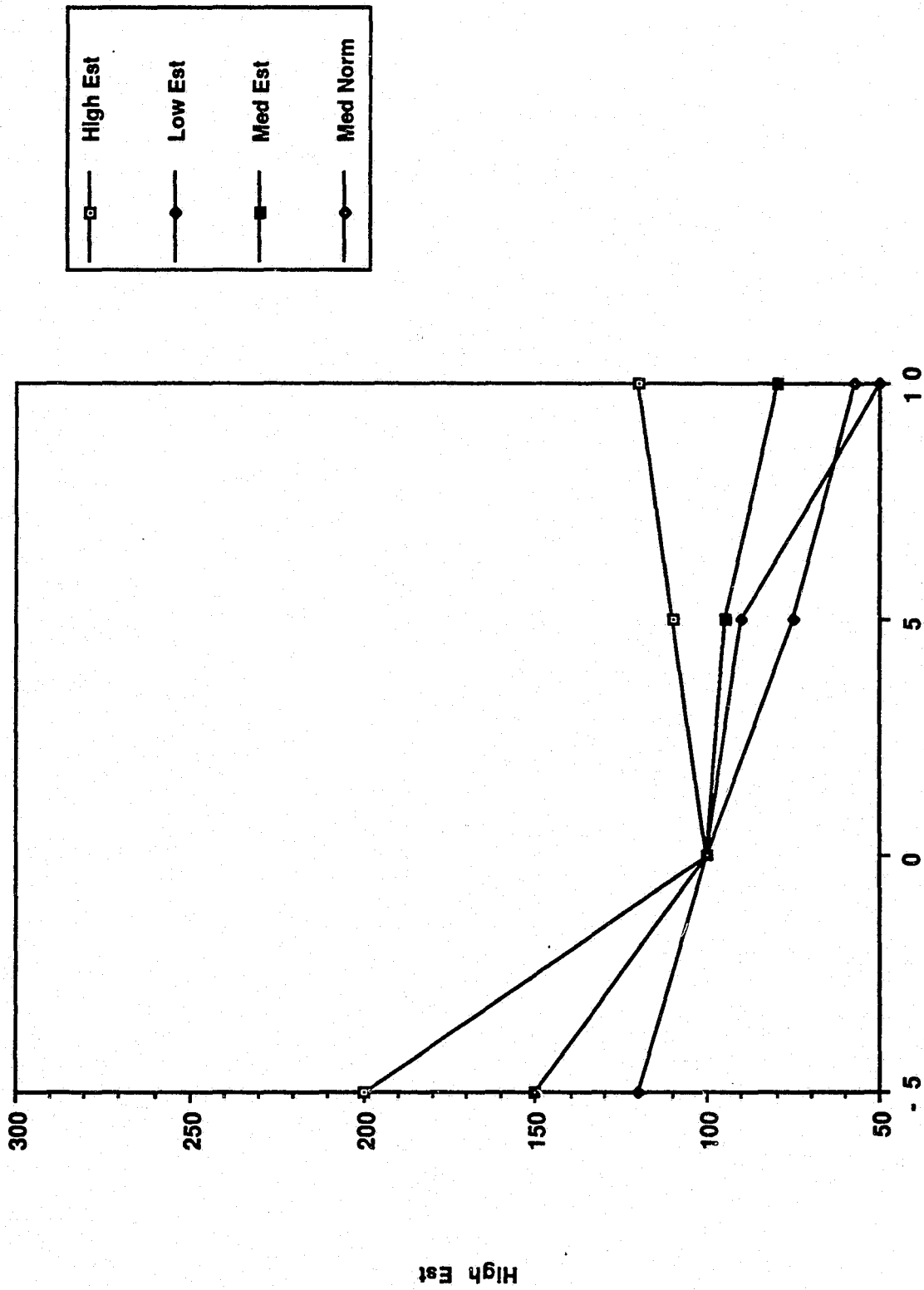
"should be"

