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A LAW ENFORCEMENT PLAN TO MANAGE GENETIC INFORMATION

by

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Command College Class 13
Commission on Peace Officer Standards and Training

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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).

INTRODUCTION

A brief background in the advances being made in the science of genetics, followed by a discussion of the applicability of this science to law enforcement and the need to manage it.

PART ONE - A FUTURES STUDY

Will management of genetic information require new law enforcement managerial policies and practices by the year 2001?

PART TWO - STRATEGIC MANAGEMENT

A model strategic plan for addressing the issue of managing genetic information and its future impact is developed for the City of Mountain View Police Department. A proactive approach designed to maximize the use of genetic information is presented.

PART THREE - TRANSITION MANAGEMENT

A plan is developed to manage the implementation process: includes identification of the critical mass, commitment planning, selection of an appropriate management structure, a timetable and technologies which can be employed to ensure that support and required commitment is attained for successful implementation in movement to a desirable future state.

CONCLUSIONS AND RECOMMENDATIONS

An overview of the study in chronological retrospect summarizes the purpose of the monograph and offers answers to the questions raised by the issues and sub-issues. Opinion and recommendations are presented to address issues of opportunity, feasibility and volatility in managing genetic information. Associated issues worthy of further study are presented to foster thought as to how significantly this application of technology will impact law enforcement in the future.

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THE DEVELOPMENT OF
A LAW ENFORCEMENT PLAN TO MANAGE GENETIC INFORMATION

by

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Executive Summary

This study examines the impact of managing genetic information for law enforcement by the year 2001. The study is comprised of four principle sections.

Section I - Introduction: A brief background in genetics and the momentum of the science as it advances. Research and review of literature provide background and overview of DNA technology and its applicability and vulnerability in the future of law enforcement.

Section II - Futures Study: Four component sub-issues are isolated for analysis and futures forecasting by a nominal group panel:

1. How will law enforcement ensure the integrity and credibility of genetic information?
2. How and by whom will genetic information be gathered, stored and analyzed?
3. How will law enforcement deal with privacy issues relative to genetic information?
4. How will legislative involvement impact the use of genetic information by law enforcement?

Current trends and potential events are distilled by panelists for forecasting the future evolution of these issues. Selected trends forecast as increasing are: 1) The number of crimes for which biological evidence is collected; 2) Training in DNA applications; 3) Court acceptance of DNA evidence; 4) Funding for DNA services; 5) Establishment of DNA data banks; and 6) Legal challenges to genetic evidence

related to privacy issues.

Five events which could impact future management of genetic information were identified and forecast: 1) Supreme Court upholds DNA identification; 2) Improper DNA analysis results in wrongful conviction; 3) National standards for DNA analysis are developed; 4) Right to genetic privacy legislation passes; and 5) DNA coding is required at time of arrest in California. Mock policy application leads to the development of a Regional Task Force to determine policy and resolve conflict in managing issues related to genetic information.

Section III - Strategic Plan: A strategic management plan was developed based upon the normative scenario environment. To bring about a desirable future, a Regional Task Force comprised of key stakeholders, including potential adversaries, is formed. The Task Force is charged with developing model policies concerning certifiable DNA laboratory standards, privacy matters, legislative influence and local training. The objective of this plan is to assertively resolve or mitigate issues before they evolve detrimentally for law enforcement.

Section IV - Transition Management: Transition from a naive and uncharted current state to one which employs a calculated strategy is illustrated using a model police agency. By designating a police Captain to serve as project director, internal support is instituted. External support is negotiated using a variety of technologies to elicit participation in the Regional Task Force.

Conclusions and Recommendations

It is concluded that, absent preventive actions by law enforcement and other key stakeholders, the future application of genetic information faces significant jeopardy. Actions recommended include: developing strict policy to deal with privacy issues; assertively seeking standardization and certification of DNA laboratories and associated technologies; involvement in seeking legislative support for both funding and expansion of genetic information use and storage; consolidating resources, both public and private, to advance forensic applications in genetics.

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INTRODUCTION

INTRODUCTION

A brief lesson in genetics.....

Every now and then throughout history, a door is opened in science. Discoveries emerge in rapid succession and theoretical suddenly becomes inevitable. The world observed this phenomenon with the invention of the transistor and it's sophisticated cousin the semi-conductor. These technologies now touch virtually everything in our lives. For the field of genetics the door has opened and the time is now.

The body's fundamental building block, the human cell, has been unsealed to reveal the chromosome, the strand containing DNA (deoxyribonucleic acid). DNA is the blueprint for producing all of the proteins and chemicals which carry out the innumerable functions of life itself. Scientists have known for some time that particular stretches of DNA, known as genes, contain the specific instructions for making these proteins. They have known that we inherit these instructions from our parents and that our genes dictate virtually everything from sex, eye color and height, to health and perhaps even behavior. But only in the last several years have the genes which can cause disease been identified and the specific characteristics and traits which provide our unique composition and identity been isolated.¹

At the center of this research is a world-wide project called **The Human Genome Project**, an effort to map human DNA. It is difficult for the lay person to comprehend the enormity of this project. We know it entails determining the sequence of some three billion characters in our DNA which together form the human blueprint.² The project is expected to take approximately the next ten years to complete and to cost several billion dollars. Despite its size, this research effort is progressing much faster than its slated pace, having already identified some 2,000 of the approximate 100,000 distinct sequences of DNA. As they are identified, elaborate computer programs are helping to map the precise location of the genes which collectively build a human being. One objective is to identify causes and cures for

¹ Merritt, Jim. "The Design of Life - Genetic Engineering Gives New Meaning to 'The World is What You Make It'" Modern Maturity (June-July 1989): page 43

² Weinberg, Robert A. "The Dark Side of the Genome" Technology Review, (April 1991) : page 51

some 4,000 genetically caused diseases.³

Driving this science are the combined resources of both government funding and the biotechnology industry. In 1990, this industry produced 4.7 billion dollars in revenue for the San Francisco Bay Area alone, a region which accounts for only 20% of all biotech industries employees. By the year 2000 it is projected to generate over 100 billion dollars in revenue.⁴ The United States is clearly at the forefront of this research. Foreign investors, smelling the potential profit from genetically engineered pharmaceuticals, are aggressively pursuing investment in U.S. biotech corporations.⁵ The research effort to find cures for AIDS and cancer is also focusing on biotechnological solutions, coincidentally uncovering new frontiers in genetics along the way.⁶

Genetic Applications in Criminal Justice

What does this mean to law enforcement?

For police agencies the initial application of these sciences has been utilizing DNA as a means of identifying victims and suspects. While still in its infancy, this technology holds the promise of establishing a third positive means of identification,⁷ the other two methods being visual identification (photographs) and fingerprints. While the latter two means have been mainstays of criminal identification for decades and have long been accepted by the courts, DNA is only now facing the tests of litigation and public challenge. The rapidly evolving field of genetics has likewise opened the door to many changes in the future of law enforcement. While most police agencies are now aware of DNA identification techniques, few have stopped to analyze DNA's future in policing, societal expectations about the technique, its associated (required) technology or the court

³ Perlman, David. "Gene Mapping Project Success Surprises Its Strongest Backers" The San Francisco Chronicle, (October 29, 1990) page unknown.

⁴ Mankitlam, Dr. Dominic. "Miracle Workers" Spirit Magazine, (July 1991): page 40

⁵ Berkowitz, Dave. "Bioscience Lures Foreign Investors" The Tri Valley Herald (September 13, 1991): page B-8

⁶ Recer, Paul. "Gene Therapy OK'd to Fight Cancer" The San Jose Mercury News (November 14, 1990): page unknown.

⁷ National Institute of Justice Reports, "New NIJ Report Discusses DNA Profiling", Washington D.C. (June 1991) page 24

scrutiny it will receive. Very few years have passed since DNA profiling was developed, but the impact of this technique on criminal investigations cannot be denied. With a growing number of states admitting DNA genetic "fingerprinting" as evidence, DNA profiles will be used in courts more often. In fact, some scientists predict that DNA profiling will become as commonplace as fingerprinting is today.⁸

For the criminal investigator, DNA available from human blood, hair follicles, semen, or other living cell nuclei can provide a conclusive linkage between suspect and crime or between anonymity and positive identification. It can exonerate the innocent and convict the guilty. As this technology evolves, new applications are concurrently being discovered. Recently a leading biotechnology corporation, Cetus, developed a 'manufactured' DNA fingerprint. This man-made chemical, not so different than that found in living cells, can be placed into a manufacturer's product to provide specific identification as to its origin. For example, if added to crude oil this synthetic fingerprint could identify those responsible for an oil spill. It could also be placed in a specific brand of perfume or a product protected by patent to identify counterfeiters. Referencing the application to the petroleum industry, investigators from the United States Coast Guard believe this technique could help solve the some 12,000 incidents of hazardous material spills they handle each year.⁹ As concern for our environment increases, it can easily be speculated that it is only a matter of time until legislation requires such synthetic genetic identifiers being placed in all hazardous materials. In another more traditional application, the Oregon Department and Fish & Game recently used DNA to track and identify poachers of protected game in their state. In one specific case an organized group of poachers suspected of killing the brown bear for its gall bladder (a popular black market item used in Europe to manufacture a scarce pharmaceutical) were linked to specimens found on two different continents by DNA obtained from the slain animals.¹⁰

⁸ *ibid*, page 25

⁹ Sabin, Russel, "Using DNA to Pinpoint Polluters", The San Francisco Chronicle, (January 28, 1991), page C1

¹⁰ KTVU Television Report on using "High Technology to Catch Poachers", San Francisco-Oakland, The 10 O'clock News; (October 2, 1991)

The Technology

How is it done..... is it reliable?

DNA is the twisted, two-strand (double helix) chain of molecules found in the nucleus of most living cells. The chain has only four different types of molecules; life's infinite variety of genetic traits is the result of the many ways these molecules can line up in sequence, much like the patterns of colored beads in a necklace. While most DNA is similar--most people have two arms, two legs, one head--no two human beings share the same DNA sequences with the exception of identical siblings.

For law enforcement this uniqueness of identity provides a powerful tool to identify the unknown or to provide linkage of an individual to a crime scene. Capitalizing on the technology developed in the scientific and medical communities, law enforcement has sought to use this new tool in the crime-fighting arsenal. When examining biological evidence, scientists attempt to match the DNA of a suspect or victim to the DNA of samples found at a crime scene or gathered from a known specimen. In a homicide case, for example, a blood sample taken from the victim might be compared with blood found in the trunk of the suspect's automobile. The blood samples would be analyzed to isolate approximately three segments of DNA. If a match occurs, another three or more segments would be analyzed. If all tests result in matches the likelihood of positively placing the victim at the suspected crime scene can be as high as four billion to one.¹¹

There are currently two methods used to analyze DNA. The following descriptions are provided by the National Institute of Justice:

Restriction Fragment Length Polymorphism (RFLP)

RFLP, which uses a highly dangerous radioactive material to produce a DNA image on X-ray film, is the most commonly performed technique today. Strands of DNA are broken into smaller lengths using enzymes as molecular "scissors" which attack

¹¹ National Institute of Justice Reports, "NIJ's Research in DNA Profiling", Washington, D.C. (June 1991): page 8.

the molecular bonds of the DNA chain at specific sites. The broken strands are sorted according to length, or molecular weight, by a process called *electrophoresis*. The rearranged DNA "chunks" are transferred to a membrane and then labeled with radioactive probes. The radioactivity lights up the molecular pattern, visible when exposed to X-ray film. These images, similar in appearance to a supermarket bar code, are compared with those of a control specimen. The comparative matching is based on the differences in length of specific fragments at certain points along the DNA chain.

The RFLP method tends to require a larger specimen of sample DNA and usually consumes small samples during the testing process. This method is the one which is currently used by the FBI laboratory.

Polymerase Chain Reaction (PCR)

This second method of analysis employs no radioactive material. Instead, PCR amplifies DNA through a molecular photocopying process. PCR is expected by the National Institute of Justice to become the principle testing method used in forensic science. PCR conducts its comparative matching process by identifying sequences of DNA fragments rather than comparing their size. PCR permits analysis of relatively minute specimens, such as hair follicles, because it actually reproduces more sample to analyze. The processing time for PCR can also be as little as two days while the RFLP method can require as much as three weeks time.

Reliability?all is not perfect in this arena

There are problems associated with these technologies. No certification process for either government or private laboratories is currently in place nor does a specific, accepted means of analysis currently exist.¹² Today, no standard has been set to precisely define what will constitute a DNA match.¹³ While fingerprint experts normally establish a specific number of matching points, a similar benchmark has not been clearly established in DNA "fingerprinting." The absence of standards obviously creates an avenue for attack in the courtroom setting. More important, it

¹² Thorton, John L. "DNA Profiling" C&EN Magazine, (November 20, 1989) : page 30.

¹³ Neufeld, Peter J. and Barry C. Scheck, "Factors Affecting the Fallibility of DNA Profiling" Expert Evidence Reporter, (Volume 1, Number 4): page 95

also creates a margin for error, unacceptable in such an absolute presentation of science. Errors have also been found in methods of analysis, possibly leading to the worst of scenarios--a misidentification.

Misidentification is possible due to several factors, including cross-contamination of samples and bacterial invasion of DNA. Proper training of technicians can alleviate some of the risk of cross-contaminations but there appears little way to ensure that this error will never transpire; with the lack of control samples (seldom available at crime scenes), there is a minuscule possibility that DNA typing may end up erroneous.¹⁴ Another difficult problem encountered in the RFLP method is "bandshifting", in which DNA actually migrates from its set path at different rates and on different occasions during electrophoresis.¹⁵ Molecular biologists insist that bandshifting is discernible and does not negate the ability to read a match but disputes continue in this area. Interpretation errors and the problems associated with the diagnostic versus forensic applications of DNA analysis have also created unresolved concerns: "There are critical differences between diagnostic and forensic applications of DNA typing. The difficulties which must be overcome are not trivial, and additional techniques must be developed before this transfer can be achieved and the rigid requirements for admitting evidence can be met."¹⁶

DNA is clearly a powerful tool in the process of positive identification. It will long be the biological centerpiece in the application of forensic science. Law enforcement must assertively anticipate and plan for the management of this information. Issues concerning genetic information abound. Society will expect safeguards to be in place regarding privacy issues; the public will demand credibility be firmly established in the application of genetic information and they will deserve a systematic, efficient approach towards its acquisition, storage and use. All of these issues warrant resolution in the ten-year future of law enforcement. Law enforcement would be remiss to not participate in this critical component of information management. As the front line in applying genetic science to forensics,

¹⁴ Weedn, Major Victor Walter. "DNA Profiling", Expert Evidence Reporter, Volume 1, Number 3 (November 1989):page 93.

¹⁵ Kolata, Gina, quoting Kenneth W. Nimmich, FBI Special Agent and manager of FBI Laboratory Division, Contra Costa Times, reprint from New York Times, (January 29, 1990) page 2A

¹⁶ Neufeld, Peter J. and Barry C. Scheck, "Factors Affecting the Fallibility of DNA Profiling" Expert Evidence Reporter, (Volume 1, Number 4): page 93

law enforcement is ultimately responsible for its appropriate use.

It is understandable that law enforcement has welcomed the use of DNA as a method of identification. But akin to the proverbial Pandora's Box, an attractive package wrapped in modern technology and filled with unimaginable information of the most sensitive and private nature is about to be opened. Examining the issues related to this information and forecasting how law enforcement will manage those issues will be the focus of this paper.

Part One

A FUTURES STUDY

Methodologies

This is a futures study, one that examines an issue and forecasts its evolution through a series of defined trends as well as possible events. The events selected were isolated as having potential to significantly impact the issue should they occur. The purpose of the study is to allow law enforcement an opportunity to plan for the changes brought about by the need to manage genetic information by the year 2001. The study will isolate a model strategic plan drawn from one of three possible scenarios and then close with a transition plan geared at introducing necessary change in an example agency. The study is intended to prompt thought and anticipation in an effort to assist the reader in preparing for the future law enforcement application of genetic science.

Issue Isolation & Definition

The task of developing and refining this particular issue came about through a series of processes. As this is an emerging science and law enforcement application, information on the topic was breaking on almost a daily basis. Newspapers and technical publications were scanned extensively, not only historically but literally though the date of completion of this study. Published works dealing with this subject matter were also reviewed (see bibliography for listing). The study began with isolating an issue. This topic is one which could fill volumes of work on its scientific nuances alone. Carving a manageable niche became the initial task; considering the topic from a law enforcement perspective the focus clearly became the management of DNA information, with technology taking a supporting role.

Initial meetings were held with the command staff of the author's employing police agency. From these meetings, broad matters of concern were isolated and plotted on a modified futures wheel (Appendix A) This information was shared with criminalists, representatives of the pharmaceutical industry, prosecutors, and the judiciary. Common themes emerged. Concern for the same primary issues relative to use and acquisition of genetic information were identified by all parties. Those core issues centered around questions of technical competence, prudent application to law enforcement, and the privacy matters associated with it.

Specific to the purpose of this futures study is the issue question:

Will genetic information management require new law enforcement managerial policies and practices by the year 2001?

To clarify the issue question, four component sub-issues were identified. These sub-issues serve to establish parameters and provide focus for both this study and the forecasting panel involved in the analysis. The sub-issues are:

1. How will law enforcement ensure the integrity and credibility of genetic information?
2. How and by whom will genetic information be gathered, stored, and analyzed?
3. How will law enforcement deal with privacy issues relative to genetic information?
4. How will legislative involvement and intervention impact the use of genetic information by law enforcement?

Discussion of Sub-issues

Integrity and credibility of genetic information

With any burgeoning discovery in science, an onslaught of information will become available in a rapid fashion. This information will require significant management. As is the case with all information, the first test for law enforcement will be ensuring its credibility prior to its presentation as fact or, in the immediate instance, prior to making the decision to acquire and apply it at all. This will entail specific resolution of the issues of multiple technologies and require a certifiable, standardized array of laboratory processes.

Law enforcement should participate in this critical preliminary component. With the establishment of credibility, comes the duty of properly training technicians to provide in-house expertise in the gathering and storage of the evidence from which this sensitive information will be derived. It also prompts the decision process as to exactly what will be stored, the DNA pattern or the actual DNA specimen. This decision will surface significant concerns about government intrusion and privacy, issues which will be subject to more discussion later in this section.

Gathering, storing and analyzing genetic information

As with any new technology, everyone is interested in getting into the race. While the private sector may be rushed due to the high profit risk, for law enforcement the approach that "haste makes waste" is probably more appropriate. Law enforcement has a great deal to lose by approaching this issue on an ad-hoc basis. Advancement through the court system of a case which is sloppily prepared or easily attacked could be devastating should it prompt a binding appellate or Supreme Court exclusion of all DNA evidence. It is therefore appropriate that law enforcement spend the time to define roles and responsibilities in the gathering, storage and application of these technologies.

In an area similar to the storage of DNA information, law enforcement observed the collapse of countless fragmented efforts to collect fingerprint data as accessible centralized repositories were developed. Literally millions of local dollars have been wasted on producing limited fingerprint data bases which have become rapidly outdated. Ultimately California developed the CAL-ID system, considered to be one of the best in the country. Law enforcement needs to learn from the lessons of the past and to proceed with the collection of DNA data in a strategic, intelligent manner. The FBI has begun the process by establishing CODIS, the Combined DNA Identification System. This system will serve as a national reference service rather than a national DNA specimen repository. An agency inquiring into the system will be referred to the state holding the specimen or the pattern analysis for specific information, similar to the NCIC system for criminal history or stolen property.¹⁷

¹⁷ Castro, Janice. "Catching Serial Killers in the Spotlight" Time Magazine, October 14, 1991; Page 17

Privacy issues relative to genetic information

Perhaps the most sensitive issue is the very nature of the information law enforcement will be faced with managing. While accustomed to dealing with the intimacies of human lives, tragedies and behaviors, never before has law enforcement (or anyone) held the responsibility of maintaining records of human composition, heredity and health; in the not-so-distant future the scope of this information will perhaps expand to include behavior and even life expectancy. This issue has already provoked debate and as the technology advances it seems destined to be subject to increasing scrutiny.

In the United States an erosion into our private lives has occurred. It has been incremental and silent but very potent. We currently have a health care and life insurance industry which maintains computer records on all insurance claims, records which include doctor visits, diagnoses, and prescription information. We have credit data collection services which maintain information on an individual's employment, buying patterns and debts. We are placed on mailing lists by the type of magazines we subscribe to, the type of car we own, or the relative affluence of the zip code in which we happen to reside. These lists are sold to others like meat on a rack, to be used for marketing and research purposes. The thought that such practices could occur with genetic information does not require a particularly vivid imagination.

It is clear that law enforcement must establish a means to maintain the confidentiality of DNA information. We have such a system now, supported by statute, which strictly protects the release of arrest and conviction information. No weaker mechanism should be employed to protect genetic information.

Legislative issues relative to genetic information

Elected officials will be challenged by these new issues of ethics and privacy. One can already see the quandary between providing law enforcement with vast useful information to help rid society of crime and the creation of an Orwellian government which maintains sensitive personal information about individuals--

information which might exceed the knowledge an individual has of himself. In specific terms, while this technology will provide the mechanism to identify an abducted child years after his disappearance or an unidentified murder victim decades after his death, it also may provide the police with those private details which make up a person's very being and individuality.

Legislators are already beginning to scrutinize the issue. When enacting California Senate Bill 1408, which required the DNA registration of convicted sex offenders with the Department of Justice, legislators added language limiting DOJ to analyzing DNA only for genetic fingerprinting purposes. This language places these limitations only on the Department of Justice but is an early signal of legislative concern. The United States Congress has also begun debating the ethics of genetic screening. "People may be unable to obtain insurancebecause of the stigma of having an undesirable gene" said Rep. Robert Wise Jr., Democrat from West Virginia.¹⁸

Regulating the storage and release of this information will be difficult. Government will need to implement a mechanism, perhaps analogous to the maintenance of Internal Revenue Service information pertaining to income and taxation, in which such records are generally considered private and inaccessible by either the private sector or other government interests. Parties with ulterior motives, such as the health insurance industry, employers and a cadre of private enterprises, are already raising their eyebrows at this potential new source of personal data. Such volatile and personal issues seem destined for legislative intervention; what remains to be determined is to what degree it will curtail or enhance access by law enforcement to this information. Law enforcement must assertively limit the application and release of this information and should proactively lead in establishing appropriate control mechanisms and safeguards. Nothing will prompt harsh restrictions more rapidly than mismanagement or flagrant abuse.

¹⁸ Snider, Mike, "Ethics of Genetic Screening Debated", The USA Today, (October 18, 1991), page D1

Selection and Assembly of the Nominal Group Panel

Using the Nominal Group Technique (NGT), seven panelists were selected to participate in a futures forecasting exercise. The panelists were selected by identifying individuals with established knowledge of police procedures, coupled with knowledge of criminalistics and general science. The panelists are listed in Appendix B.

Trends and Events

A series of forecasted trends and events were developed by the panel using the NGT process. A "round robin" recording of ideas created a candidate list of 34 trends and 21 events (Appendix C & D). Each trend was reviewed for clarity and lack of defined directionality. Following the review of the trend list, the events were reviewed, clarified, and several of them consolidated. Upon conclusion of this clarification process the panel was asked to rank each trend and event based upon its impact on the issue and sub-issues.

Trends

From this ranking process six trends emerged as most valuable in the context of having a good long range forecast of their movement. This forecast would provide essential data in developing a strategic plan geared at managing the issues. The panel was asked to review each trend, forecasting their levels using a ratio establishing today with a value of 100. The forecasting required trend estimates of five years ago and both nominal (will be) and normative (should be) future estimates of five and ten years from now. Table 1 depicts the forecast of the panel using median values. The full range of each trend forecast are contained in Appendix E.

TABLE 1

TREND EVALUATION

Trend #	TREND STATEMENT	LEVEL OF THE TREND ** (Today = 100)			
		5 Years Ago	Today	*Five years from now	*Ten years from now
T-1	The number of crimes which are identified as having biological evidence.	60	100	150/200	200/250
T-2	The level of training provided Criminal Justice Professionals in DNA applications.	30	100	200/200	300/300
T-3	The level of acceptance by the Courts of DNA evidence.	20	100	200/250	300/350
T-4	The level of funding for forensic DNA research and laboratory services	15	100	200/300	400/500
T-5	The number of established DNA data banks	5	100	200/200	300/300
T-6	The number of legal challenges raised on privacy issues.	10	100	200/100	300/100

** Panel Medians N=7

*Five years from now

*Ten years from now

~~"will be"~~

~~"will be"~~

~~"should be"~~

~~"should be"~~

Trend 1

The number of crimes which are identified as having biological evidence.

This trend specifically dealt with the potential of locating biological evidence at crime scenes. This trend was defined as being fed by a hybrid containing two elements. The first was the incidence of "violent crime", due to the higher instances of biological evidence involved in such cases (rape, robbery, felony assault). Second was the development of new techniques and technologies which could make possible the collection of biological evidence in all crimes--hair follicles left by the suspect at a burglary, for example, or minute blood specimens at a window-smash burglary.

Panel Analysis

The panel clearly viewed the number of crimes to which this technology could be applied as increasing. It is important to point out that in panel discussion the members did not foresee a significant increase in violent crime but did believe that advances in identification and collection techniques would increase the number of crimes in which biological evidence could be identified. The scientific community lends support to the panel forecast. The director of a crime laboratory in San Diego recently stated that he expects the technology to develop to the extent that DNA analysis may be possible from the few skin cells left on a cigarette by its smoker.¹⁹ Panelists forecast a 50% increase in the number of crimes with biological evidence within five years. In the ten year future, panelists believed that through a combination of new technology and expanded applications to certain property crimes a 100% increase would occur.

Trend 2

The level of training provided to criminal justice professionals in DNA applications for law enforcement.

This trend was defined as the amount and the degree of sophistication of training

¹⁹ "DNA Lab Puts San Diego On Leading Edge" San Diego Union, reprinted in PORAC News, (October 1991) Vol. 23, Number 10, quoting Dr. Patrick O'Donnell

given to police academy recruits, in-service police officers, prosecutors and criminalists in gathering, analyzing, storing and applying DNA evidence.

Panel Analysis

The panel considered this trend to play a significant role in imparting the skills and knowledge necessary to fully employ this technology and to establish its credibility in forensics as well as in the courtroom. The panel forecasted that training efforts focused on genetic identification methods will triple. As police academy and detective training programs adopt instruction blocks in this application of technology, a keen awareness in this body of knowledge will spread throughout the criminal justice community. Old cases with long-idle, but now useful biological evidence will be subjected to successful analysis using new technology, providing momentum and excitement for this new application. Professional application of such technology would seem intrinsically tied to a viable, precise training curriculum. Panelists forecast a 100% increase in the five year future, with training efforts tripling by the year 2001. More ambitious "should be" forecasts denote a collective desire from the panelists to increase these efforts by half again.

Trend 3

The level of acceptance by the courts of DNA evidence.

This trend was defined as the admission to evidence of DNA identification by the courts. It was viewed in the context of both the civil and criminal courts as the panel believed that the civil courts were the actual forerunners in the use of DNA evidence pertaining to paternity matters.

Panel Analysis

The panel viewed this as an increasing trend, primarily driven by the expectation of standardized techniques and methods in applying the technology coupled with the escalating number of cases which will be reviewed by the courts over the next decade. Courtroom acceptance of DNA evidence arose as one of the most volatile issues in this forecasting exercise. The panelists all expressed concern that if publicized or cited in a precedent-setting court ruling, sloppy laboratory analysis or

poorly-prepared case would quickly reverse what is seen as a continuing increase in evidentiary admissions. The level of courtroom admissions was forecast as doubling in the next five years and, as this technology encroaches deeper, tripling by year 2001.

Trend 4

The level of funding for forensic DNA testing, training and research.

This trend was limited to public funding for such activities, geared at DNA laboratories specifically focusing on forensic applications. Such applications included the creation of DNA data banks and automated processes for the analysis, retrieval and storage of genetic information.

Panel Analysis

The panel was aware of current (1991) legislation which, if approved, will provide the FBI with eight million dollars for development of DNA applications; this legislation will provide the states with an additional ten million dollars.²⁰ That this benchmark event would occur in conservative fiscal times signaled future successes to the panelists, who forecasted doubling and quadrupling of funding in the five and ten year timeframes respectively. It was believed that government will benefit from private research in the area of genetics and that law enforcement will benefit as well from government funded biomedical research. Despite such optimistic forecasts, panelists saw a strong need for even higher levels of fiscal support as expressed in "should be" forecasts which reached 300% and 500% increases at the five and ten year forecast points.

Trend 5

The number of established DNA data banks.

This trend was identified as the number of repositories of DNA information established by individual law enforcement agencies as well as State and Federal agencies. It also included the creation of private DNA data banks and their role in

²⁰ DNA Identification Act of 1991, Authored by United States Senator Paul Simon, Illinois, and Congressman Don Edwards, California.

the collection of genetic data. For forecasting purposes the panel drew an analogy to the collection of personal credit data by the private sector or the storage of medical history information by the health care industry.

Panel Analysis

DNA data repositories were forecasted as an inevitable part of DNA data analysis. Data on sexual offenders in the California prison system already exists and the panel viewed this lead as an indicator as to what the future might bring. Panelists believed that State governments would begin collecting DNA data on all convicted felons, particularly those convicted of violent crime. The panel acknowledged the failure rate of correctional institutions in rehabilitating felons and the discouraging statistics of recurring offenses as the fuel required to spawn such a movement. Automated systems were believed to be capable of tracking this information on a wide-scale basis, some of which have already been implemented. Panelists generally dismissed the future of private DNA data collection sources, citing concern over ensuring the credibility of the information and issues of privacy. One panelist did note that genetic data collection would be a logical extension to the genealogical information already collected by private organizations such as the Mormon Church. Nevertheless, for law enforcement purposes this application was dismissed. Significant increases in government data bases were forecast. The five year forecast projected a doubling of the number of existing DNA data banks and a tripling was anticipated in the ten year future. "Should be" forecasts conservatively matched the "will be" forecasts in this trend. Queried about the future being at "just the right" level, panelists, despite law enforcement orientation, expressed concern over government over zealously maintaining such personal information.

Trend 6

The number of legal challenges raised over privacy issues regarding genetic data.

This trend was defined as the number of court challenges based on privacy issues regarding the admissibility of genetic evidence. It was also defined as including any civil court challenges aimed at restricting the release and use of genetic data by both private and public organizations.

Panel Analysis

The panel saw serious issues associated with privacy and the use of genetic information. Emerging from the discussion was the anticipation that civil rights organizations would surface Constitutional issues of both Fourth and Fifth Amendment applications. Panelists forecast that the number of such challenges would double in five years and triple in the next ten years. It was felt that these challenges would closely follow technological achievements as the understanding of genetic composition reaches more intimately into the privacy of individuals. While forecasting significant increases, the panel clearly believed that such a trend would be mitigatable with the adoption of appropriate policy and legislation addressing these concerns. This belief is evidenced by the "should be" forecasts indicating that the level of such incidents would stabilize at today's rate.

Events

The following five events emerged as having the highest probability of occurring and the most significant impact on the identified issue and sub-issues should they occur. The panel was asked to forecast each event on a percent probability scale. It was explained that the value of zero indicated that the event was not expected to occur and a value of 100% indicated that the event probably would occur. Each panelist was asked to provide a forecast as to when the probability of the event occurring would first exceed zero and what the subsequent probabilities would be at five and ten years. The panel was also requested to rate the impact, positive or negative, on the issues should the event occur. The impact, either positive or negative was scored on a scale of one to ten. Some events emerged as having split impact, affecting the event to some degree both directions. Table 2 depicts the collective median forecasts of the panel. The full range of these forecasts are contained in Appendix F.

TABLE 2

EVENT ANALYSIS

Event #	EVENT STATEMENT	* YEARS UNTIL PROBABILITY FIRST EXCEEDS ZERO	* PROBABILITY		IMPACT ON THE ISSUE AREA IF THE EVENT OCCURRED	
			Five Years From Now (0-100 %)	Ten Years From Now (0-100%)	* POSITIVE (0-10 scale)	* NEGATIVE (0-10 scale)
1	U.S. Supreme Court upholds DNA as positive identification	2	75	90	10	0
2	Defendant wrongly convicted, based upon improperly analyzed DNA data.	1	5	40	0	10
3	National Standards for DNA identification established/adopted	2	50	90	10	0
4	Federal right to genetic privacy legislation passes.	6	0	55	2	8
5	DNA coding recorded as part of arrest process in California.	5	50	90	9	1

* Panel Medians N=7

Event 1

The United States Supreme Court upholds the use of DNA as positive identification.

This event is the precedent setting high court ruling which establishes DNA identification as both admissible and credible throughout the United States. For forecasting purposes, "a ruling" was defined as either the Supreme Court hearing a disputed case and ruling in favor of DNA evidence, or refusing to hear a favorable case, tacitly supporting such evidence.

Panel Analysis

The panel did not believe such a ruling would occur within the next two years. This was founded in the belief that national standards for use of DNA must first be developed and that the number of appealed DNA cases would remain relatively small in the immediate future. The group also considered that the appeals processes, which would bring such a matter to the Supreme Court, would take a minimum of two years to be exhausted. The panel saw this event as having a strong positive impact on the issue should it occur, in that a definitive sanctioning of DNA evidence would put law enforcement on solid ground from which to safely use and expand applications of DNA technology and the requisite storage of such information. The forecasting panel strongly believed such a ruling would occur in the next ten years, placing probabilities at 75% within five years, and 90% within the ten-year time frame. Such a ruling was viewed as strongly positive toward issue resolution.

Event 2

A defendant is found to have been wrongly convicted, based on improperly analyzed DNA data.

This event is the discovery that an improper analysis of genetic evidence, had resulted in the conviction of an innocent person for a crime he did not commit.

Panel Analysis

The panel believed this to be an unlikely event. Panelists with forensic expertise believed it would be much more likely to miss a match where one existed than to misidentify an individual. With increased utilization of these technologies, however even the low probabilities forecast validate the legitimate threat of such an occurrence. The simple accidental application of the same sample to both tracks during electrophoresis could create such an occurrence, as both would obviously match. Absent an alert defense or a second analysis, the error could go undetected. The critical element of focus for planning purposes is how catastrophic such an event would be to the use of genetic evidence. All agreed it would be devastating. Despite the low probabilities forecast, 5% within five years and 30% within ten years, this event further illustrates the need to establish solid, certifiable laboratory procedures with check and balance systems employed. Such an event was seen as overwhelmingly negative toward issue resolution.

Event 3

National standards for the use of and analysis of DNA are developed and adopted.

This event is defined as the acceptance of a specifiable standard for the identification and analysis of DNA evidence. For purposes of comparison, the panel viewed this standard as comparable to the set of standards in use for fingerprint analysis.

Panel Analysis

The panel believed only a minimal possibility existed of the adoption of nationally accepted standards for DNA identification techniques within the next 24 months. The prevailing opinion of the members was that the scientific community needed to resolve their issues before a resolute stance would be established. Contributing to the delay will be the evolution of the technology itself. It is quite conceivable that new methods may evolve in the ten year future, causing additional dispute over standardization. Within the two to ten year time frame, however, it was believed courtroom disputes and public demand would cause either professional organizations, such as the American Society of Crime Laboratory Directors to impose standards or, absent such initiative, the legislature will impose government regulation to formulate and implement accreditation for DNA laboratories. This

impose standards or, absent such initiative, the legislature will impose government regulation to formulate and implement accreditation for DNA laboratories. This event is viewed as having a highly positive impact on the overall issue; it was forecasted as having a 50% probability of occurring five years from now and a 90% probability within ten years.

Event 4

"Right to genetic privacy" legislation passes.

This event is defined as a successful piece of legislation at the federal level which imposes significant restrictions on the gathering and analysis of DNA/genetic evidence. For purposes of forecasting, these restrictions were cited as limiting the use of DNA specimens to analysis for identification purposes only, and forbidding the retention of samples or subsequent analysis of DNA for other traits or evidence of heredity.

Panel Analysis

The panel believed significant concern about privacy issues would emerge as the public became aware of genetic advances and the capabilities of analysis. While forecast as not being probable at all until six years from now, all agreed a sensationalized or widely-publicized abuse could trigger a rapid acceleration of restrictive legislation. Such legislation was viewed strongly negative to law enforcement in that it would no doubt limit the expansive use which is anticipated for this technology. In the ten year future panelist saw a 55% probability of such legislation.

Event 5

The recording of DNA coding is required upon arrest in California.

This event is defined as the passage of legislation which requires the recording of an individual's DNA in official records upon arrest.

Panel Analysis

This event, while not forecast as occurring within the next five years, was believed

by the panel to be the direction in which DNA identification is headed. Panelists discussed the current process in California, where a DNA record is created only for those persons convicted of specific sex offenses. One panelist with expertise indicated that non-intrusive means to gather DNA, such as the use of a toothpick to the interior of the cheek, are already plausible for gathering specimens, particularly with advances made in the PCR methodology. Non-intrusive collection methods seemed to remove a barrier in the eyes of the panelists, that of current technology generally requiring a blood specimen. The act of venepuncture seemed to cross a significant "personal" threshold to the panel. The collection of DNA data from arrestees will probably occur for violent crimes first, according to panelists, but as it becomes an acceptable identification practice will encompass all crimes which require booking. Panelists forecast a 50% probability of such an event five years from now and a 90% probability at ten years. Such an event was seen as being strongly positive to law enforcement and its ability to use and manage genetic information.

Cross Impact Analysis

Three members of the Nominal Group Panel (Appendix G) met as a sub-group to analyze the cross impact of the identified trends and forecasted events upon one another. The purpose this analysis was to identify those trends and events in which interrelationships existed and to gauge their impact on one another. The purpose of doing this analysis is to develop a better understanding of how and to some degree in what sequence the future will unfold.

Cross Impact Methodology

Using a pre-established cross impact matrix (see Table 3), the five "actor" events were listed vertically on the matrix. An "actor" event is one which influences other events and/or trends should it occur. The seven "reactor" trends were listed horizontally. They are referred to as "reactor" because a trends movement is reactive to the occurrence of an event. It was explained to the panel that they would be forecasting the degree of impact, in positive and negative percentages, which each event had upon another. Subsequent to forecasting event influence upon other

events, they would be asked to forecast the effect each event had upon the identified trends. The panel was then asked to forecast the number of years (or portion thereof) until maximum impact occurs. This was applied in both event-to-event, and event-to-trend analysis.

High Impact Events

From this analysis, three actor events emerged with a high impact score. Impact scores are determined by the number of "hits" received. A "hit" is defined as any time an event influences another event or trend, either positive or negatively. Future policy considerations and organizational focus should be targeted toward fostering or mitigating the occurrence of these high impact events.

The United States Supreme Court upholds the use of DNA as positive identification. (Event 1)

This event influenced all others events and trends, with ten "hits". Such a sanctioning of DNA as evidence, increases the probability of standards for laboratory processes being set substantially, because such a ruling would establish an accepted laboratory protocol. However, in analyzing magnitude and sequence of impact, it appears that the reverse will occur first. Logically, the establishment of standards (Event 3) will set the stage for such a ruling. Cross impact analysis indicated such an event would positively impact the probability of such a ruling by 80% in a two year period. The most significant aspect of Event 1 occurring, is the mitigating affect it has upon the "undesirable " future. Event 2, a wrongful conviction, would have it's damage mitigated by 50%. Restrictive legislation (Event 4) would have a 30% less chance of being successfully launched. Lastly, the level of legal challenges (Trend 6) would be tempered by 30%

A defendant is found to have been wrongly convicted, based on improperly analyzed DNA data. (Event 2) This event, with nine actor hits, stands out as having the most negative influence upon the normative future. It is clearly at the top of the list for mitigation. Event 2 positively affected only two other events, that of establishing standards (Event 3); it was believed that standardization and certification would be literally demanded following such an occurrence. The second trend also positively influenced was that involving training (Trend 2). The

probability of positively affecting the level of training would be increased by 25% with the occurrence of Event 2.