T1-Funding For Law Enforcement

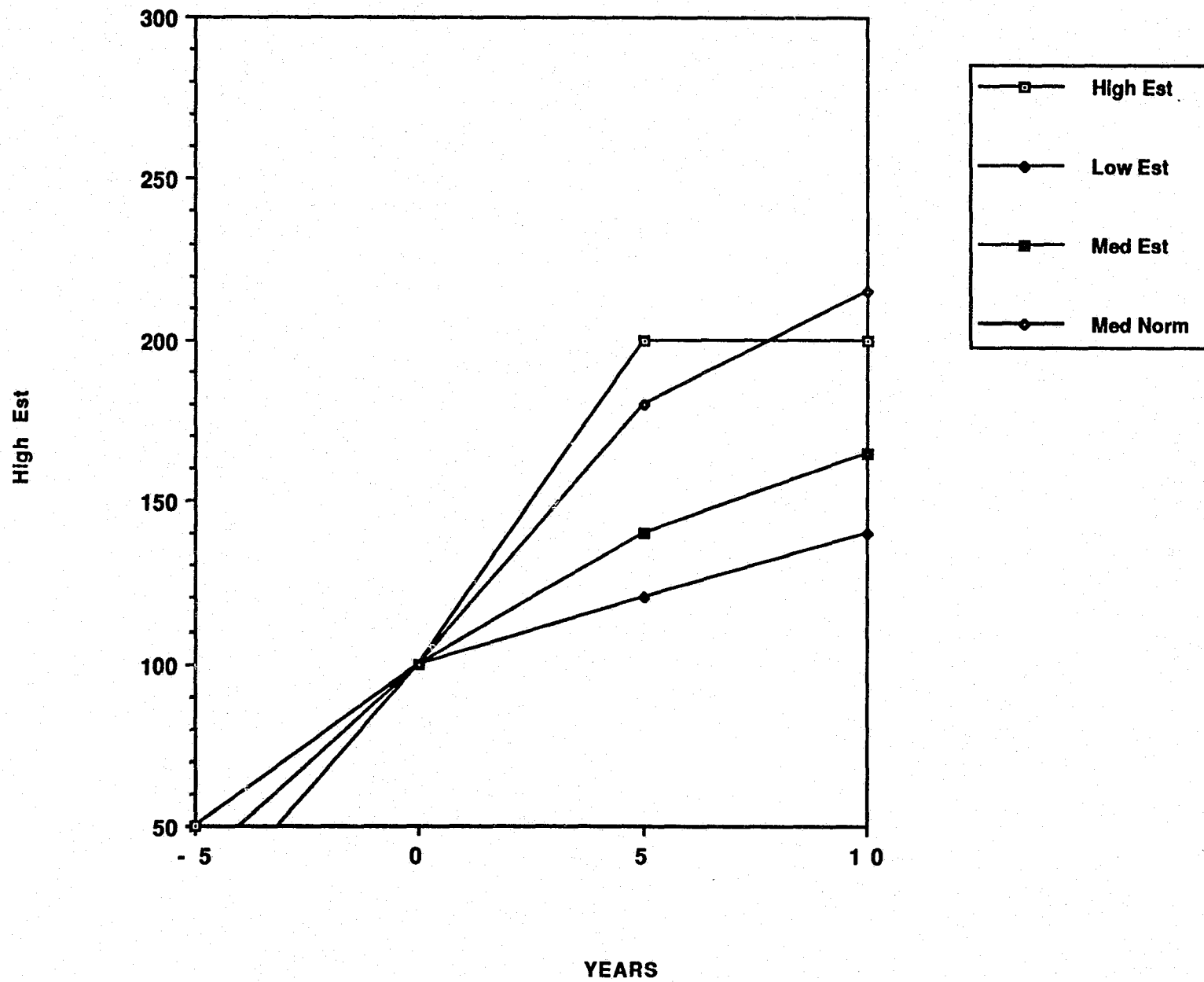


YEARS

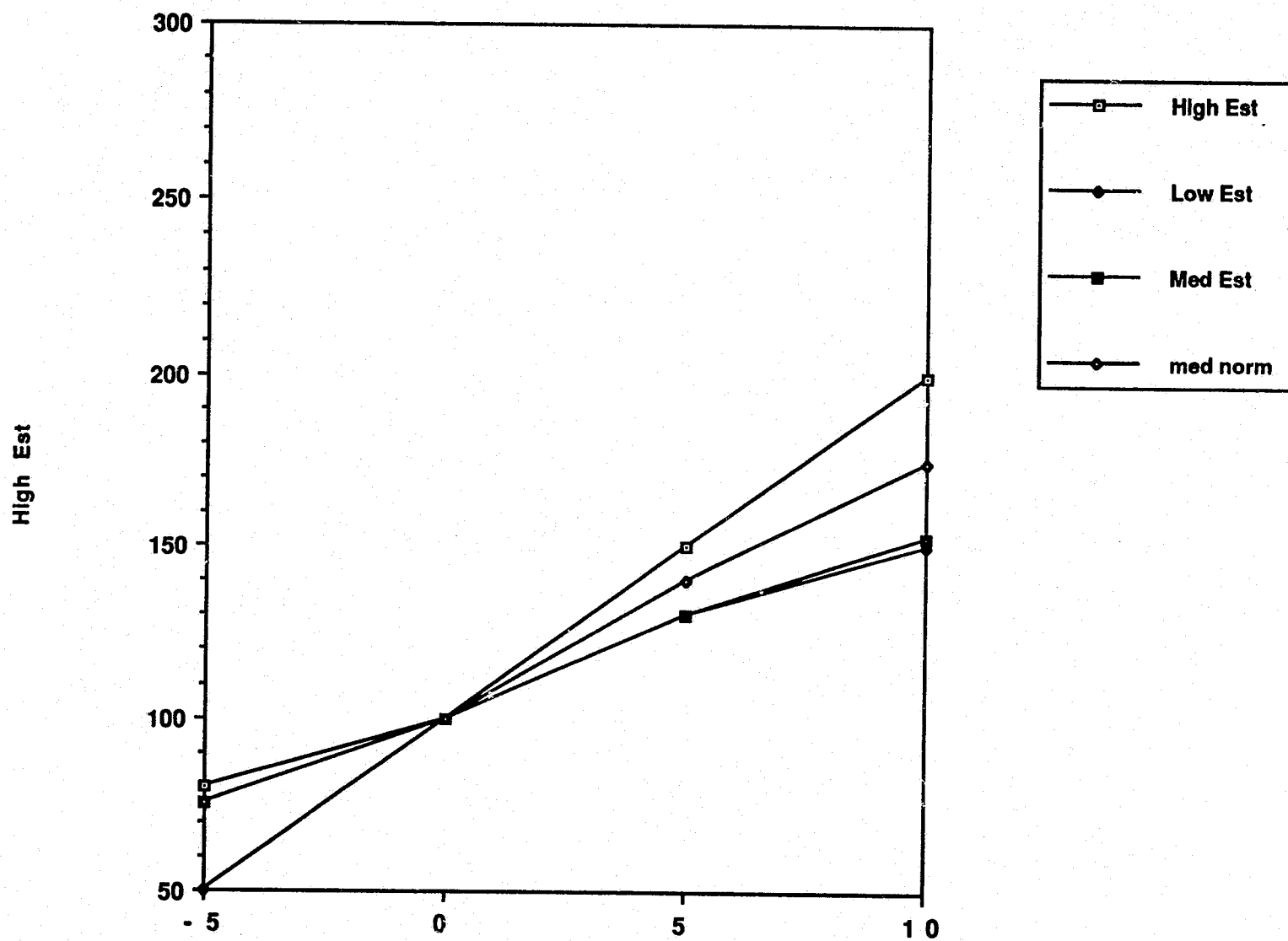
T2-Cost of High Tech



T3-Quantity of Information

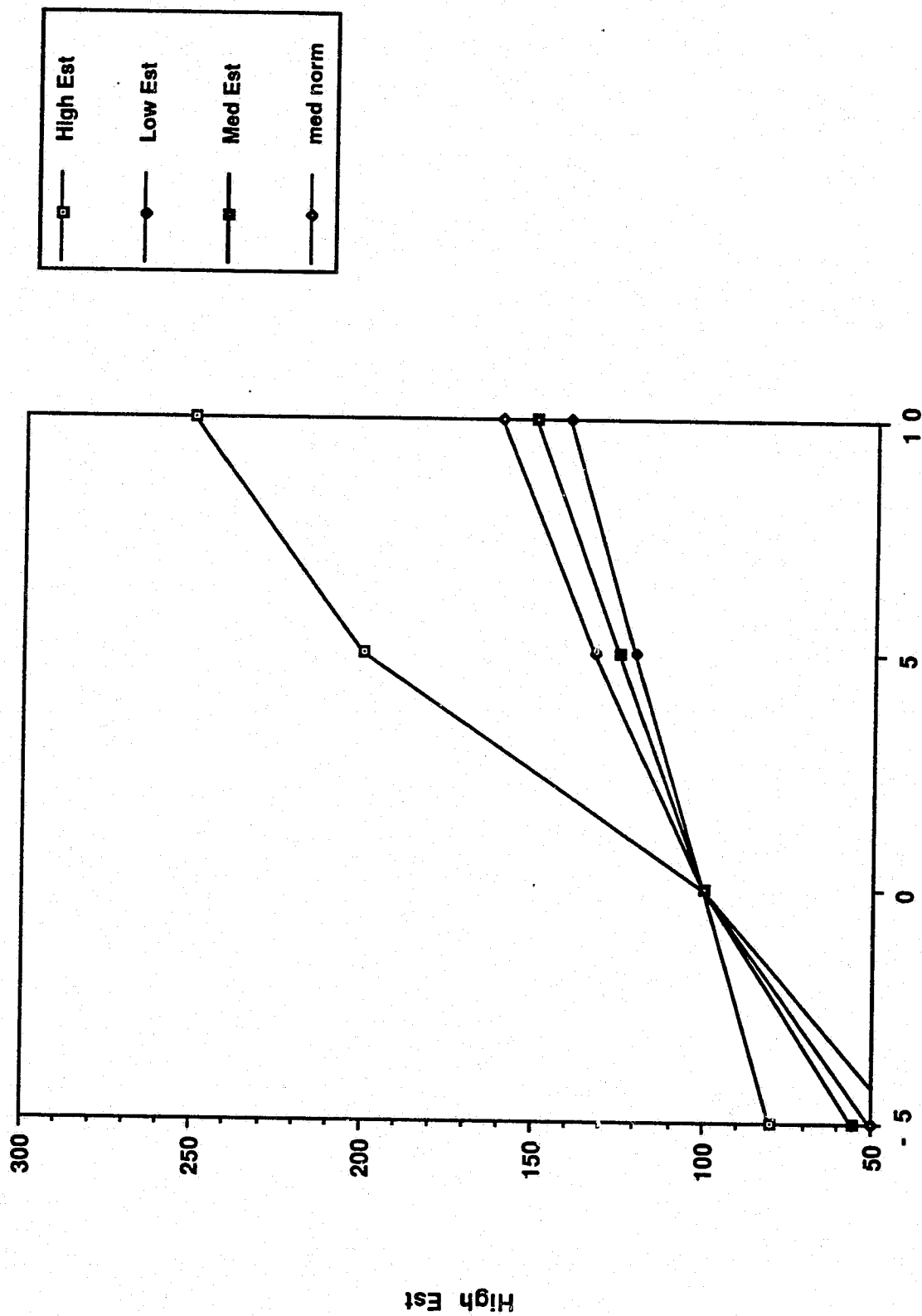


T4-Mgt Job Complexity



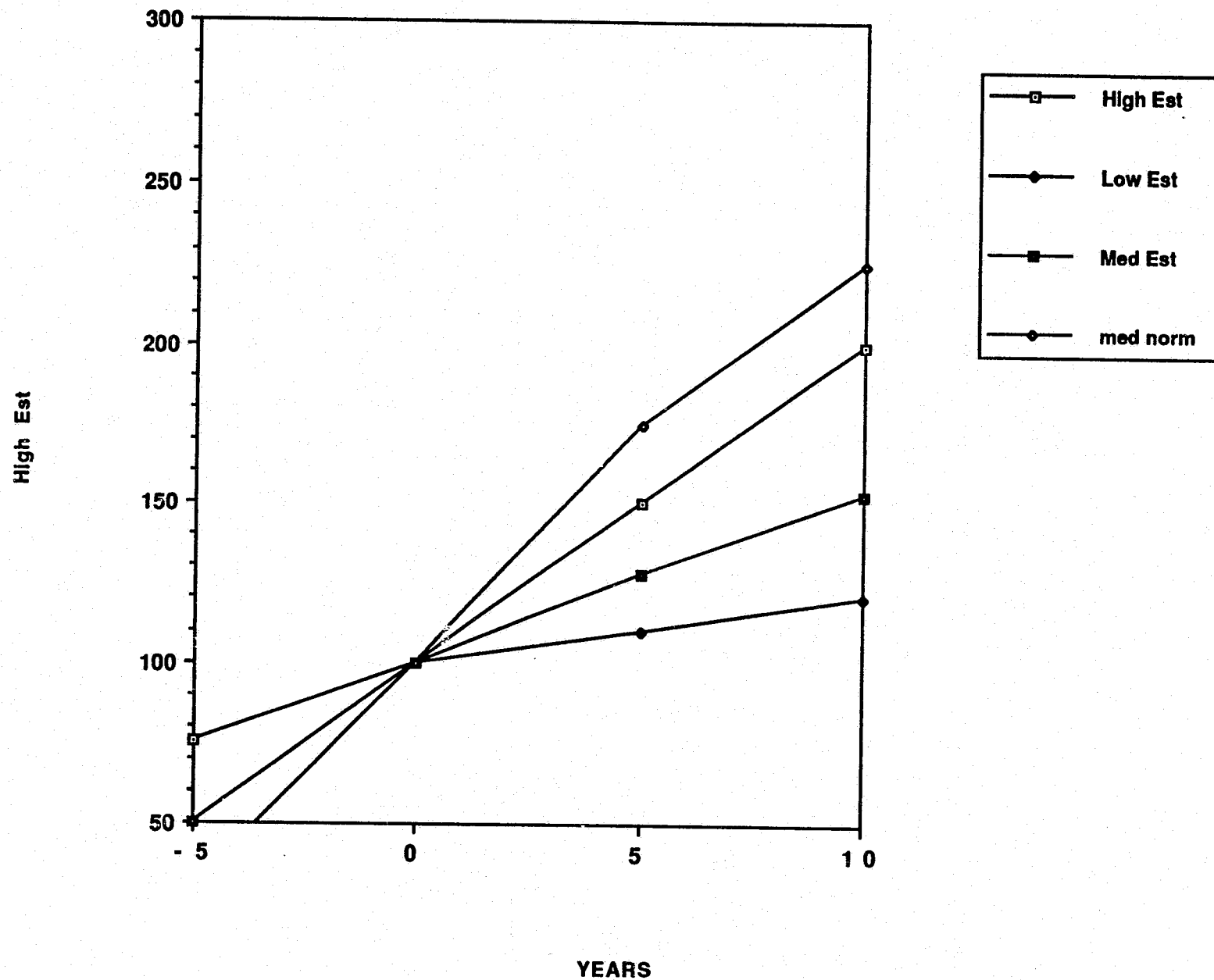
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T5 - Turnover Rate