National standards for the analysis of DNA are developed (Event 3) This event also impacted all events and trends with 10 hits. It emerged as having the most positive influence upon the nominal future. Its strongest positive influence being on the court system. Event 1 (the supportive U.S. Supreme Court ruling) is positively affected 80% by establishment of national standards. Trend 3 (level of court acceptance) follows with a 90% positive effect being forecast. This event stands the strongest ground in mitigating the occurrence of Event 2 (wrongful conviction), which is lessened by 40%, and the impact of Trend 6 (legal challenges), also lessened by 40%.

TABLE 3

CROSS IMPACT EVALUATION												Maximum Impact (% change ±) Years to Maximum
**	E1	E2	E3	E4	E5	T1	T2	T3	T4	T5	T6	"ACTOR TOTALS"
E1	X	<u>-50</u> 3	<u>60</u> 3	<u>-70</u> 2	<u>80</u> 5	<u>30</u> 1	<u>70</u> 3	<u>100</u> 2	<u>60</u> 2	<u>70</u> 3	<u>-30</u> 3	E1 <u>10</u>
E2	<u>-50</u> 4	X	<u>60</u> 1	<u>-20</u> 2	<u>-30</u> 5	X	<u>25</u> 1	<u>-60</u> 1	<u>-40</u> 1	<u>-60</u> 2	<u>-80</u> 1	E2 <u>9</u>
E3	<u>80</u> 2	<u>-40</u> 2	X	<u>10</u> 1	<u>50</u> 2	<u>30</u> 1	<u>50</u> 2	<u>90</u> 2	<u>60</u> 2	<u>75</u> 2	<u>-40</u> 2	E3 <u>10</u>
E4	<u>-30</u> 3	X	X	X	<u>-80</u> 3	X	<u>-60</u> 2	<u>-80</u> 1	<u>-40</u> 1	<u>-80</u> 2	<u>90</u> 2	E4 <u>7</u>
E5	<u>20</u> 5	X	<u>60</u> 5	<u>-75</u> 3	X	X	<u>25</u> 2	X	X	<u>90</u> 5	<u>-40</u> 3	E5 <u>6</u>
"REACTOR TOTALS"												
	E1	E2	E3	E4	E5	T1	T2	T3	T4	T5	T6	
	4	1	3	4	4	2	5	4	4	5	5	

** Legend

- | | | | |
|----|--------------------------------|----|-------------------------------|
| E1 | US SUPREME COURT ACCEPTS DNA | T1 | # OF CRIMES WITH BIO EVIDENCE |
| E2 | WRONGFUL CONVICTION/DNA ERROR | T2 | LEVEL OF TRAINING |
| E3 | NAT'L STANDARDS FOR DNA | T3 | COURT ACCEPTANCE OF DNA |
| E4 | RIGHT TO GENETIC PRIVACY LAW | T4 | LEVEL OF FUNDING FOR DNA |
| E5 | DNA RECORDED IN ARREST PROCESS | T5 | NUMBER OF DNA DATA BANKS |
| | | T6 | NUMBER OF LEGAL CHALLENGES |

N=3

Scenarios

Scenarios depicting what the future may hold for law enforcement's use of genetic information have been developed by analyzing the information produced through research and forecasting. These scenarios offer three variations, which are: surprise free (nominal); desirable and attainable (normative); and "what if" - the least desirable scenario (hypothetical). Each provides a glimpse of how genetic information use may manifest, dependent upon the approach taken by law enforcement.

Exploratory (Nominal) Mode

"POLICE AGENCIES EYE SUCCESS OF HUMAN GENOME PROJECT" June 10, 1995

"WHO WILL DECIDE DNA TECHNOLOGIES FUTURE?" August 18, 1998

"PRIVACY CHALLENGES CONTINUE TO EMERGE IN GENETICS" April 2, 1997

The Human Genome Project, begun in 1989 by an international group of research scientists, today announced its completion of the enormous task of mapping the human chromosome. This mapping is said to be aimed at the goal of assisting biomedical researchers in their assault against disease. "The main benefits of our genome research," said Dr. David Morgan, "will be to provide tools to better understand the afflictions that exact an enormous toll of human suffering in every culture and in every geographic region." But their research has caught the eye of another potential benefactor, America's law enforcement community. Police Departments across the country are eager to derive benefits from this exhaustive study. For some time now police have used DNA pattern identification in linking criminals to their crimes but this new arsenal of information stands to drastically expand this application.

State Crime Laboratory Director Joseph Holden stated "such vast genetic information will be invaluable to law enforcement. This technology will allow us to analyze biological evidence found at a crime scene, or drawn from an arrestee for an entirely new array of genetic indicators. We will now be able to determine the race, hair and eye color, and a myriad of personal health and composition factors

from collected DNA", Holden explained.

###

Fragmented efforts at building regional DNA data banks continue to cause problems in California's law enforcement community. California now leads the nation with 41 independent, county run forensic DNA laboratories. Each of which uses one of eight existing methodologies for DNA fingerprinting. While critics continue to assail the lack of cooperation in sharing resources between local governments, the State's legislature continues to postpone decisions on additional funding for CAL-DNA, the State's genetic analysis program. "They just can't get their act together" said House Speaker William Simmons. The now decade long dispute over crime laboratory certification, and accreditation of specific procedures for DNA laboratories has caused a series of courtroom disputes and the exclusion of potentially critical evidence in hundreds of criminal and civil cases.

###

A New York Times survey revealed this week that three of the nation's largest police departments are maintaining genetic specimens on all arrestees, and tracking DNA information in computers far in excess of simple genetic coding. While it is common practice to gather specimens for the purpose of noting and registering an arrestee's genetic code, the maintenance of genetic specimens by government is generally frowned upon by privacy advocates, and public watchdog organizations such as the ACLU. It is a highly questionable, unethical practice according to ACLU, Los Angeles attorney, Ernest L. Chapman. "It is the difference between knowing my telephone number, and listening to my telephone calls" Chapman explained. Police agencies justified their practice by illustrating the value of this genetic information. LAPD Forensic Bureau Chief Larry Simpson, noted "if we have a serial rapist, and DNA from biological evidence found in connection to these crimes tells us our suspect is a black male, Jamaican, with sickle cell anemia, and an 80% likelihood of having diabetes, we can compare this data to possible suspects' DNA and look for matches in these segments. It will greatly narrow our investigations". Chapman retorted " So would placing microphones in Catholic Confessionals!" Chapman indicated the ACLU is seeking injunctions in Los

Angeles against such practices, and is sponsoring genetic privacy legislation in California and two eastern States.

Normative (Desired and Attainable) Mode

"VIOLENT CRIME CONVICTIONS RISE IN CALIFORNIA" July 27, 2000
"SUPREME COURT ACCEPTS DNA AS POSITIVE IDENTIFICATION" May 1, 1995
"DNA CODING JOINS FINGERPRINTS IN FBI FILES" November 15, 1997
"LOCAL POLICE CHIEFS ADOPT GENETIC PRIVACY RULES" October 30, 1994

Crediting the progress made in the area of forensic genetics, the California Department of Justice announced today that convictions for violent crime in California have risen 16% in the past five years. "You can't get around it, we've looked at these cases, and it comes down to one thing, we are making more and more cases based upon biological evidence" said spokesman Rodney Benson. It is extremely difficult for a suspect to commit a crime, particularly one of violence and not leave some biological specimen behind. Minute evidence, sometimes as small as a few skin cells, or a single follicle of human hair, have led to many criminal convictions. "Police agencies have been superbly trained in this State. They employ state of the art laser aided search technologies to help them locate even the tiniest of evidentiary items", Benson added. The Department of Justice's CAL-DNA program, now containing a genetic library of some four million people serves as the hub of this effort.

###

The United States Supreme Court upheld the murder conviction of a Virginia man, based upon DNA evidence analysis. Police officials, who have been waiting years for the high court to rule on DNA admissibility, applauded the sanctioning of this high technology. Forensic scientists throughout the country credited the work of the American Society of Crime Laboratory Directors for reversing what was a trend of confusion and distrust of DNA technology in the early 1990's. The ASCLD has worked aggressively for the establishment of professional standards and certification processes for the country's crime laboratories. "This is the fulfillment of our primary objective for DNA processing. We have worked long and hard at building a

cohesive, standardized network of laboratories, the Court has recognized our credibility. DNA now has a permanent place in law enforcement's crime fighting arsenal", said ASCLD President Richard L. Thorton.

###

The Federal Bureau of Investigation announced today that it will begin maintaining "DNA fingerprint" data for all arrestees, when the contributing States submit it. Citing California's passage of legislation which required the procurement of a DNA specimen during the arrest and booking process, the FBI stated DNA has been long recognized as one of the most useful, conclusive means to identify a person. One FBI agent interviewed in Washington, stated, "this is the wave of the future, we will soon see military and government employers taking DNA fingerprints of their employees". The FBI indicated that DNA is useful in all questions of identification. In one recent case, the FBI laboratory was able to identify the remains of seven people killed in a small plane crash in Oklahoma. "There was no way victims who were burnt to this degree were going to have fingerprints. With DNA we were able to conclusively identify them," Special Agent Susan Killmer stated. Killmer went on to speculate that a national identity base created around DNA fingerprinting, perhaps recorded at birth, could finally eliminate the issue of nurses mixing up babies in a nursery. Some futurists have forecasted the use the numerically unique molecular weight of DNA to as a means of registering with the Social Security Administration, instead of the sequential/geographical numbering system currently in use today.

###

The Santa Clara County Police Chiefs' Association announced today that each of the thirteen represented agencies have agreed to subscribe to a county wide "Genetic Privacy Agreement." This agreement serves to protect the privacy interests of the individual, while allowing law enforcement to access confidential DNA information in criminal investigations, where such information is warranted. Chief Ronald Warren, of the San Jose Police Department speaking on behalf of the group said "We have instituted measures which protect DNA information in the

same manner as we protect criminal arrest history in California." Those rules include; that you must have both a right to know, and a need to know before you are granted access, and further, that no public release of such information shall be made. In the boldest of moves, the Association's members have voted to self impose a significant hurdle in accessing personal genetic information. Chief Warren added "No analysis beyond numerical DNA analysis will be performed for those persons arrested." Any further analysis of the specimen for genetic traits and heredity markers would have to be justified by judicial order. Santa Clara County Judges have agreed to serve as intermediary in this sensitive issue. The Judge will weigh the probable cause of such a request, in much the same manner as a search warrant, before the analysis could occur. The local ACLU applauded the agreement, expressing praise of the Police Chief's action, but indicated that even greater protection of genetic information is being pursued.

Hypothetical Mode

"DNA LAB ERROR CONVICTS INNOCENT MAN" January 13, 1993

"CALIFORNIA SUPREME COURT QUASHES DNA EVIDENCE" February 6, 1994

"IMPROPER RELEASE OF GENETIC INFORMATION PROMPTS WOMAN'S SUICIDE" December 16, 1996

Orange County law enforcement officials were stunned today by the news that a laboratory error in a rape case has resulted in the conviction of an innocent man. Walter Fender, an unemployed auto mechanic, was convicted three years ago based upon the expert testimony of a County criminalist who performed analysis of seminal DNA found in the victim. Last week it was discovered that the criminalist apparently had accidentally applied the same specimen to both sample "tracks," used in the comparative analysis, resulting in what appeared to be an obvious match. While lab officials defended such a laboratory error as a fluke, the debate over the credibility and lack of standards in DNA laboratories has once again emerged. Orange County Public Defender Samuel Smith announced he will re-open and examine cases involving DNA evidence handled by his office during the past five years. "This is deplorable," Smith said. "Someone will be held accountable, and that laboratory's credibility will always be suspect in my eyes." Fender has spent the

last two and one half years in Folsom State Prison. A second laboratory analysis conducted by the FBI laboratory has specifically eliminated Fender as a suspect in the rape.

#

The California State Supreme Court eliminated the use of DNA evidence in California today with a ruling that barred it from being admitted as evidence. Citing questions about inconsistencies in applications and analysis methodologies, the high court majority stated "Far too much confusion still exists to give this evidence the weight of positive identification." Police throughout the state were shocked when informed of the ruling. "What they have done is taken a solid piece of scientific evidence and relegated it to the status of the polygraph examination, an inadmissible tool," said San Francisco Police Lieutenant James Fisher.

###

In Alameda County a 48 year old divorced mother of two committed suicide after learning that local police officials had informed her two children that DNA analysis had shown her to be a carrier of Huntington's disease. This disabling disease, always fatal, causes severe deterioration of physical and mental skills in later life, usually with an on-set by age fifty. The woman, who had been arrested two years ago for drunk driving, was recently suspected of burglarizing her ex-husband's office. Police officials had found blood at the office burglary and had conducted detailed analysis of the woman's DNA taken at the time of her drunk driving arrest, in an effort to link her to the crime scene. During an interview with the woman's two grown daughters, an investigator informed them that the analysis had revealed the non-regressive gene for Huntington's disease. The woman, who apparently was unaware she carried the gene, was devastated over the finding and explained in a suicide note, "I did not want my daughters to go through the next few years wondering when is mom going to start to slip. They have children of their own and they don't need having to care for their mother."

Police officials apologized for the inadvertent release. The woman's daughters have indicated their intention to sue the police department.

Policy Identification and Analysis

The normative scenario forecast, that of attaining a desirable future use for genetic information, was isolated for policy development and analysis. Utilizing this scenario environment, five policies were isolated from a candidate list of thirteen identified (Appendix H). These policies were selected by the same three panel members used in the cross impact analysis portion of the futures exercise (Appendix G). The policies were screened using the following criteria:

1. Are they realistic and feasible?
2. Can they be locally managed and controlled?
3. Will they significantly impact the issues in a desirable manner?
4. Are they in the best interests of law enforcement?
5. Are they cost effective?

The policies identified were:

Policy 1: Police agencies will employ the most advanced genetic technology in the solution of criminal investigations by training their employees in DNA technology, evidence collection, storage and analysis techniques.

Policy 2: Police agencies will support the development of DNA analysis capabilities in the county criminalistics laboratories and encourage the certification and regulation of all laboratories by professional accreditation.

Policy 3: Police agencies will develop in-house procedures regulating the use and release of genetic information.

Policy 4: Police agencies will collectively support local and State legislative funding of DNA programs pertaining to training, data collection, and laboratory certification.

Policy 5: Police agencies will support the expansion of the CAL-DNA Program and the collection of DNA specimens from all arrested felons.

These policies were evaluated as to their potential influence on the identified trends and their impact on event probabilities. Only those trends and events believed to be directly affected by the policies were examined. This evaluation produced the following assessments:

Trend: The number of crimes which are identified as having biological evidence.

The proactive policies selected are geared toward increasing the awareness and skill necessary to physically locate biological evidence. While the ability to control "crime rate" is very subjective, the degree to which a crimes are investigated , and the methods which are utilized to investigate them are not. Just as a policy which required fingerprinting at the scene of all burglaries will result in the location of more fingerprints; an analogous policy pertaining to genetic evidence should have the same result for biological specimens.

Trend: The level of training provided to criminal justice professionals in DNA applications for law enforcement. This issue is specifically targeted by policy, and is believed to be attainable. Law enforcement agencies, particularly in California with POST funding, have strong training budgets and substantial flexibility in how they allocate their training dollar.

Trend: The level of acceptance by the courts of DNA evidence. All five policies commingle to encourage the use of DNA evidence and to increase credibility in court of such evidence by addressing the issues of laboratory certification and proper training and by prudently regulating how the technology is applied through procedure and policy.

Trend: The level of funding for forensic DNA testing, training and research.

Local support and allocations of funding toward DNA applications, coupled with successful statewide legislation brought about through successful lobbying efforts promise an increase in DNA funding. Public expectation for use of DNA methods in solving crime will augment these efforts by police to gain support.

Trend: The number of established DNA data banks. These policies all serve to create a strong foundation for the building of DNA data banks.

Trend: The number of legal challenges under violation of privacy issues for genetic data. The development of in-house policies and procedure, as a preemptory move geared at mitigating something as drastic as legislative preclusion, should assist in limiting the number of abuses, and challenged uses of genetic information.

Event: The United States Supreme Court upholds the use of DNA as positive identification in a court proceeding. The same analysis presented to support the forecast increased level of courtroom acceptance also applies here. Policies focusing upon the credibility of information will provide the platform for such an event.

Event: National standards for the use and analysis of DNA are developed and adopted. As noted in the cross-impact analysis, this event plays a crucial role in the advancement of genetic information for law enforcement use. As such, it is the targeted objective of Policy 2, which seeks standardization through accreditation and certification. The probability of this event occurring is substantially increased by such a policy.

Event: The recording of DNA coding is required at arrest in California
Local support would be generated to expand DNA data from arrestees. While the policy supporting such an act deals specifically with this matter, the supportive structure built by all policies would establish the foundation for this event to occur.

PART TWO

STRATEGIC MANAGEMENT

Strategic Planning

Analysis of the issues facing law enforcement in the management of genetic information shows volatility in many areas. While this instability is discomfoting, it is a normal process in the adaption to change. Both successes and failures should be anticipated. While the issues are volatile, the environment around them is prime for law enforcement to take the lead and proactively attempt to bring about the most desirable scenario for the use of genetic information. This is the objective of strategic planning. It is fortunate that at least at present, no unsurmountable obstacles such as restrictive legislation appear to exist, nor have any catastrophic events occurred, such as a wrongful conviction based upon a DNA error. Intelligent analysis must occur to carefully anticipate, mitigate, and, to whatever degree possible, manipulate the future.

The normative scenario (desirable and attainable) was selected for development and is the objective of this strategic plan. The strategic planning process involves an assessment of the current environment, both external and internal to the selected model agency. It assesses external threats and opportunities, considers organizational capability through strengths, weaknesses, and mission, and identifies individuals, groups and entities who will either impact or be impacted by the process of change.

Model Agency

The Mountain View Police Department was selected as the model for this strategic plan. The City of Mountain View is located in the heart of California's high tech "Silicon Valley". It is a predominantly middle class community, with a population of 70,000. The Police Department is staffed by 86 sworn personnel and 45 civilian employees. While affected by economic recession, it is fortunate to be significantly more solvent than many California communities. Mountain View has approximately 3,700 Part One (serious) crimes each year, providing ample opportunity for genetic evidence applications.

Mission Statement

In the formation of a strategy, a statement of direction and purpose is useful. The Mountain View Police Department has a macro-mission statement in place which serves to guide general operating philosophy rather than the specific accomplishment of objectives. The Department's existing Mission Statement consists of five tenets:

- To provide superior police service
- To maintain high ethical standards
- To value our employees as our most important resource
- To foster an environment of cooperation and trust within the community
- To challenge the future with a spirit of optimism and innovation

A proposed micro-mission specific to this issue has been developed to provide focus and direction:

The Mountain View Police Department exists to prevent crime and disorder from deteriorating the quality of life in our community.

In our quest to prevent and solve crime we will recognize and implement the potential of genetic technology toward the achievement of our goals.

We will employ the latest in DNA identification techniques in apprehending criminals and identifying victims.

We will support the creation of a established standards in the application of genetic technology.

We will support the efficient use of genetic information by sharing resources and by encouraging the development of DNA data collection banks.

We will recognize and respect the privacy of the individual in applying, storing, and regulating the confidentiality of genetic information.