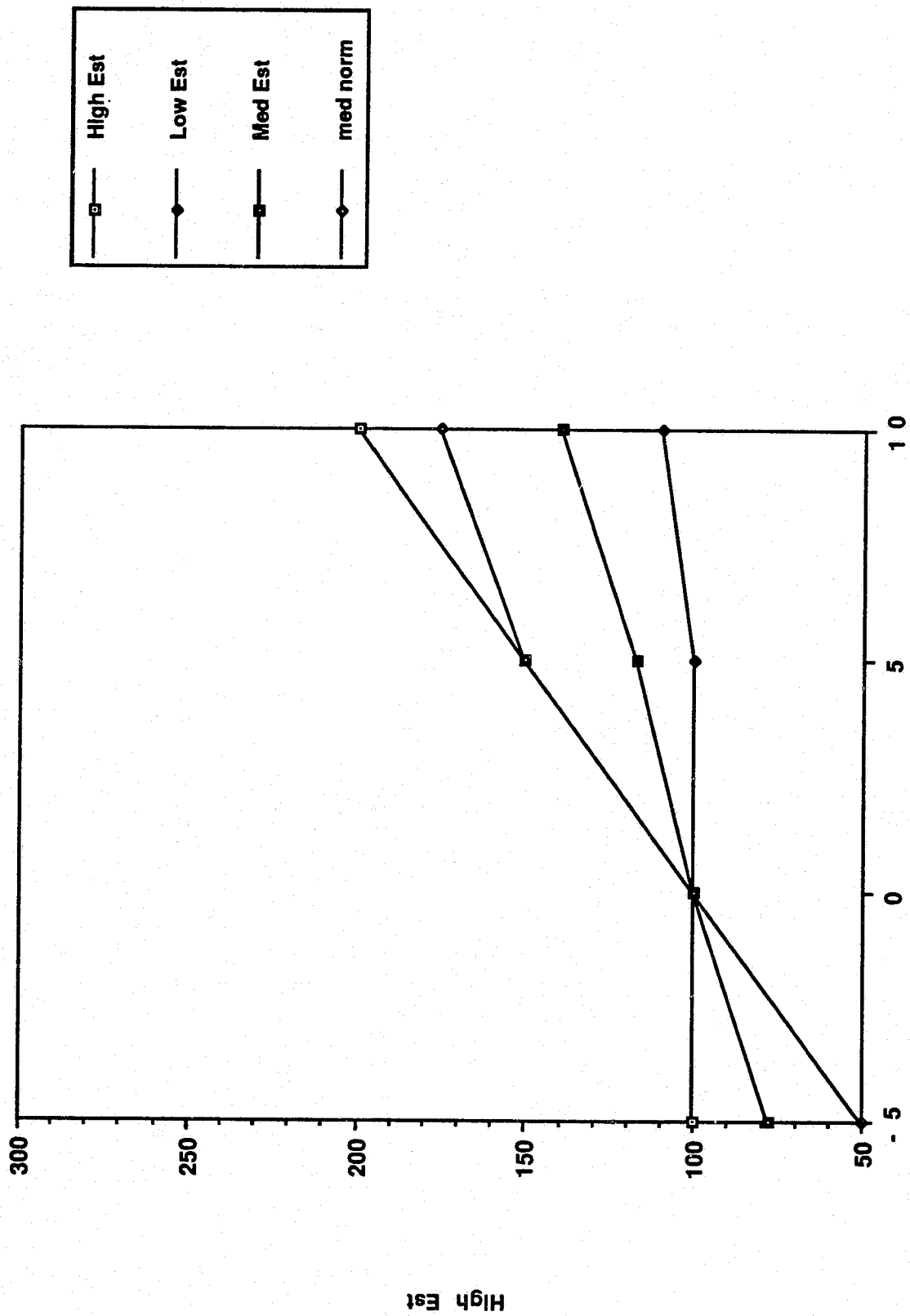


YEARS

T6-Acceptance of High Tech Use



T7-Training Costs



YEARS

APPENDIX D

Selected Events

Note: The following events were identified by the group as ones likely to impact whether or not expert systems would be employed by law enforcement agencies.

- E1 - State mandates basic computer skills training as part of supervisor and manager courses**
- E2 - FBI creates program to certify expert systems for law enforcement use**
- E3 - Legislation exempts law enforcement agencies from liability for use of certified expert systems**
- E4 - Perfected voice recognition software is developed/marketed**
- E5 - Courts hold law enforcement agencies responsible for appropriate use of available information**
- E6 - Courts require training in use of certified expert systems prior to use**
- E7 - LEAA reactivated and funded with grant emphasis on development of expert systems for law enforcement use**
- E8 - Military research & development funding reduced by at least 25%**
- E9 - Lack of appropriate law enforcement response to a major hazardous material spill results in multiple fatalities**

E10 - Courts establish minimum level of expertise required by all law enforcement agencies

E11 - State establishes computer network of expert system applications available to local law enforcement agencies

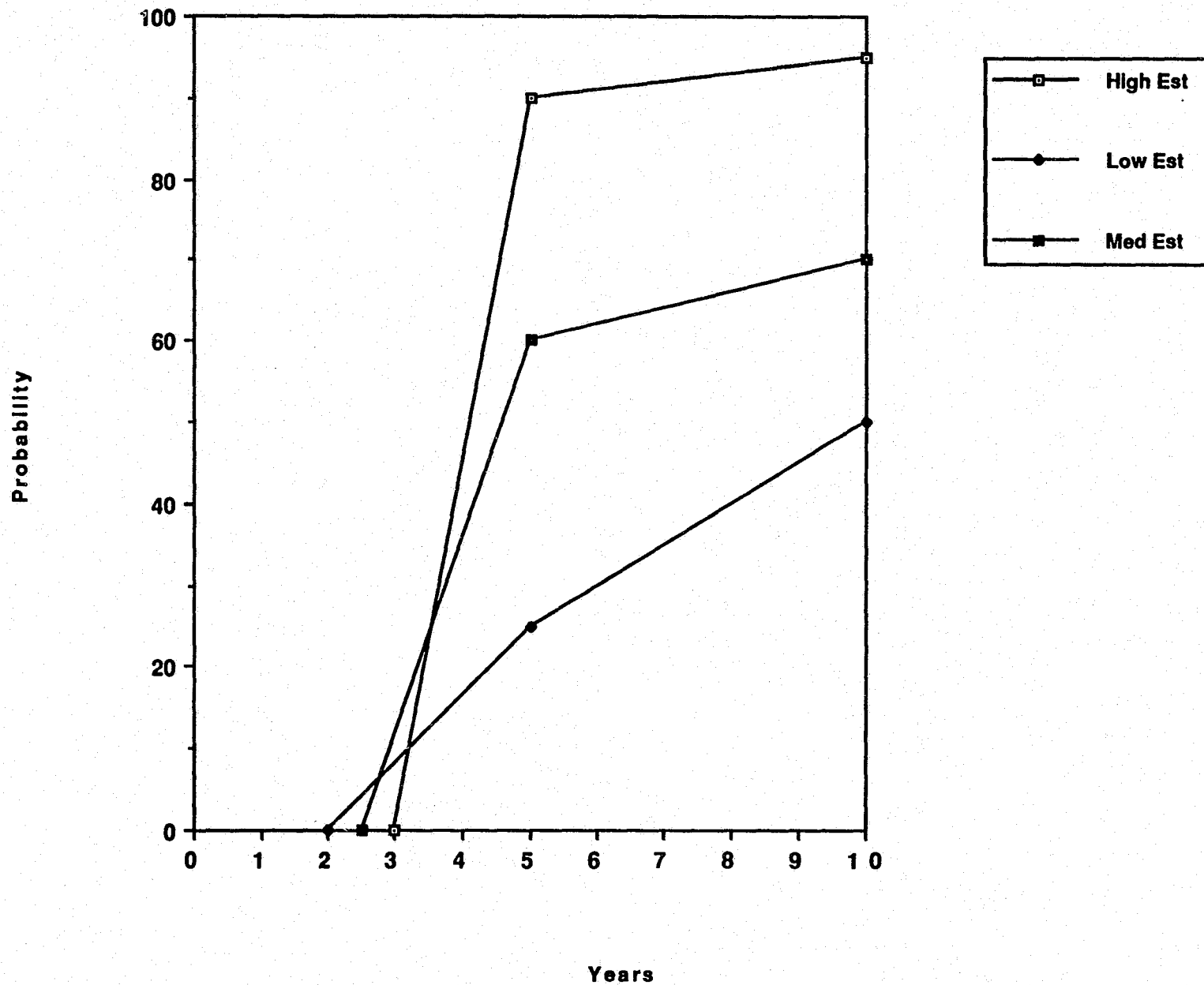
E12 - Fourth Generation computer language perfected

Event Evaluation

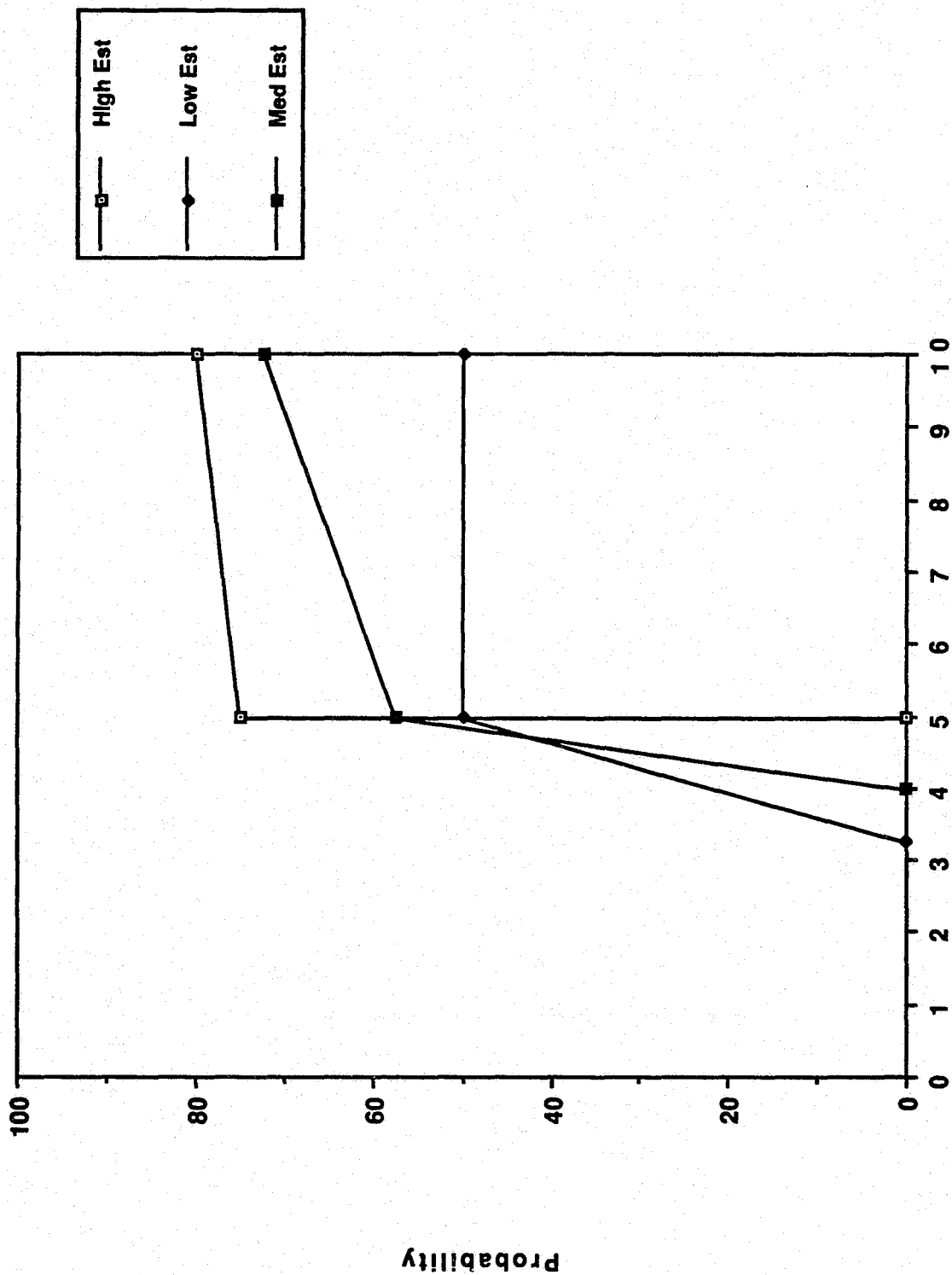
No.	EVENT STATEMENT	* Years Until Probability First Exceeds Zero	* Probability		Impact On Issue * Event Occurred	
			5 Years From Now (0-100%)	10 Years From Now (0-100%)	Positive (0-10)	Negative (0-10)
E1	State Mandates Computer Training For Police Managers	2.5	60	70	5	2
E2	FBI Creates Program To Review/ Certify Expert Systems	4	57.5	72.5	6	0
E3	Legislation Protects Police From Liability For Expert System Use	8	0	50	8	0
E4	Voice Recognition Software Is Perfected	2	40	90	10	0
E5	LEAA Funding For Expert Systems	5	10	65	7	0