We will interact with the biotechnology industry in seeking genetic solutions to policing problems.

Situational Analysis

Three Mountain View Police Department staff members (Appendix G), participated in an analysis of environmental opportunities and threats, as well as organizational strengths and weaknesses. Two additional members from the private sector reviewed and provided input to the organizational analysis, for purposes of objectivity.

Environment

Analysis of the environment, particularly to advancements in the area of genetics reveals substantial activity. This rapidly emerging technology has captivated and intrigued more than just the scientific and law enforcement communities. The use of high technology to resolve social issues brings about a unique marriage, one that is not without controversy. The following lists depict opportunities and threats present in this environment, followed by organizational strengths and weaknesses found within the selected model agency.

Opportunities

- Society seems to have had enough with crime, drug use and random victimization. Law enforcement agencies, crime laboratories and prosecutors are employing new tactics geared at apprehending and prosecuting criminals.
- New crime fighting tactics and resources such as drug asset seizure and the use of civil process against criminals are emerging.
- Liberal judges are being ousted and conservative ones put in place. Courts are becoming more and more intolerant of criminal behavior and progressively more open minded toward the application of new technology as a criminal justice tool.
- Virtually every candidate for political office professes a platform which places a priority for ridding society of crime. Political support for employing genetic technology is expected.
- The use of new identification methods such as voice prints, DNA, and hair and fiber analysis have brought enthusiasm. Statewide fingerprint systems, such as CAL-ID in California, as have digitized photograph repositories (CAL-

PHOTO). Specific to this topic, the legislature has taken the first step toward creation of DNA data banks with the inception of CAL-DNA.

- DNA analysis has found large scale public acceptance and, so far, similar court acceptance.
- Increases in violent crime both outrage the public and provide the largest opportunity to utilize genetic identification technologies.
- Scientists have linked alcoholism and drug addiction to genetic indicators, creating the possibility of eliminating these social ills with genetic therapies. These maladies account for nearly half of all crime and police calls for service.
- The emergence of genetic knowledge and technology is accelerating rapidly. Fueled by billions of tax dollars, The Human Genome Project is identifying the genes which cause disease as well as those which form the blueprint of identity at a mindboggling pace.
- The opportunity to influence the State and local criminalistics laboratories by being one of, if not the first law enforcement agency to utilize genetic identification indicators beyond DNA coding in a successful prosecution.
- As this technology progresses, indicators far beyond DNA identification are becoming available to the police investigator. Genetic information such as hair and eye color, height and body composition, as well as health factors including diabetes or other inherited diseases could prove invaluable in the identification of a criminal or a victim.

Threats

- Economic recession is causing constraint upon both public and private funding geared at biotechnology research.
- Demand from other growing needs such as homelessness, drug abuse, gang violence, white collar crime, crimes against the environment, and computer fraud are creating competition for criminal justice funding.
- Issues of morality and ethics abound concerning genetic engineering and the controlled mutation of the human body.
- Alternate technologies in DNA analysis; Restriction Fragment Length Polymorphism (RFLP) versus Polymerase Chain Reaction (PCR) create controversy and vulnerability to criminal defense.

- There are no standards for certification of DNA laboratories, nor have specific identification criteria been established.
- As discoveries from DNA analysis are publicized, society has become aware of, and concerned about the fact that something as simple as a follicle of their hair could tell the government (or anyone else) virtually everything about their heredity, their life expectancy, their physical being and perhaps even their behavior. Privacy issues abound.
- The lack of unified standards in the collection, preservation, analysis and interpretation of DNA evidence created the potential for courtroom omission of such evidence, negative publicity and the removal of the technology from the law enforcement arsenal.
- The lack of training of police officers, criminalists, prosecutors and the judiciary pose problems for successful use of genetic evidence.
- An increasing number of cases face litigation, bringing with them close scrutiny and the possibility of a largely publicized error in the application of genetic technology.

Organizational Capability

Strengths

- The Mountain View Police Department located in California's "Silicon Valley" is proximate to several of the leading biotechnology research companies (Cetus, Genetech), and some of the Country's leading research hospitals (Stanford, University of California, Children's Hospital). It is also near the only operating Department of Justice DNA laboratory located in Berkeley. By virtue of proximity, awareness and interest it has an opportunity to learn, prepare for and influence this future.
- The Police Department has been exposed to several successful applications of DNA evidence, creating an enthusiasm for the technology throughout the organization.
- An established, cohesive group of Field Evidence Teams serves the Department in processing major crime scenes.
- The organization is in better shape fiscally than most of its counterparts, enabling it to focus some resource on the training of its staff, and the procurement of specialized equipment. This financial resource has enabled us to utilize private laboratories to conduct sophisticated genetic profiling of

suspects.

- While unfortunate, the substantial retail commercial base of the City, has lent itself to a high robbery rate, a crime that frequently turns violent and produces biological evidence.

Weaknesses

- The Mountain View Police Department is limited to an extent by being a recipient of these technological advances. They cannot particularly accelerate biotechnology research, nor influence to a great deal, court decisions involving the use of DNA. This is not to dismiss any influence upon the evolution of the issue, but to illustrate an inherent constraint.
- The field of DNA and biotechnology is sophisticated, and the education required to employ these technologies is substantial. Many Police Officers do not have the skill or interest in applying this science.
- No local means exists to store DNA data, automated or otherwise.
- The department lacks procedure and policy to deal with genetic applications and with issues of privacy and disclosure of information.
- Poor storage capabilities for biological evidence exists. The Department lacks space to store biological evidence, and the space that is allocated is not secure and subject to courtroom challenge.
- While the department employs organized Field Evidence Teams for major crime scene processing, they have not been specifically trained in new applications of biological evidence.
- The department's Strategic Plan has no provision to deal with the use of DNA and genetics in achieving it's stated mission.
- The department's Master Training Plan does not address training in the area of DNA applications.

Stakeholder Analysis

As a precursor to developing a strategic plan, a list of individuals, organizations or entities, which play a role by either impacting or being impacted by this issue, were identified. They are called stakeholders. Assumptions were drawn for planning purposes based upon historical perspective, environmental assessment and logical

speculation. The following is a list of nine stakeholders with their associated assumptions.

1. Police Department

- A. Want to use this technology to solve crimes and convict criminals.
- B. Having a repository or data bank of DNA data is desirable.
- C. Desire standardization and uniform applications of Genetic Technology.

2. The Courts

- A. Fear litigation backlog if DNA evidence weaknesses are found or standards challenged.
- B. Are optimistic at the possibility for quick and conclusive trials if DNA is firmly established by Supreme Court ruling.

3. Defense Attorneys

- A. Are fearful that indisputable evidence, such as DNA would put them out of work by making criminal defenses virtually impossible in biological evidence cases.
- B. Fear that the aura of infallibility of this high technology science might unduly sway juries away from other opposing evidence.
- C. Have concern for violation of client rights. This technology crosses the point where constitutional guarantees against self incrimination/privacy intrusions apply.

4. Prosecuting Attorneys

- A. Worry about trouble with expert witness & lack of law enforcement education on subject
- B. Are optimistic about easy and conclusive trials in biological evidence cases
- C. Have concern over costs incurred in applying this technology.

5. The Crime Victim

- A. Would welcome new, conclusive means to solve crimes and convict criminals.
- B. If victim exemplars are required, information available from biological evidence to the police, health insurance carriers and employers would be feared.
- C. Concern that this expensive use of technology would cause deterioration in funding for victim assistance programs.

6. The American Civil Liberties Union

- A. The type of information available from DNA evidence to the police, health insurance carriers & employers would be feared.
- B. Have concern that monies allocated to this technology would be taken away from more deserving social service programs.

- C. Would raise constitutional issues, particularly regarding privacy rights and self incrimination.

7. The Biotechnology Industry

- A. Fed by profits and obligation to do public good, they will flourish in this use of technology by law enforcement or anyone who wishes to employ it.
- B. Would view Law Enforcement applications trivial compared to medical applications

8. Crime Laboratories

- A. Would welcome new weapon in their technology rich crime fighting arsenal.
- B. Worry that new equipment would strap them financially and other programs would suffer.
- C. Storage problems for biotechnology evidence would be burdensome.
- D. Providing training in molecular biology to criminalists and providing experts to testify would be costly and time consuming.

9. Criminals

- A. Would resist submission to collection and analysis of biological specimens as violation of civil and personal rights.
- B. Would fear that prison populations would become the guinea pigs of experimentation for genetically engineered drugs and therapies, analogous to what is done today in the pharmaceutical arena (consent from the vulnerable).
- C. Would oppose anything that made their apprehension and prosecution easier.

Assumption Mapping

After completing the process of establishing assumptions for the listed stakeholders, each assumption was again reviewed and plotted on an "Assumption Map" (Appendix I). This procedure allows the negotiator a visual depiction of the perceived certainty and importance of each assumption, as projected in the mind of the stakeholder. Those assumptions plotted as being less certain or less important tend to indicate areas for bartering and movement. Assumptions with high importance and high certainty tend to be less flexible, hence more difficult to mitigate or manipulate.

ALTERNATIVE STRATEGIES

Through the use of a Modified Policy Delphi process, involving nine police management personnel (Appendix J), the following three alternative strategies were selected for development.

Strategy One

Limited Local Approach

Under this alternative the Department would fundamentally operate independently in implementing their mission. To accomplish training, the department would utilize the local county crime laboratory to train their crime scene technicians in the collection, preservation and appropriate application of biological evidence. The matter of conflicting technologies would not be a concern for the department, as little opportunity to affect it exists. This matter would be left to the scientific community and the courts to resolve. The department would assume the role of "user" in context to this application of technology. In a similar fashion, the issue of establishing standards for the use, analysis and application of genetic evidence would be left for the scientific community to resolve and for the courts to sanction. The department would take no active role in the development of DNA data banks. It would allow the Department of Justice and local legislators to be the driving force behind the DNA registration movement, operating only as a contributor if warranted. Privacy matters would be respected, but no external involvement in seeking legislative or administrative restrictions would be sought.

PRO

- Utilizes the minimum amount of resource, while limitedly allowing the department to achieve its mission.
- Leaves delicate issues of technology in the educated hands of those most knowledgeable to resolve them
- Eliminates the department from being targeted by organizations for operating with a "Big Brother" mentality.

CON

- Fails to truly achieve the spirit of the mission statement
- Limits the breadth of training by localizing it.
- Does not provide us with a "voice" involving the future evolution of this technology and its applications.
- Presents substantial risk in letting the courts decide standardization & conflicting technology issues. This approach could backfire; it would be better for the department to clean up its own act before going on public exhibit.

Perception by Stakeholders

This alternative, as the most limited of those presented, poses the least likelihood of controversy. Nevertheless, it is not anticipated to be universally acceptable either. Stakeholders sharing the law enforcement perspective, including police, prosecutors, crime laboratories, the courts and victims, would view this alternative as not achieving enough and not moving quickly enough to resolve the key issues involving the use of genetic information. The public, as it learns of technological applications such as these, tends to develop an expectation that the technology will be applied universally, to all criminal investigations. This would not be the case in most crimes, burglaries and other property crimes for example. A disappointed group of victims could result.

Strategy Two

Regional Task Force

Under this alternative the department would participate in the formation of a Regional Task Force on genetic applications in law enforcement. Training would be provided using not only local crime laboratory personnel, but by using the resources of the State DNA laboratory as well. Consideration would be given to forming a regional "Field Evidence Team" sharing the resources of multiple agencies. This practice currently exists for SWAT teams, hostage negotiators, and other highly specialized units.

Even with the unified and educated voice of a Regional Task Force, the matters of conflicting technology and development of standards would still be left to the

scientific community to resolve, but the Task Force would be operate as a driving force to resolve these matters, however, before they are castigated by the courts. By using a regional concept, the creation of a data base containing DNA information on known offenders would begin.

Using available sources, such as drunk driver and drug influence blood samples, a data bank would be created. The unified voice of a larger entity would be used to effectively lobby our legislators, and the Department of Justice to support the large scale collection of genetic information. The data base needs of law enforcement could be coupled to the growing AIDS crisis, which some believe warrants the blood analysis of every person entering the jail and prison system. In formation for collective data bases could be jointly derived from this effort.

By involving regional powers, a model group policy could be developed to deal with privacy and disclosure issues as a preemptory means of self-regulation.

PRO:

- Clearly permits accomplishment of the mission
- Consolidated resources are more cost effective.
- Consolidated voices carry more impact.
- Training is superior.

CON:

- May be slowed down by participants who are not as motivated, or financially stable
- A Task Force can be crippled with political infighting, which would only further delay issue resolution
- Using existing blood analysis sources without public acceptance could backfire

Perception by Stakeholders:

Strong support from the law enforcement community would be expected employing this alternative. Those sharing a police perspective would view this alternative as being aggressive and leaving them in control of this application of science. Some friction would be anticipated between government bodies as politics conflict with

group cooperation and the sharing of resources. Public and civil rights organizations, such as the ACLU, would be expected to express objection to the collection of genetic information, particularly from arrestees who are suspected of violent crime or who have not given their consent.

Strategy Three

Privatization of Resources

This alternative would shift the key mechanisms for the training, analysis and refinement of genetic applications used by law enforcement to the private sector. Recognizing the private sector as the origin of much of the technology driving this science, biotechnology companies would be used to provide training to crime scene personnel, as well as providing analysis for specimens.. To some extent, this practice has already been accomplished in those instances when government laboratories were not available or technically capable. The matter of conflicting technology would be left for the biotechnology companies to resolve, as would the issue of standardization.

Finally, the development of genetic information banks would be handled in the private arena as well. The role of institutions such as credit reporting services who now collect financial data on individuals, could be expanded to store DNA data. Another mechanism would be to allow organizations such as the Mormon church, who presently collect more genealogical data than any other institution, to be responsible for amassing genetic information. Police agencies would become subscribers to such services or organizations, and privacy regulations would be put into place to protect unauthorized dissemination of information.

PRO:

- The private sector is most skilled at genetic technology
- The private sector, operating on a profitability standard is motivated toward, quick, efficient solutions
- Previous successes in standardization, ranging from VHS formatting of video

tapes to automobile tire sizes

- Keeps with public swing toward reducing the size and cost of government

CON:

- Lack of governmental control could prompt "marketing" of genetic information
- Profit motives can exceed ethical constraints
- Would leave law enforcement decimated if private sector folded, or decided to "get out of the business"
- Public distrust of business may exceed distrust of government.

Perception by Stakeholders:

Government agencies would resist the removal of this science from their control. Only facing the alternative of losing it, would this become a palatable solution. The private sector, specifically the biotechnology industry, if it smelled a market and a profit, would welcome this alternative. The public, and watchdog groups such as the ACLU, would probably fear this alternative the most. If data collection about genetic characteristics becomes reality, they would probably prefer to leave it within a sphere they can influence through government regulation and legislation.

Preferred Alternative

The preferred alternative selected by the panelists consisted of the adoption of Alternative #2, the Regional Task Force concept, with some elements of the privatization of resources described in Alternative #3. Specifically, all of the provisions of Alternative # 2 were adopted with the exception of covertly beginning a DNA data base. Such a practice was perceived as contrary to the openness of participating in a multi-disciplined Task Force. From Strategy Alternative #3 the concept of involving the private sector would be included by asking them to participate on the Task Force. The Task Force would include a representative of the biotechnology industry to keep abreast of developments that pertain to law enforcement, and provide a conduit for shared information. The additional resources of the private sector would be used to augment training for law enforcement personnel in the applications of biological evidence. With

representation from the private sector on the Task Force, input would be sought on issues of conflicting/alternate technologies and standardization of application and interpretation. Lastly, an idea which surfaced not directly from a listed alternative, but from analysis of stakeholder perspectives, was that the ACLU , or other appropriate civil rights watchdog organization would be invited to be a member of the Task Force. Their participation would be encouraged with the belief that it would be better to deal with their concerns from the outset, rather than to be on the defensive later.

Justification

The panel believed that this strategy held the greatest promise of meeting the needs of most stakeholders while enabling the department to successfully accomplish its mission. Adoption of any one of the three alternatives, strictly as presented, posed disadvantages to our mission and obstacles to implementation. Disadvantages in adopting the other two alternatives included loss of control, loss of resources, and diminished momentum.

Implementation Plan/Action Steps

Phase I - Preparation of the Internal Organization

Timeline: 0-6 months

Initial efforts would be directed at educating and preparing the police department to take the lead in establishing a regional Task Force on the law enforcement use of genetic information.

Internal Objectives:

Within the organization the Police Chief will modify the existing departmental strategic plan to include provisions in the training of department personnel in the collection, preservation, presentation , analysis and application of genetic evidence. At the direction of command staff, the Personnel & Training unit supervisor would begin researching and combining the best possible means, (through POST, the Department of Justice, the FBI, and the private sector) of training all Field Evidence Technicians in the collection, preservation, presentation , analysis and application of

genetic evidence.

Internal training sessions, coupled with accompanying training bulletins will be produced for dissemination to all department personnel. This will achieve a general organizational understanding of this technology.

The Investigations Commander, coupled with the supervisor of the Field Evidence Teams would invoke a mechanism to track all cases where biological evidence was gathered; the disposition of the laboratory analysis; the disposition of the case, and the cost of employing such methods.

Key Resources Required

- Commitment of City and Department administration to support and implement this application of technology.
- Involvement and appropriate commitment of Task Force (stakeholder) members.
- Funding to accommodate training expenses would be necessary, as would the development of a training curriculum.
- After the education of personnel, a needs assessment would be performed identifying what specialized crime scene processing equipment might be required to employ this technology.
- Additional frozen/refrigerated storage space would be required within the security of the Property and Evidence facility to provide for the preservation of this type of evidence.

Phase II - Development of Task Force

Timeline: 6 months to 1 year

Externally, the Police Chief would, through the County Police Chief's Association, initiate the formation of a multi-agency Regional Task Force geared at the examination, resolution and management of issues related to the use of genetic information and evidence. Representatives will be sought from each stakeholder discipline, with the exception of criminals. Criminal's perspective would be acquired through the defense attorneys and ACLU representatives.

Regional Task Force Duties

A list of objectives and responsibilities will be developed which work toward resolution of identified genetic information issues. Specific committees, containing a cross section of interests would be created to research and address:

1. Genetic information credibility and the matter of laboratory certification.
Objective: Recommendation, and local adoption of a certifiable laboratory process in the analysis of DNA.
2. Actual roles will be defined within the region, as to who is responsible for procurement, analysis, and storage of evidence and data.
Objective: Resources will be coordinated and maximized for efficiency. Duplicated efforts and data repositories will not occur.
3. A model regional policy governing disclosure, use and privacy of information will be developed.
Objective: A preemptory mechanism will be installed to establish a defense against possible attack over issues of privacy violations; a protective mechanism will be instituted to protect both law enforcement and the public.
4. A law enforcement coalition will be developed to lobby influential legislators and government officials to support law enforcement's expanded use of genetic information.
Objectives: 1) to prevent restrictive legislation limiting law enforcement's use of genetic information 2) to encourage government funding of statewide DNA data base and laboratory network 3) to support legislation requiring the collection of DNA information from all arrestees in California.
5. A training block would be developed in DNA evidence for the local police academy.
Objective: to institute a base level of knowledge in police recruits about DNA evidence methods and applications.

Phase III - Performance Measurement

Timeline: 1 year - and on-going

- The cost effectiveness, as well as the overall value in solving cases would be weighed in context to other resource allocations, such as undercover operations and gang enforcement.
- Convictions and court rulings would be comprehensively tracked, and areas determined to pose risk would be subjected to further analysis and additional

preventative measures, preventing further occurrences. Likewise, areas subject to attack under privacy and search and seizure issues would be monitored and subjected to the same analysis and preventative planning process.