* Panel Medians

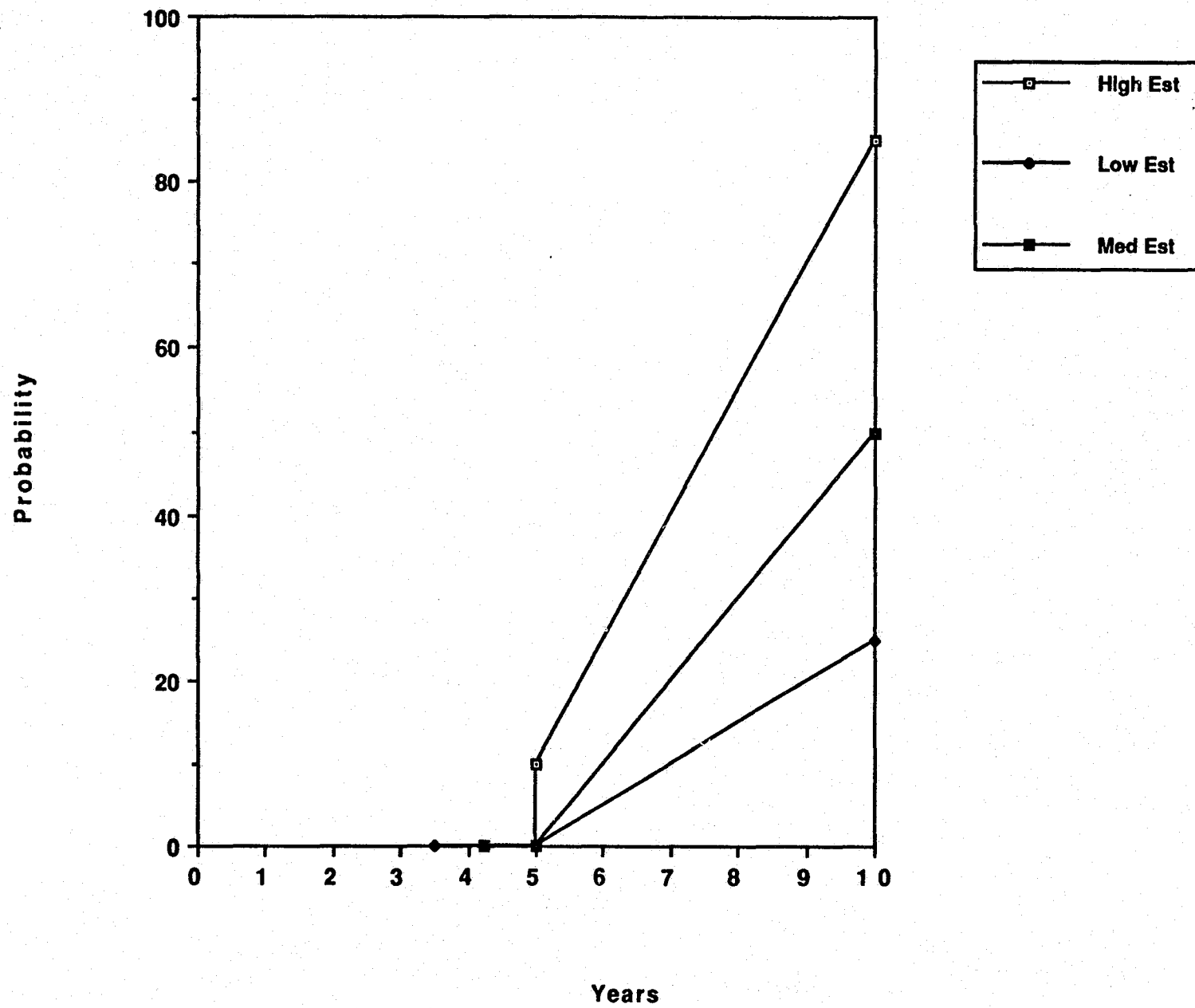
E1-State Mandates Computer Training



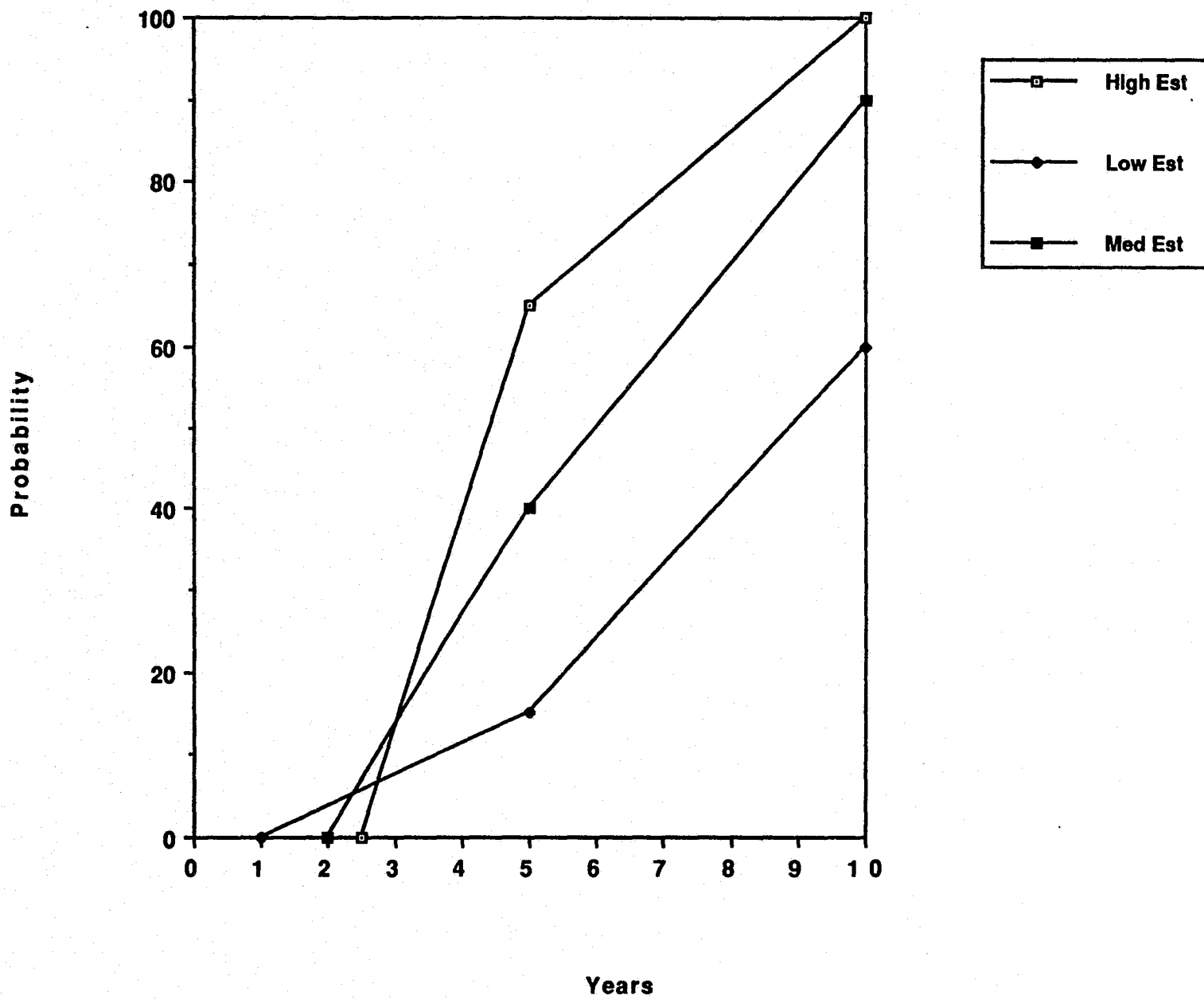