- Laboratory performance would be regulated and measured by the formation of a professional accreditation system for technologists and laboratories. It is believed that an existing professional association, such as the American Society of Crime Laboratory Directors could assume the function. The development of a standardized practice for DNA analysis would denote success.
- The number of cases where biological evidence was located would be monitored. Training efforts would be indexed to both location of evidence and successful use of evidence as a performance indicator. A positive correlation would be indicative of improvement, an negative or stagnant one would prompt re-evaluation.
- The adoption of model policies dealing with appropriate genetic applications and the confidentiality of genetic information would be expected from each participating agency.

Negotiating Acceptance of the Strategy

Negotiator Position (Police Department)

The fundamental elements of this issue, and of the implementation plan; that of managing genetic information normatively to identify criminal suspects and unidentified victims, seems on its surface to be rather innocuous. If the mission concluded at this point, there would be relatively little difficulty "selling" the mission to involved stakeholders. Controversy emerges when the police department's needs or values are imposed upon others without consideration of their perspective, or alteration to accommodate their values. The non-negotiable matters are considered critical to successfully achieving the mission. Negotiable matters provide some opportunity for flexibility to provide for conciliation and accommodation of diverse stakeholder needs and perspectives.

Not Negotiable:

- Access to this information, for solving and preventing crime is imperative, even if limited to only an investigative tool, it must not be removed.
- The level of information needs to be expanded from simple DNA

- identification, to (at minimum) genetic profiling of suspect and victims.
- The ability to legally obtain this information, by extracting exemplar specimens from criminal suspects must be maintained, whether by legislation, probable cause, or court order.
- Development of standards and laboratory accreditation must be sought to insure integrity of information.
- Resources required to employ DNA technology.

Negotiable:

- Mandatory submission of specimen for all arrests.
- Time tables for the development of standards or accreditation of laboratories.
- The participants in the Task Force, and the structure of any standardization or accreditation body.
- The role of the public and private sector
- Funding sources for both material resources and services

Stakeholders Positions

Five key stakeholders were isolated by the panel. The following is a brief synopsis of their projected interests and posture on the issues.

1. Crime Victims: This group is somewhat disjointed, with the exception of representative "Victims Rights Groups" and "Victim/Witness Programs" which have limited voice and primarily function to ease the plight of the victims by providing support during court proceedings. The influence of crime victims should not be underestimated, as they hold high public support, and draw large scale attention.

Not Negotiable:

Anything which dehumanizes victims (could include submission to blood specimens for DNA exemplars), or makes the victim's burden greater, such as additional trial delays, or redundant testimony requirements.

Negotiable:

Might consider slight reductions in funding for their programs in favor of this technology, if they believed it would best serve the victim. Would also consider permitting victims to submit to DNA analysis if assured it was for exemplar purposes only, and no release of other information would be possible.

2. Defense Attorneys: Their concerns are driven by their quest for exonerating their client; followed by ethics fed by constitutional guarantees of right to fair trial and

presumption of innocence. They tend to hold a distrust of police; could oppose anything that makes their job more difficult. They are concerned about the overwhelming power that scientific evidence presents at trial.

Not Negotiable:

Will hold fast on any issue subject to constitutional interpretation toward their client. They would want to use this technology to exonerate their clients where they felt assured of innocence.

Negotiable:

Believed to be negotiable on means by which law enforcement collects DNA information, and as to formation of DNA data bank or who "contributes" May be negotiable as to who will pay for DNA analysis made in accordance with defense motions.

3. A.C.L.U. As a public rights "watch-dog" organization, the A.C.L.U. holds a fundamental suspicion of government, particularly of police. They would seek protective measures to ensure strict adherence to constitutional guarantees.

Not Negotiable:

Any constitutional issue (by their perception) would be off limits. They would oppose any "Big Brother" movement to collect large scale DNA information in a government database from society in general.

Negotiable:

Limited requirements to submit to DNA registration, might be permissible, by court order, or for certain types of arrests.

4. Biotechnology Industry: Primarily driven by business ethics; possess highly skilled research and development capabilities. They are in a position of helping law enforcement more than law enforcement can reciprocate, and they know it.

Not Negotiable:

Involvement must be profitable; they must maintain control of their own resources, won't let law enforcement issues bog them down, view medical advances as primary goal, not criminal prosecution.

Negotiable:

How they define profit, for example if they achieved a high degree of positive publicity at a slight monetary loss they might be willing to bend their corporate rules or priorities a little to law enforcement benefit.

5. **Crime Laboratories:** Local laboratories (often an element of county government), share law enforcement's goals; operated by scientifically-oriented people, enthusiasm would be expected from this group to join in the achievement of law enforcement's mission. This group is operating on a constrained budget, which might produce sensitivity to program costs.

Not Negotiable:

They will want to maintain control over their own functions, and not be told by their "users" where to focus priorities. If additional resource is required, they will clearly expect additional funding.

Negotiable:

Alternate funding sources would be considered, they might also be willing to relinquish a little of their own operation to consolidate specialized functions in regional laboratories (in an cost sharing move); addition storage needs and who provides them would be negotiable, as would their involvement in local law enforcement training in this technology.

Negotiating Strategies

Successful implementation of a regional task force supporting law enforcement applications of genetic information will require various levels of support, or involvement from each identified stakeholder. Achieving this necessary support will require the employment of specific negotiation tactics. The following concepts represent several example approaches for each stakeholder, which may be successful in attaining support or preventing opposition. Strategies may vary significantly depending upon the idiosyncrasies of individuals and circumstances.

Crime Victims

- Assertively presume they support the plan, present posture of "look what we have done for you," and wait to see if objections emerge.

- Do not volunteer information about possible funding cuts to victim-witness programs or intrusions into victim rights by requiring DNA exemplars. If these issues emerge, signify intention to oppose any such actions.

- Begin with a firm benchmark, as if it were a completed project, rather than a tentative proposal.
- Include victims as "partners", expressing that "we are clearly in this together, we are your friends, and this will assist us in helping you."
- Use a sensational or particularly emotional example in which genetic/DNA technology was used, like the arrest and conviction of a child molester, serial killer or other success; let victims identify with the success of this technology.
- With statistics, show victims supportive numbers which indicate the usefulness of this technology.

Defense Attorneys

- Stand fast, the public and politics are on the side of law enforcement. Issues should resolve themselves favorably if properly planned for.
- The "anti-crime" movement and public concern will make their opposition unpopular.
- Project the assumption that this technology has happened, and it is going to be employed.... "it's a done deal."
- Put constraints on negotiations, begin with the premise that police are going to employ this technology and set very restrictive parameters for the level of participation they will be permitted.
- Incrementally attack issues, begin with admissibility rules, move on to applications, then to rules for obtaining specimens from clients, and finally who's going to pay for it. Proceed one step at a time, rather than a shotgun approach, where too much could be lost by interconnection.

The ACLU

- Speak to the overall mission "The ACLU and law enforcement are all in this for the good of society." Law enforcement wants to deal with your concerns. Encourage their participation in development of policy and protective measures.
- The ACLU is frequently aligned with victim's rights groups, attempt to sway them with obligation to this key client obligation, outweighing obligation to criminals and others.
- Introduce multiple issues, such as DNA registration of newborns, all arrestees, sexual registrants, child molesters, military , and prison inmates. The strategy being to provide concession to all but arrestees, sex registrants and prison inmates, creating a win/win situation (perception).

Biotechnology Industry

- "This technology is now being applied in forensics, its application will only grow." Encourage them to get on the bandwagon.
- Law enforcement and industry share many objectives. Mutual needs can feed their profits, and their knowledge can assist law enforcement's mission.
- Explain and illustrate how much positive publicity and public support their company would receive by associating themselves with successes in areas of criminal apprehension, or genetic solutions to social maladies. Offer to assist them with endorsements, testimonials, or by being beta sites for study of methodologies.

Crime Laboratories

- The starting point exists, the technology is here. They need to move toward accreditation, standardization and refinement of genetic applications.

- An allegiance exists between the crime laboratory and law enforcement, their objectives mirror one another. Emphasize that the police and crime laboratory need to work together to achieve their mission. They absolutely need each other.

- Illustrate the successes of large government laboratories, Department of Justice, and FBI, as well as those of the private sector. Encourage local laboratories to align themselves with these accomplishments, and to emulate the capabilities of established laboratories.

PART THREE

TRANSITION MANAGEMENT

Transition Planning

The development of a strategic plan brings us to the point of implementation. Using the same three police department managers involved in the planning process, a transition management plan was developed. The purpose of such a plan is to facilitate change from where we are today to where we want to be in an orderly and calculated process. The process begins with identifying those key players who possess ability to advance or thwart our movement. Having identified those players, gaining their support or negating their opposition must be accomplished. Following stakeholder analysis, a suggested management structure will be proposed to motivate the change, guide the transition period, and plot progress to measure results.

The Development of a Commitment Strategy

Critical Mass

From the more comprehensive list of stakeholders identified in the development of the strategic plan, a more refined list of crucial participants was created. This list of individuals/organizations consisted of those key parties whose commitment was required to successfully implement our strategic plan. They are referred to as the "Critical Mass". Without the commitment of any of these critical mass players, the strategic plan would fail.

Those identified as "Critical Mass" participants are:

1. Chief of Police
2. District Attorney
3. County Crime Laboratory Director
4. Public Defender
5. Administrative Services Captain

Readiness and Capabilities of the Critical Mass

Each individual or group bears a certain degree of willingness or motivation toward participating in and achieving the strategic plan. This is referred to as "readiness". Linked to readiness yet discernibly different is the power, influence or authority to make or allow the plan to occur. This power can be as simple as the authority to grant permission or as complex as being the only group member with the requisite knowledge required. Both of these examples represent "capability". Table 4 depicts the readiness and capability of the critical mass.

TABLE 4
Readiness/Capability Chart

Critical Mass	Readiness			Capability		
	High	Medium	Low	High	Medium	Low
Chief of Police	X			X		
District Attorney			X	X		
Crime Laboratory Director		X			X	
Public Defender			X			X
Administrative Services Captain		X			X	

Levels of Commitment

The following discussion lists each of the critical mass participants, focusing on their current level of commitment to the strategic plan and indicating the level of commitment necessary from them for the plan to be successful. A brief synopsis of how each of the player's respective position might be shifted to an appropriate degree of support is offered. To help visualize the current positioning and the change required, each of their present and required levels of commitment have been plotted on a "Commitment Chart" depicted in Table 5.

1. Chief of Police The Police Chief is a technology driven manager. He is excited about the Department's proximity to the leaders in the biotechnology industry, and intrigued by the successes he sees in using DNA and genetically based evidence in major crime resolution. The Police Chief currently resides in a "make it happen" position, although the minimum level of commitment required of him is "let it happen". The Police Chief is very much an activist in the local criminal justice community. His participation in the County Police Chiefs' Association, as well as serving on several county level boards , give him clout to muster support for a regional task force.

2. District Attorney The District Attorney is not presently an avid supporter of the genetic evidence move in law enforcement. He is very concerned about the threats presented in criminal prosecutions by such issues as conflicting technologies, and the lack of available expert laboratories and witnesses. He firmly believes that it is more prudent to wait for the scientific community to refine the technology issues, than it is to create bad case law by introducing "half-baked" and vulnerable evidence. The District Attorney has been stung by misrepresentation of DNA evidence. Evidence that was not as conclusive as it was presented. His exact position on the plan is uncertain, but he is known to have either a "blocking" or "no commitment" philosophy. For the plan to be successful he must be shifted to a "let it happen" position. It is he who holds the decision making power to allow law enforcement to pursue genetic evidence in criminal prosecutions, and it is his input the regional task force will require on matters of materiality and admissibility of evidence.

The District Attorney must be convinced that participation in and support of a regional task force will help alleviate his concerns pertaining to adequate education, training, expert availability, and most significantly, resolution of the issue of conflicting technologies. He must be convinced that the task force is an appropriate means to resolve the very issues he raises.

3. Crime Laboratory Director The Crime Lab Director, as a manager of a sparsely staffed County crime lab, is in a quandary about DNA evidence applications in forensics. While his background as a scientist drives him to be interested and

willing, his duties as a manager trying to control his department's budget and workload pull him back. Being torn between priorities, he currently holds a "let it happen" position. Being local law enforcement's primary source of laboratory analysis, he must be shifted to a more assertive "help it happen" position. To accomplish this change, negotiators will appeal to his scientific interests. By illustrating the possibility of cost savings accomplished by pooling resources in joint activities by both the public and private sector. Lastly, by identifying "role models" such as the FBI Laboratory and the Department of Justice DNA Laboratory, highlighting their successes and professional reputations, it can be shown that being a leader in this field is worthy of being emulated.

4. Public Defender The Public Defender, as the County's representative charged with defending indigent criminals, is in a key position to obstruct the success of the strategic plan. While initially ruled out as a "critical mass" player, further consideration revealed how significantly success depended upon him. The Regional Task Force is intended to be three dimensional, and multi-disciplined. The Public Defender is a crucial player in the local justice system. By seeking the Public Defender's input and concerns and dealing with them, later courtroom disputes can be minimized. The Public Defender is believed to presently reside in a "block " position. He resides there because he opposes anything which (in his perception) may violate his clients rights, such as DNA analysis of their blood. He also knows that high technology evidence can unduly sway a jury toward conviction. He is very concerned that the clients he represents do not have, nor does he have the financial means (within his budget) to easily dispute genetic evidence.

The Public Defender must be shifted to a position of "let it happen". This change will be accomplished by illustrating that this new application of science can just as easily exonerate an innocent defendant as it can convict a guilty one. Explanation of the purpose of the task force and its puritan intentions, should help to sway him. Those intentions being to deal with his concerns, (from a defense perspective) from the outset. By illustrating the pace at which this technology is emerging, hopefully the Public Defender will hopefully deem it to his advantage to get on board, to educate himself and have input into the policy-making process.

5. Administrative Services Captain, Mountain View Police Department

The Administrative Services Captain currently oversees the Police Department's support operations, which include Property and Evidence Unit, as well as the training function within the Department. The Administrative Captain coordinates all laboratory services for the Department. Serving in these capacities, lends itself toward participation in the regional task force. The Administrative Captain currently resides at the "let it happen" level. He will serve as the Department's front line in both task force participation and departmental adoption of advanced biogenetic applications in forensics. The Chief of Police will deliver the Administrative Captain by assignment, and will designate him "Transition Manager", requiring and providing a commitment level of "make it happen" from the Captain.

**TABLE 5
Commitment Chart**

Critical Mass Actor	Block Change	Let it Happen	Help it Happen	Make it Happen
Chief of Police			O ←	X
District Attorney	X →	O		
Crime Laboratory Director		X →	O	
Public Defender	X →	O		
Administrative Services Captain			X →	O

X= Current Commitment O= Commitment Needed

Management Structure

Analysis of the present (pre-change) state shows that the organization lacks training and education in the application of and information provided by genetic technologies. Through benign neglect, the department is not aware of and is

therefore not employing these technologies to near their potential. Both the organization and regional justice community are both complacent and somewhat naive in this area of science. Unfortunately, little is being done to resolve this circumstance, hence, the development of a Strategic Plan. The organization needs to evolve into a future (post-change) state where a higher level of understanding exists, and ultimately prudent information management occurs. To facilitate the transition between the present and the future state, the organization will need to align itself in a manner that will be most conducive to the change process.

The Administrative Captain will be appointed to serve as Project Director. While the Chief of Police clearly supports the plan and will inevitably be an active participant, he cannot assume the time commitment and dedication to detail that would be required should he serve as "The Chief Executive". The Administrative Captain will serve well in this capacity. In the organizational structure he reports directly to the Chief and is viewed informally as the "Assistant Police Chief." He will carry the clout of the Chief's office in his direction and decision making ability. The organization respects this individual, based upon his previously successful history in making major changes, such as, transforming the manual Records and Dispatch operation into a fully automated one. The organization knows that the Administrative Captain is keenly interested in the topic and his motives will be seen as genuine.

By function and fortune the Administrative Services Captain has within his division the Personnel and Training Unit, as well as the Property and Evidence Unit. These are critical resources required to successfully implement the plan. He will not need to compete for resources, or justify his needs to a third party. Lastly, selection of the Administrative Captain as Project Manager provides a familiar and credible face to those who will make up the Regional Task Force, as he has worked with many of them for the past four years. This particular strategic plan and its associated "Transition" period, bring with them the additional complexity of not only involving the Mountain View Police Department, but the outside members of the Regional Task Force. Using the Administrative Captain as a "Project Manager" allows him to serve as a conduit between these groups. This will deliver the clearest communication between groups.

Implementation Technologies

In all situations of change, resistance should be anticipated. Different perspectives bring with them different priorities and concerns. This concern, or confusion can manifest itself as obstacles to change. In order to move past these, a variety of "technologies" or methods need to be employed to clarify, placate, resolve or simply move past them when they create a barrier. In implementing the strategic plan the following technologies would be utilized.

Confrontation & Goal Setting

A series of preliminary meetings to discuss direction and objectives would be held. Uncertainty and confusion can be minimized by bringing the entire Task Force up to the same general level of knowledge on the topic. The meetings will also serve to encourage communication between parties who might have otherwise been intimidated by their lack of understanding on genetics. Building on this understanding, issues can be confronted and clarified, alternatives can be discussed, and responsibility and timelines can be attached. Landmarks, such as resolution of the conflicting DNA technology issue and the development of a plan to achieve standardization can be drawn as a means of showing progress and achievement.

Team Building Workshops

In developing a regional task force, a series of team building workshops are ideal for developing working relationships and defining goals. Anxieties caused by interpersonal problems can be quelled at the outset through the use of such workshops. Exercises where individuals can work together on a problem, where they hold no territorial bias, can build working relationships and trust that can cross over into "real life" environments.

The Vision

This complex transition process would be kicked off expressing a clear destination. All parties would be made abreast of just what circumstances brought about the

need for the Task Force, and just what the issues require management. By using examples (role models) of state of the art applications of these sciences (FBI/DOJ Laboratories), and spectacular criminal cases which were brought to resolution using this technology, participants will see the value of this quest. Likewise, by giving worst case scenarios of what could happen if the situation was left unmanaged (Supreme Court rejection of DNA Evidence/misuses of genetic data) the group would see the importance of their role.

Responsibility Charting

Utilizing multiple disciplines in the composition of the Regional Task Force will prompt the need to isolate individual areas for responsibility. While each member will represent their particular area of expertise, more generic issues will be clearly assigned to individuals for research and recommendation. Individuals with opposing perspectives could be assigned shared responsibility for recommending problem solutions as a means to resolve issues. Assigning individuals responsibility will empower them to make decisions and will make them feel valued as a contributing member of the group. To help accomplish this individual responsibility and authority will be plotted using a responsibility chart. An example of such a chart is depicted in Appendix J.

Conflict Management

The transition toward implementing the strategic plan will be laced with conflict. By sheer make up, the regional task force will contain opposing perspectives. This diversity will serve as both its strength and its weakness. To manage conflict individuals will be encouraged from the outset to surface concerns. Within the context of regular meetings open discussion will be held isolating issues away from individuals, and jointly merging resources and perspective to achieve viable solutions.

Managing the Neutral Zone

The nature of the Strategic Plan lends itself toward a period of indecisiveness or a void in knowing exactly where we are. A series of disputes or failures may leave the Task Force feeling aimless. It is anticipated that some Task Force Members will feel comfortable in employing a certain faction of genetic information, where others will be uncertain. To manage this "neutral zone" it will be critical to plot (monitor) the direction, key decisions and recommendations to determine whether we have remained on course. As previously mentioned, setting "landmarks" such as the establishment standards to ensure credibility, or establishing a set of applied ethics to the use and dissemination of this information, can all be utilized to plot progress and keep the group in alignment and focus.