E2-FBI Offers Systems Certification



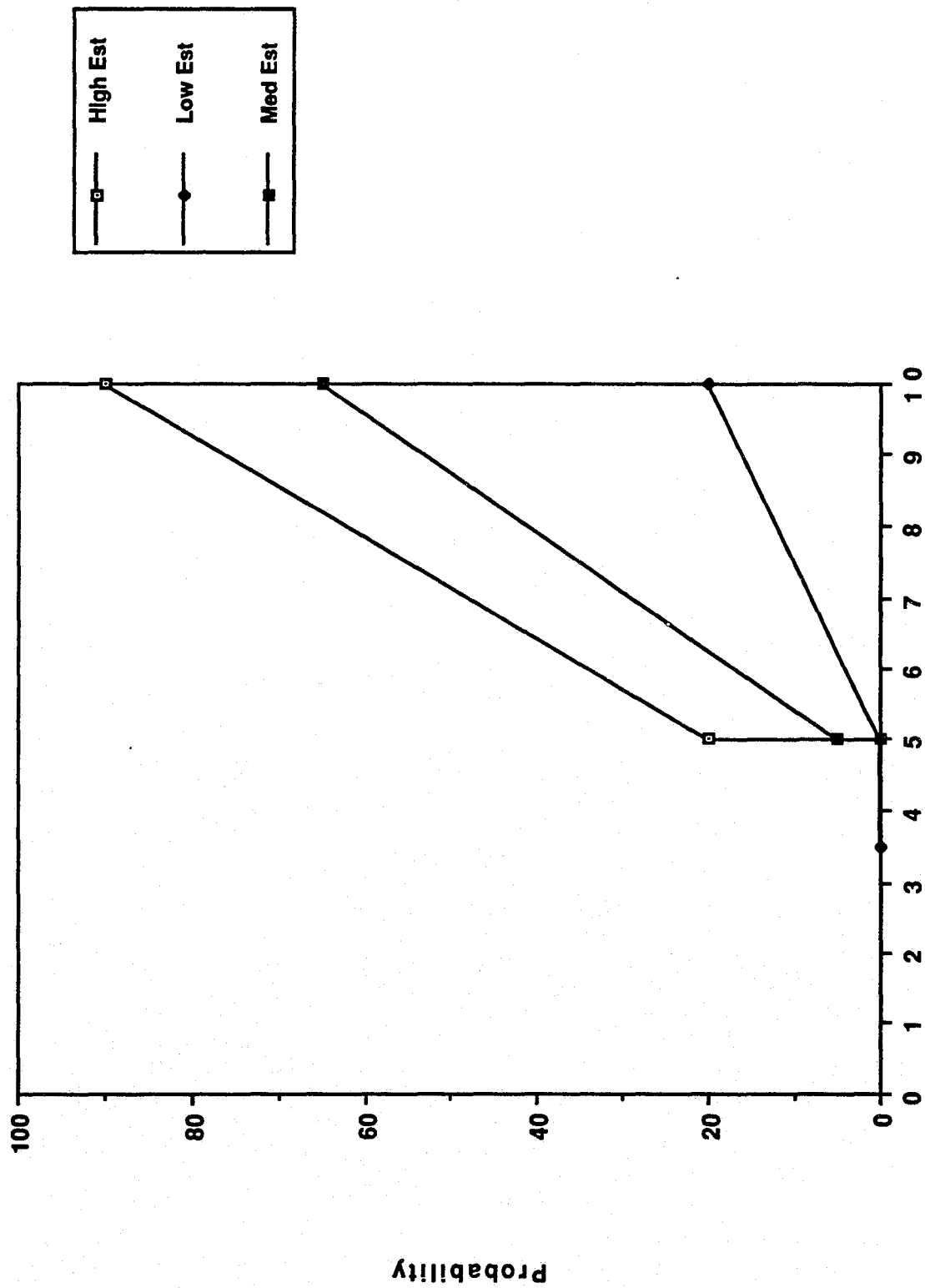
E3-Legislation Protects Use of Certified Systems