Measuring and Marketing Achievement

Objectives and action steps outlined in each of the three phases of the Strategic Plan will be shared with the organization. As objectives are accomplished updated information will be publicized. The organization must be kept informed of progress being made in this process. It will be important to maintain organizational "buy in," so that they do not perceive the Task Force is simply telling the organization what to do. A reward mechanism, such as commendations for those who successfully gather or utilize genetic information or evidence would appropriately be instituted. Keeping the issue in the organizational limelight in order to strengthen awareness will be important. Sharing other agencies successes by distributing newspaper clippings or magazine articles is another way to accomplish this.

Summary

It is the intention of this transition plan to guide a relatively naive organization and local criminal justice system toward understanding and intelligently managing the information provided by this new frontier in science. The process will not be as succinct or clean as many will desire. Instead, incremental achievements will be implemented, and an ongoing educational processes will be instituted. This is not

to say the period of transition will be without end. The purposes of transition management will be served when a mechanism (the Regional Task Force) is installed and is successfully guiding organizational activities in the use and prudent management of genetic information. In the broad context, other agencies, observing local successes will begin to address similar issues and progress toward the ultimate goal of achieving the normative future.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

As is often the case with emerging technology, new applications of DNA and genetic information are being discovered at such a rapid pace that there is little time to reflect on them. From analysis of the present state and though forecasts of the future, advances in genetic information create an ideal set of issues to which futures research can be applied. Through futures research we can intelligently plan for and anticipate issue evolution in an effort to achieve the maximum use of this technology.

The use of genetic information in law enforcement prompts excitement, not only in the law enforcement community but in society as well. While the use of genetics to advance a medical theory or remedy a non-sensational virus might be back page news, the use of genetics to solve crime is somehow different. People are intrigued in not fascinated by police work, as evidenced by the popularity of detective novels, police television series, and even the sensational headlines of supermarket tabloids. Introducing the aura of genetics to this field somehow seems to foster that fascination by presenting the idea that the "blackbox" of human identity is being unlocked.

It is important to remember that fingerprints, physical appearance and blood analysis are all forms of genetic identification; They are all unique genetically-inherited characteristics, which are all commonly accepted law enforcement identification techniques today. What bio-molecular DNA analysis presents to the future is a logical progression of these sciences capable of providing a much more detailed description by examining the origin of human uniqueness. DNA analysis also presents is tremendous potential for social misuse. Managing this and other volatile issues surrounding genetic information will clearly require new managerial policies and practices for law enforcement by the year 2001.

Preventative measures are clearly the verdict of this study. Through the development of policy and practice, an opportunity exists with each of the presented issues to bring about the normative future.

The study determined that the credibility and integrity of genetic information is dependent on technological competence. As evidenced by the high impact of its forecasted occurrence, the development of certifiable, standardized laboratory methods for DNA analysis stands alone as the single event most likely to ensure a desirable future use of genetic information for law enforcement. Establishing the credibility and integrity of genetic information is the starting point for all future evidentiary applications. Law enforcement must begin the process of bringing the scientific community together to achieve standardization from which certification can follow. The accomplishment of standardization and certification can mitigate or even prevent the negative events forecast in this study, such as the wrongful conviction of an innocent person or the imposition of restrictive legislation.

Societal expectations will serve as a catalyst to employ genetic technology. Jurors in criminal trials already expect to see law enforcement employ this technology in an effort to exonerate defendants. In two recent rape cases, one in Ohio and one in Arizona, juries have returned an acquittal and reduced sentence for who did not receive the benefit of biological evidence. In one case the police did not attempt to take a biological swab from the victim; in the other semen stained clothing which might have provided exonerating DNA analysis was discarded.²¹ One can easily extrapolate upon such early signals. Law enforcement must prepare its environment and equip itself to fulfill these expectations. Determining responsibility for evidence collection, analysis, and data storage will both maximize fiscal resources and serve to organize law enforcement efforts, efforts which will otherwise be fragmented. The education and training of law enforcement personnel in methodologies of genetic evidence is forecasted as steadily increasing. Local police agencies as well as training institutions such as POST, the Department of Justice and regional police academies must also gear themselves for such expectations. Police administrators and legislators must recognize the need to fund this technology as it becomes part of the mainstream of police practice and moves into the public spotlight.

Measures to ensure privacy of genetic information and safeguards to prevent abuse

²¹ State of Ohio v. Apanovitch, 514 N.E. 2d 394, (1987) & Arizona v. Youngblood, 109 S Ct. 333 (1988)

can only be accomplished through development of new policy and practice. Highly charged issues of ethics and privacy emerge as emotional and philosophically diverse matters for law enforcement to resolve. Addressing these issues through proactive self-regulation before abuses occur or reactive/restrictive legislation is adopted surfaces as both critically important and ethically correct. Trends forecasts used in this study demonstrate that, absent strategic intervention, a substantial risk exists that the tool of genetic analysis could be removed from law enforcement in the future. Speculative analysis, accomplished through event forecasting, more clearly illustrated how this high yield investigative technology could manifest itself in catastrophe if left unmanaged.

Law enforcement should not stand alone in the resolution of these issues. Involving stakeholders in a policy-making task force is not only an efficient means of focusing resources, it appropriately involves people of diverse viewpoints from an overall community, who will contribute their perspective as to the proper use of genetic information. Law Enforcement must actively participate in the management of issues pertaining to genetic information, including the use of its collective voice to educate legislators, solicit funding and encourage expansion of DNA applications. These efforts will also serve to open a dialog which could reduce the potential for restrictive state or federal legislation limiting the use of genetic information. Simply viewing this issue as a matter to be resolved by the scientific and legal communities will not work. Courts of law and crime laboratories both thrive on the presentation of factual data. In managing the issues related to genetic information, law enforcement will serve as not only the conduit but the mediator in bringing these two institutions together.

Issues for Further Study:

The use of DNA in forensics only scratches the surface of what lies ahead in bio-molecular research. For police agencies and for all of mankind, the advances toward the identification of genes which determine physical composition and which cause disease and behavior maladies promise to change human health and the art of medicine over the next decade. Genetically-engineered drugs, therapies and controlled mutations of the human body hold promise for some of the most

profound changes ever experienced in the history of mankind. Already, genetic linkages have been drawn to alcoholism; geneticists forecast the identification of other behavioral genes, perhaps a gene which causes schizophrenia or other anti-social behaviors. The thought that such social ills could someday be remedied through genetic modification is mindboggling.

Like most new opportunities, new crimes associated with genetics will occur. What does one call the theft of a hair follicle or a few skin cells? Today, such a "crime" sounds absurd, tomorrow it might become the mechanism for the deepest violation of privacy.

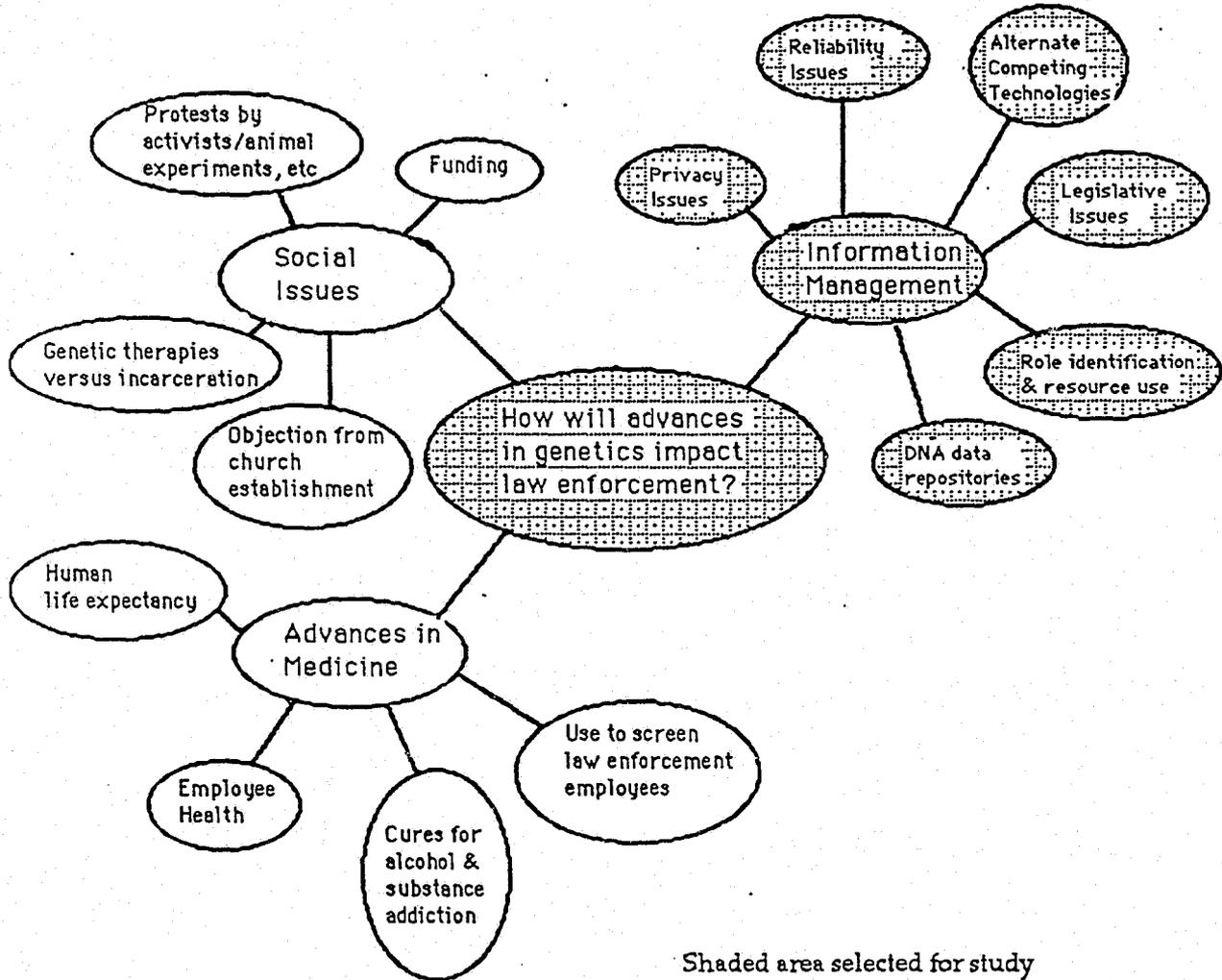
Social issues involving genetic engineering will emerge. While few would protest the genetically-developed cure for cancer, or the elimination of mental retardation, how many will support the breeding of super humans. Not unlike the social unrest surrounding the issue of abortion today, law enforcement tomorrow may find itself amidst a battle between the church and scientific establishments over genetic issues.

Finally, law enforcement themselves must consider the future use of genetic information for its own internal purposes. Today prospective police officers are submitted to polygraph examinations, psychological evaluations and thorough medical screenings - a much more intrusive process than for most other segments of society. Tomorrow will we genetically screen police applicants for physical health, behavioral problems, intelligence quotient, coordination skills or other information yet to be determined? This science poses difficult decisions in the years ahead for police managers and for all of society.

APPENDIXES

APPENDIX A

Modified Futures Wheel



APPENDIX B

NOMINAL GROUP PARTICIPANTS

- One Police Chief from a Bay Area Mid-Sized Police Agency
- One DNA Laboratory Director,
- One Crime Scene Technician from a large Bay Area Police Agency,
- One Municipal Court Judge
- One Police Lieutenant from a Mid-Sized Bay Area Police Agency
- Two Police Captains from Mid-Sized Bay Area Police Agencies.

APPENDIX C
CANDIDATE TRENDS

*Trends selected for forecasting are highlighted in **BOLD**.*

The level of acceptance by courts of DNA evidence of positive identification (the three major means of positive identification; photo, fingerprint, & DNA).

Pace of genetic breakthroughs in medicine. ie: human growth hormone, genetic links to Cerebral Palsy, Muscular Dystrophy, Cancers, viral identification & vaccine development.

Collection rate of genetic & DNA data from prisoners, sexual registrants, arrestees, and from the military.

Level of use of DNA identification in criminal matters, paternity matters, positive ID of kidnap victims, disaster victims, and missing children.

Level of public expectation for application of genetic technology by law enforcement.

The level of public concern for law enforcement maintaining genetic information.

The number of established DNA data banks.

The level of training provided Law Enforcement/ Criminalists/and District Attorneys in the collection, analysis and presentation of genetic evidence.

Number of organizations that form to protest genetic engineering as interfering with God's work, nature, etc.

The number of employers/military who utilize genetic information to profile or screen job applicants/candidates.

The incidents radiation accidents in DNA analysis.

The number of conflicting technologies used in the analysis of DNA.

The number of legal challenges raised for genetic evidence based upon privacy issues.

The growth rate of the AIDS epidemic.

The number of pharmaceutical firms, and biotechnology firms conducting genetic research.

The impact of genetics research on human life expectancy rate/ worker longevity.

The level of funding for police budgets.

Appendix C
Candidate Trends - Continued

The crime rate in general.

The number of crimes which are identified as having biological evidence.

The number of identified hereditary ailments / diseases and disorders , or the proclivity toward acquiring them, which are identified through genetic research.

The number of automated processing technologies available in DNA/genetic laboratory analysis.

The sophistication of automated systems to store genetic data.

The level of legislative activity (bills, committee hearings, funding issues) geared at genetics issues.

The level of court calendar congestion, back logged cases, plea bargains, and cases requiring expert criminalist testimony.

The level of funding for forensic DNA research and laboratory services.

The cost associated with of genetic/DNA analysis.

The number of DNA laboratories available.

The storage requirements for genetic specimens, refrigerated blood or computer generated numerical coding?

The number of exonerated defendants based upon DNA identifications.

The number of convictions of guilty based upon DNA identifications.

The number of evidential challenges (1538.5 E.C) hearings based upon the challenges of genetic evidence.

The number of crimes involving influence of alcohol and drugs.

Law Enforcement's capability to manage genetic technology.

The level of cooperation between Law Enforcement and private laboratories/ research firms in DNA/genetic application development.

APPENDIX D
CANDIDATE EVENTS

*Events selected for forecasting are highlighted in **BOLD**.*

U.S. Supreme Court accepts DNA as positive identification.

Permanent Alteration of Human Behavior achieved through therapy derived from Genetic Engineering

DNA Coding recorded at birth as part of registration process

Force drawing blood (for DNA) at arrest survives 1st Amendment Challenge against self incrimination.

POST includes 40 hour course in advanced criminalistics, teaching Genetic /DNA evidence collection, analysis and presentation in Police Academy and all homicide and violent crime investigation courses

FDA approves Genetic Engineering therapy for controlled mutation of human body.

Federal right to genetic privacy legislation passes

Cancer cured utilizing genetically engineered vaccine

AIDS cured utilizing genetically engineered vaccine

Human mortality from disease rate cut by 50%

FDA approves Genetic Engineering therapy for controlled mutation of human behavior

National standards developed for DNA identification techniques

Applicant screening by employers and insurance companies ruled violation of right to privacy by US Supreme Court.

Genetic engineering develops cure for substance addiction (alcoholism & drug addiction)

Biotechnology company develops chemical incarceration, by inducing Coma, and treating behavioral malady with genetic therapy. When sentence is up, "rehabilitated inmate is released from Coma.

Genetic therapy eliminates aggressive behavior in violent people, sexual drive in rapists, urges to ignite fire in pyromaniacs, and other compulsive anti-social behaviors.

Appendix D
Candidate Events - Continued

First Genetic Data Reporting Service opens, analogous to Credit Data Bureaus for personal genetic information.

Defendant wrongfully convicted based upon improperly analyzed DNA evidence.

State of California bans genetic research from State.

The recording of DNA coding is required at arrest in California.

California Supreme Court overturns use of DNA evidence in Criminal Matters

Police Budget cut by 15%, eliminates department crime scene unit.

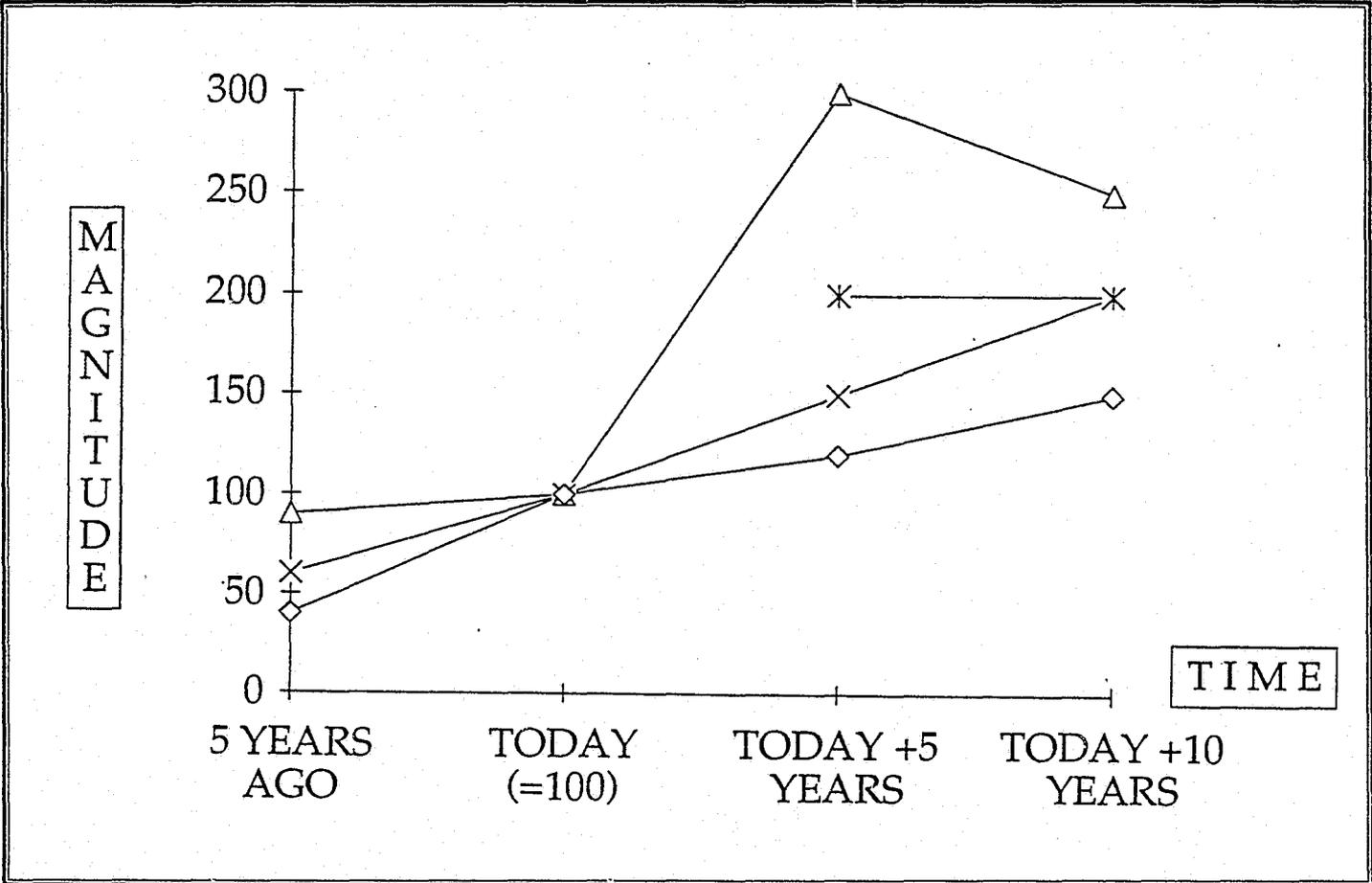
Accident at Genetic Laboratory causes birth of deformed child