E4-Voice Recognition Developed



E5-LEAA Funding For Expert Systems



Years

APPENDIX E

Strategic Panel

In order to assess the impact of events on other events and trends, create future scenarios, establish a strategic plan and provide a means of transition management, the following individuals from the trend/event analysis group were selected to form a panel:

Member # 1

Mid-level manager of large law enforcement agency. Extensive experience in graduate level research on budgets and use of advanced technology by law enforcement agencies.

Member # 2

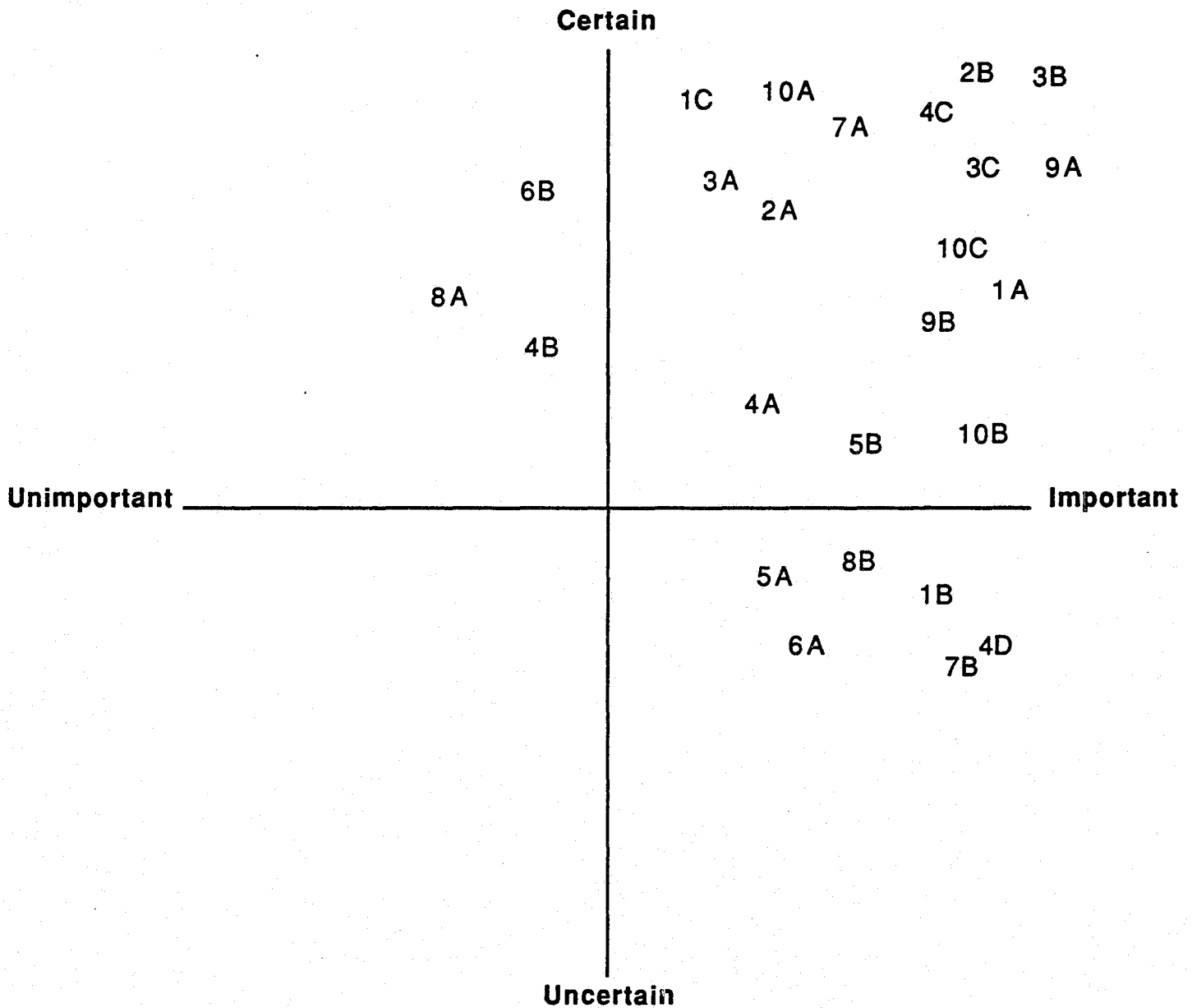
Data base manager for multi-million dollar record management/management information system. Background in communications and software applications. Member of a number of national and/or international computer user groups focused on computer-aided communications or the maintenance of relational data base systems.

Member # 3

Information systems manager. Major areas of expertise include telecommunications equipment and computer hardware. Also has minor programming experience with both micro and mini-computers.

APPENDIX F

Stakeholder Assumption Map



- 1 Sheriff
- 2 Assistant Sheriff
- 3 Patrol Division Commander
- 4 Patrol Managers
- 5 Line Personnel

- 6 Deputy Sheriffs' Assoc.
- 7 Board of Supervisors
- 8 Other L.E. Agencies
- 9 Service Area Population
- 10 Other Division Commanders

APPENDIX G

Critical Mass

C=CURRENT POSITION

N=POSITION NEEDED

↔=DIRECTION MOVEMENT NEEDED

ACTORS	BLOCK CHANGE	LET HAPPEN	HELP HAPPEN	MAKE HAPPEN
SHERIFF	C —————→			→ N
AST. SHERIFF	C —————→			→ N
BOARD OF SUPS.	C —————→	→ N		
DEP. SHERIFFS' ASS.			N ←————	← C
SERVICE AREA POP.		C/N		