APPENDIX E

Trend Forecasts

TREND ONE

The number of crimes which are identified as having biological evidence



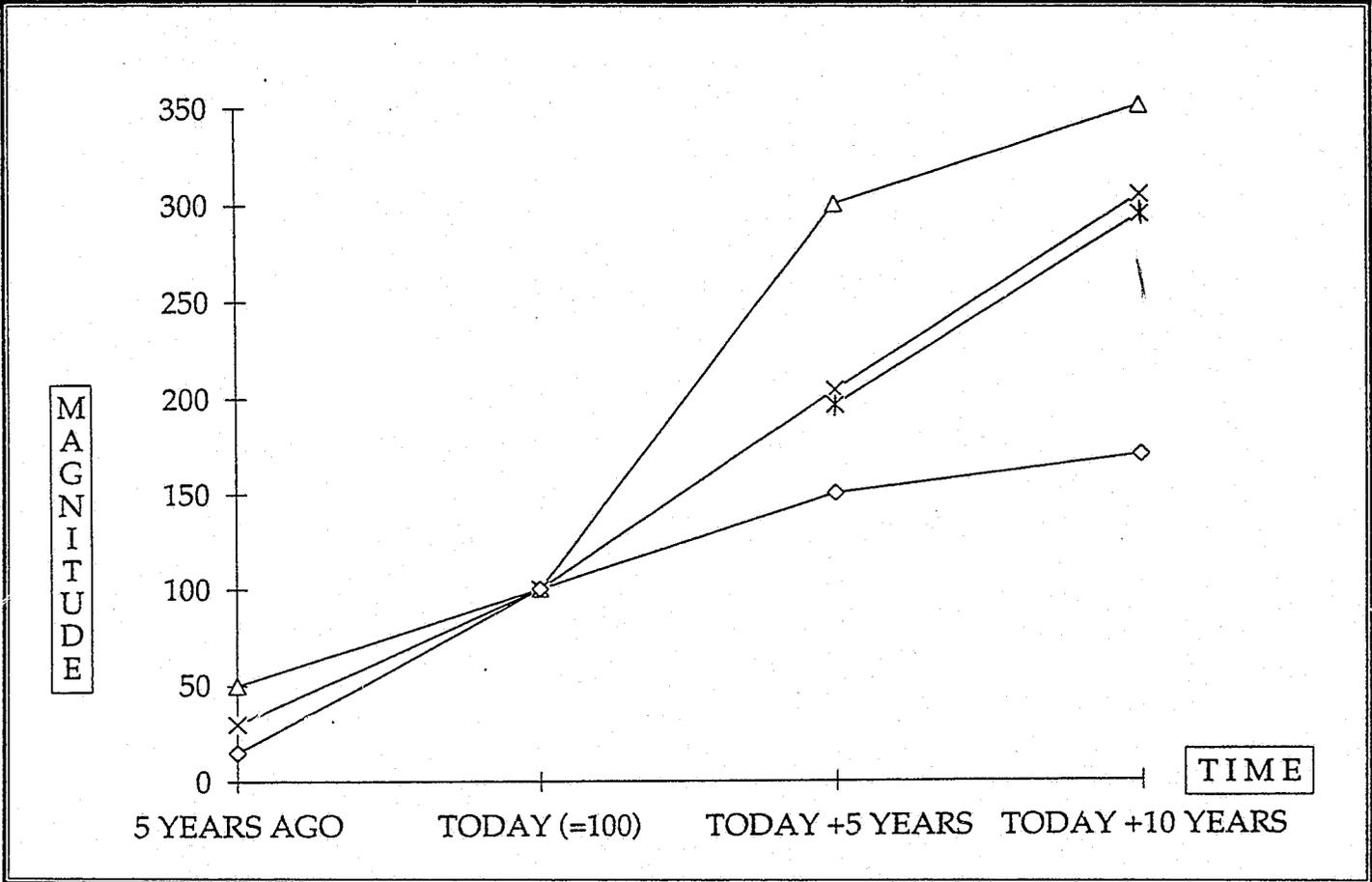
LEGEND

- × MEDIAN
- Δ HIGH
- ◇ LOW
- * SHOULD BE (MEDIAN)

N=7

TREND TWO

The level of training provided criminal justice professionals in DNA applications



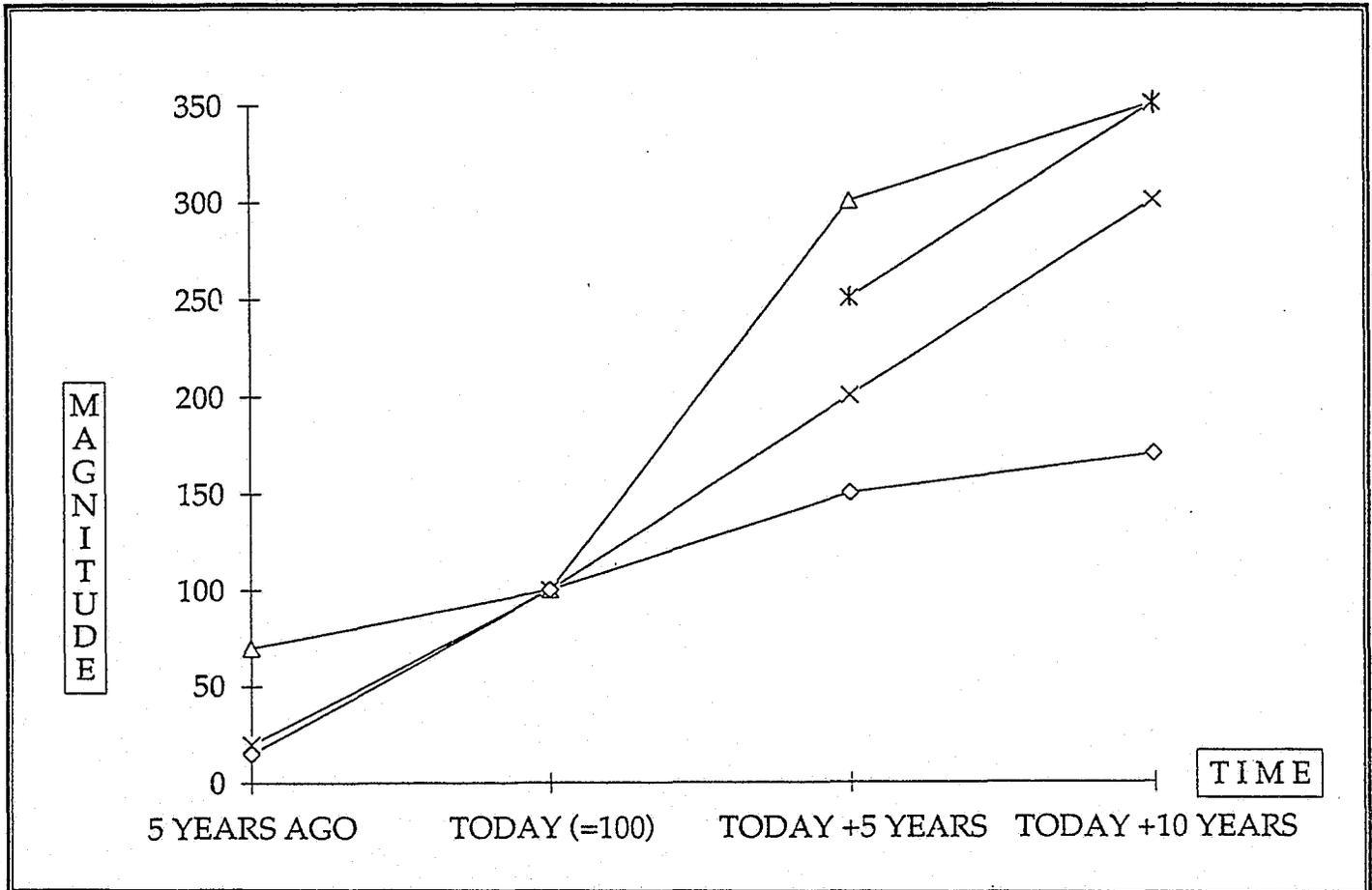
LEGEND

- × MEDIAN
- △ HIGH
- ◇ LOW
- * SHOULD BE (MEDIAN)

N=7

TREND THREE

The level of acceptance by the courts of DNA evidence



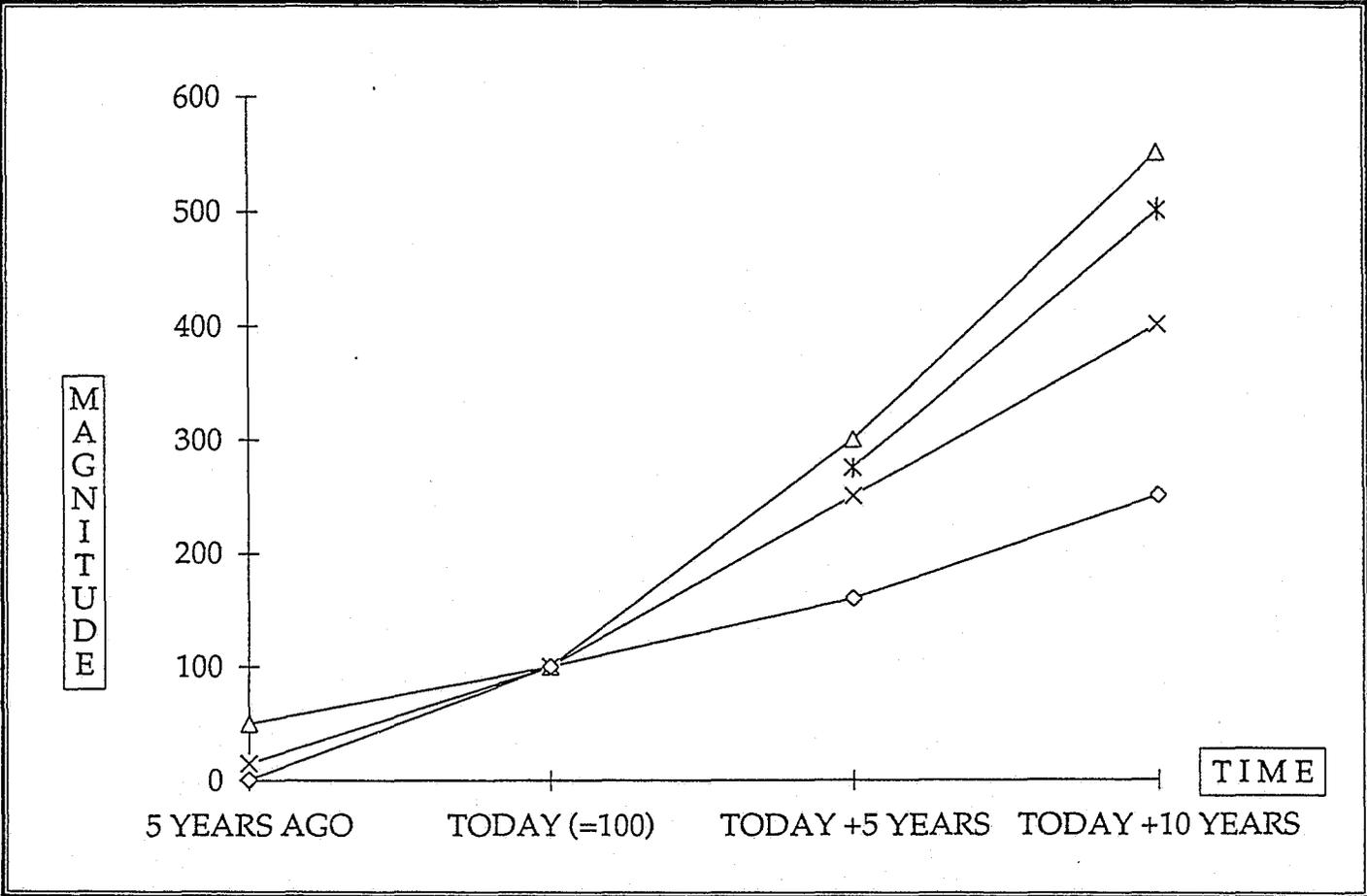
LEGEND

- × MEDIAN
- Δ HIGH
- ◇ LOW
- * SHOULD BE (MEDIAN)

N=7

TREND FOUR

The level of funding for forensic DNA research and laboratory services



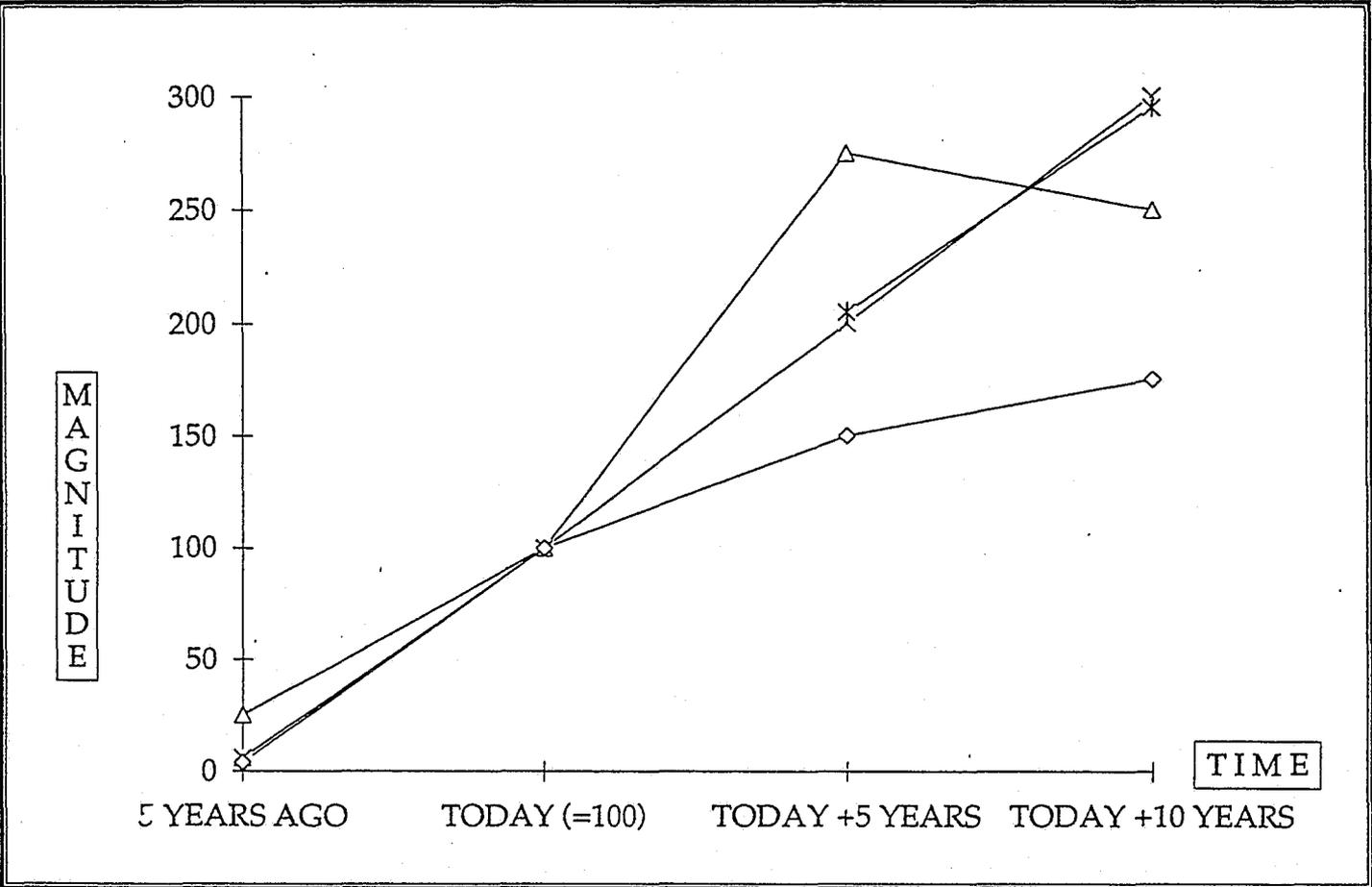
LEGEND

- × MEDIAN
- △ HIGH
- ◇ LOW
- * SHOULD BE (MEDIAN)

N=7

TREND FIVE

The number of established DNA data banks



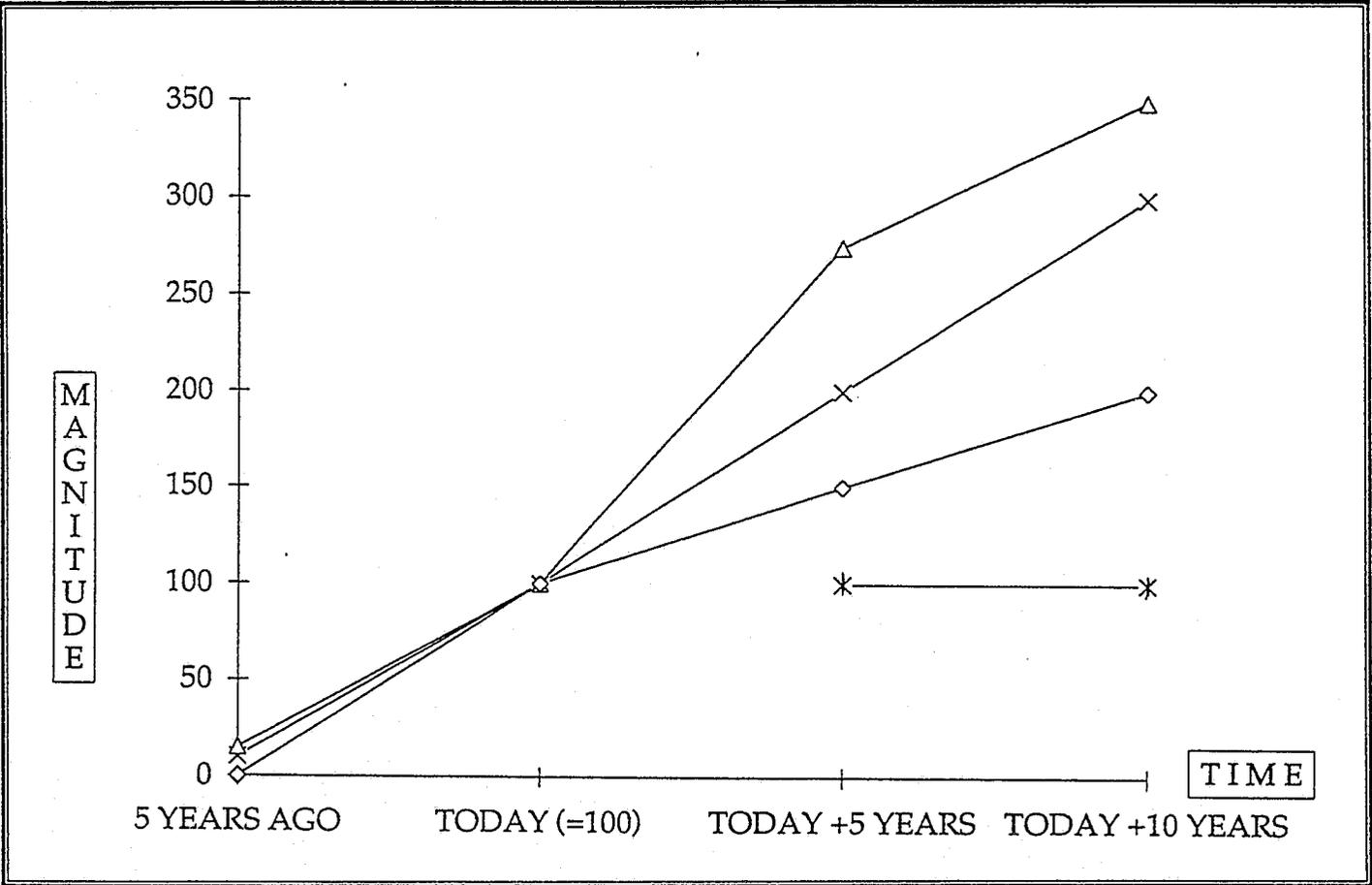
LEGEND

- × MEDIAN
- Δ HIGH
- ◇ LOW
- * SHOULD BE (MEDIAN)

N=7

TREND SIX

The number of legal challenges raised over privacy issues regarding genetic information



LEGEND

- × MEDIAN
- Δ HIGH
- ◇ LOW
- * SHOULD BE (MEDIAN)

N=7

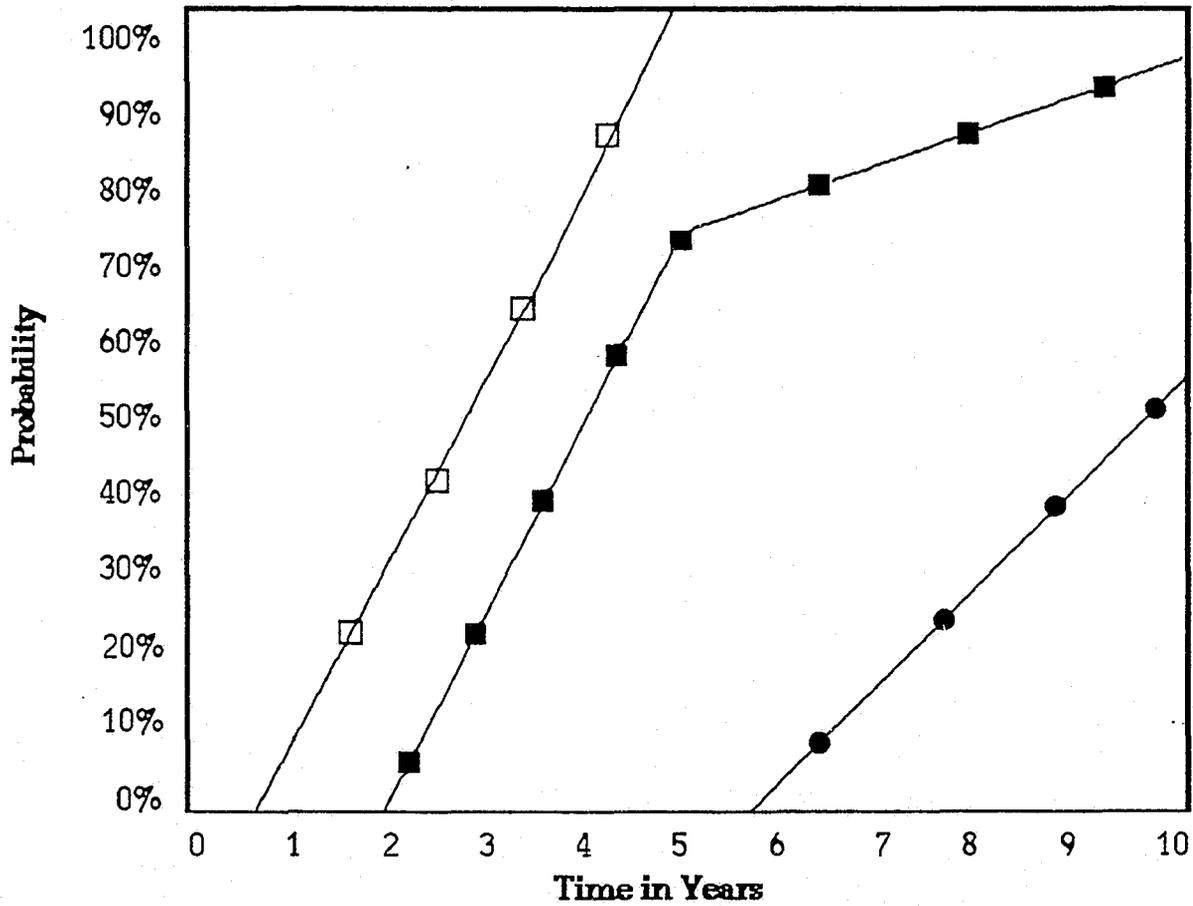
APPENDIX F

Event Forecasts

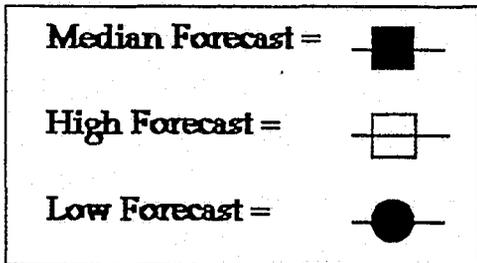
EVENT 1

U.S. Supreme Court upholds DNA as positive identification

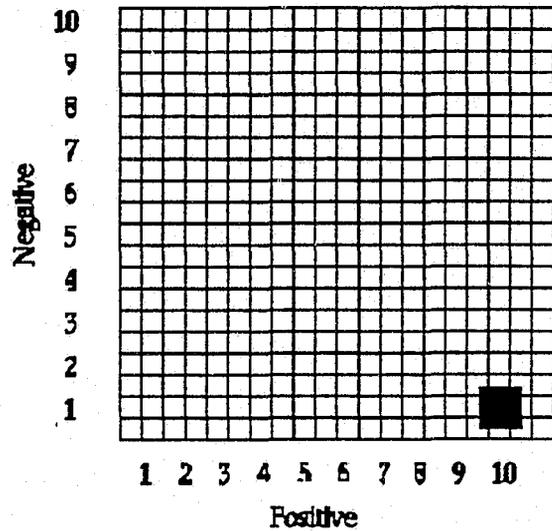
Percent Probability Forecast



Legend



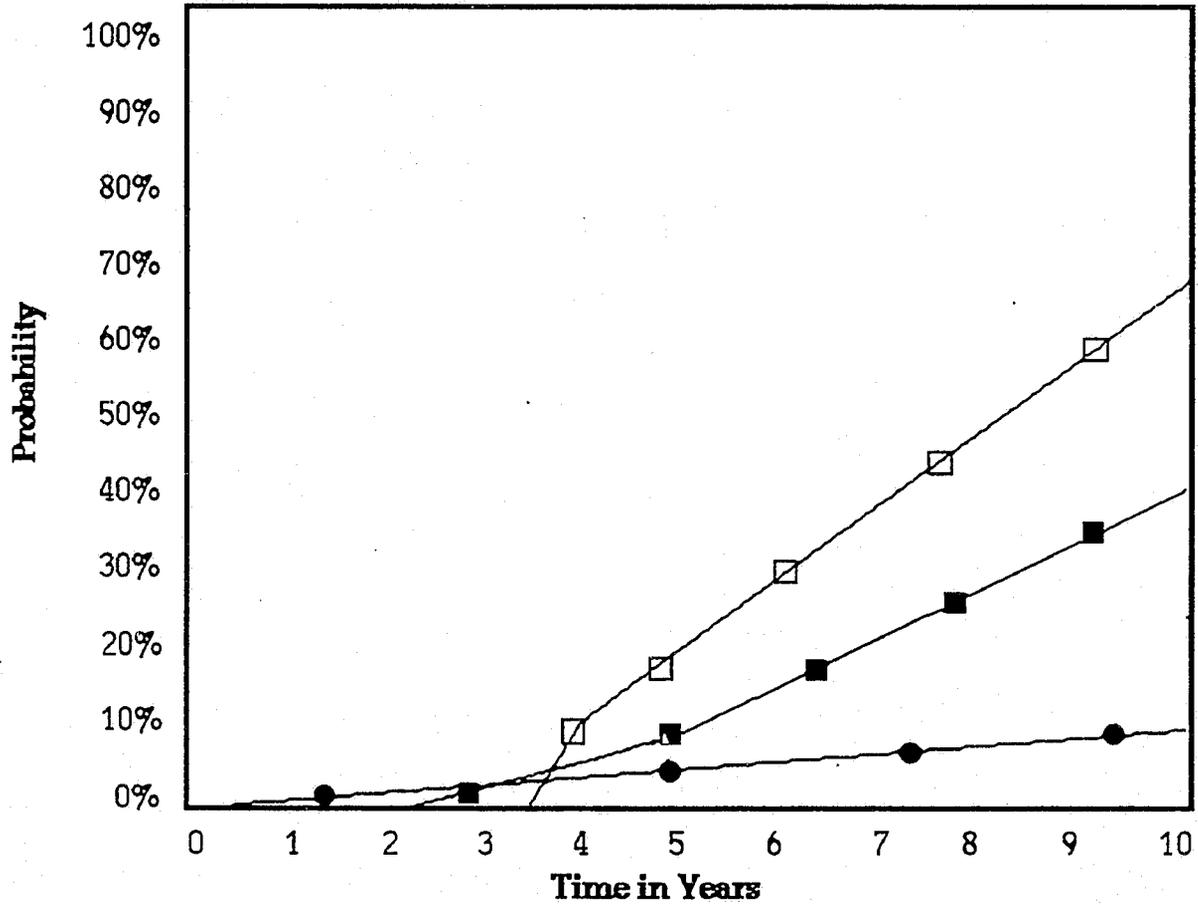
N-7



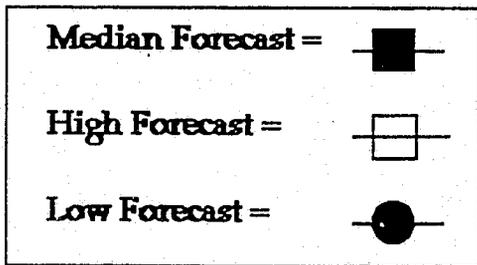
EVENT 2

Defendant wrongly convicted based upon improper analysis of DNA

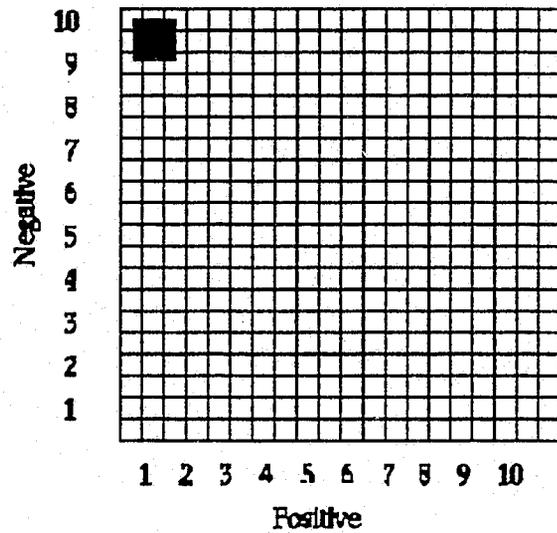
Percent Probability Forecast



Legend



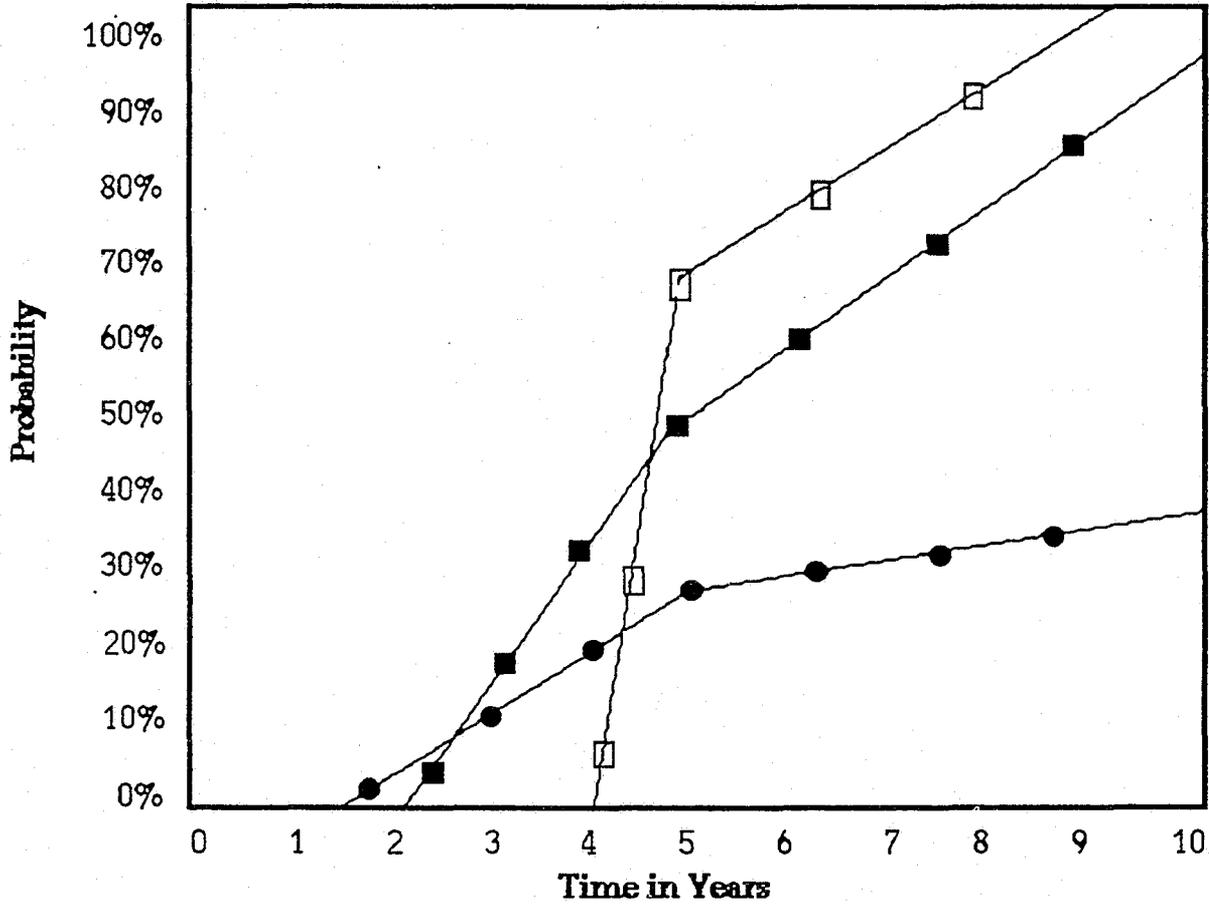
N=7



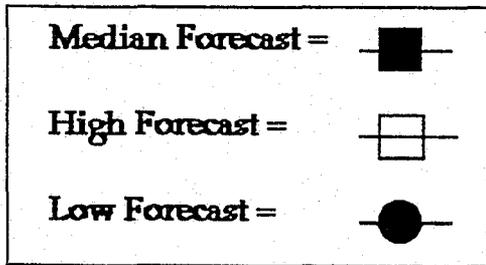
EVENT 3

National standards for DNA use and analysis are developed and adopted

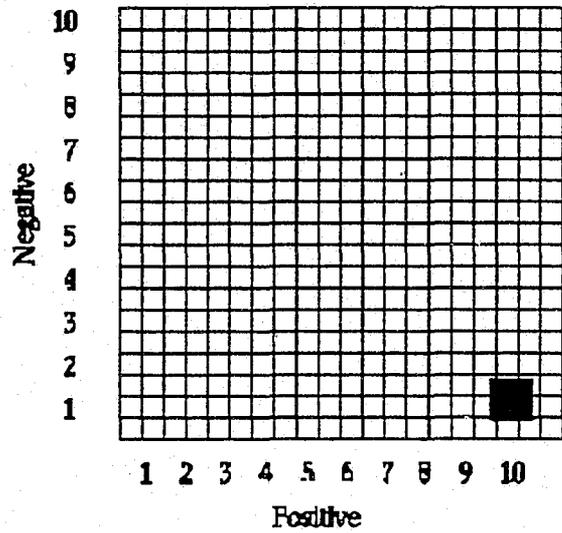
Percent Probability Forecast



Legend



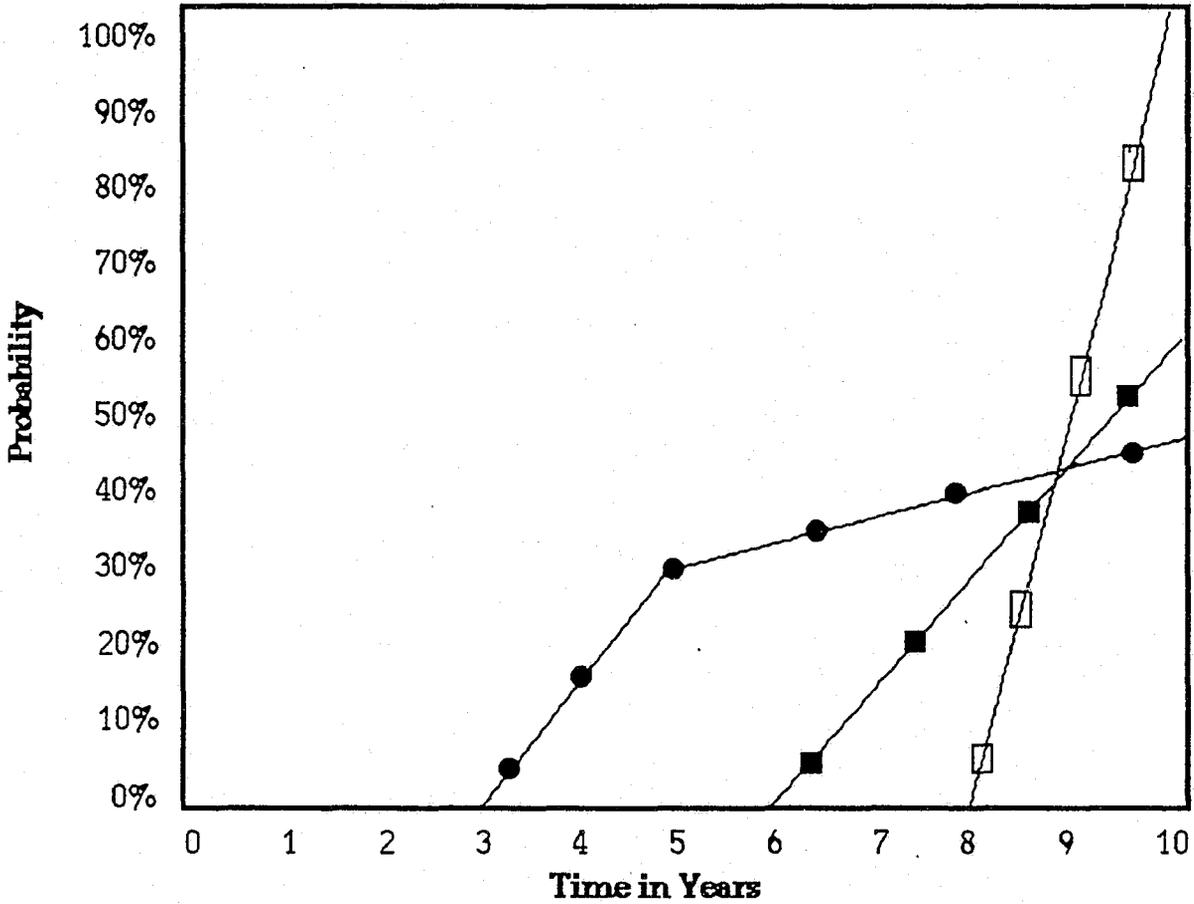
N-7



EVENT 4

Federal right to genetic privacy legislation passes

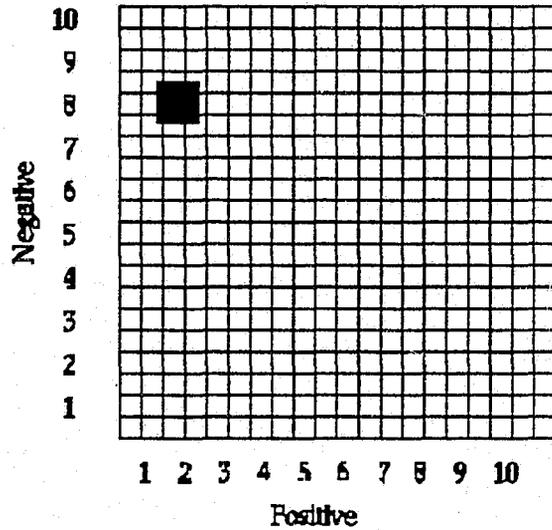
Percent Probability Forecast



Legend

Median Forecast = 
High Forecast = 
Low Forecast = 

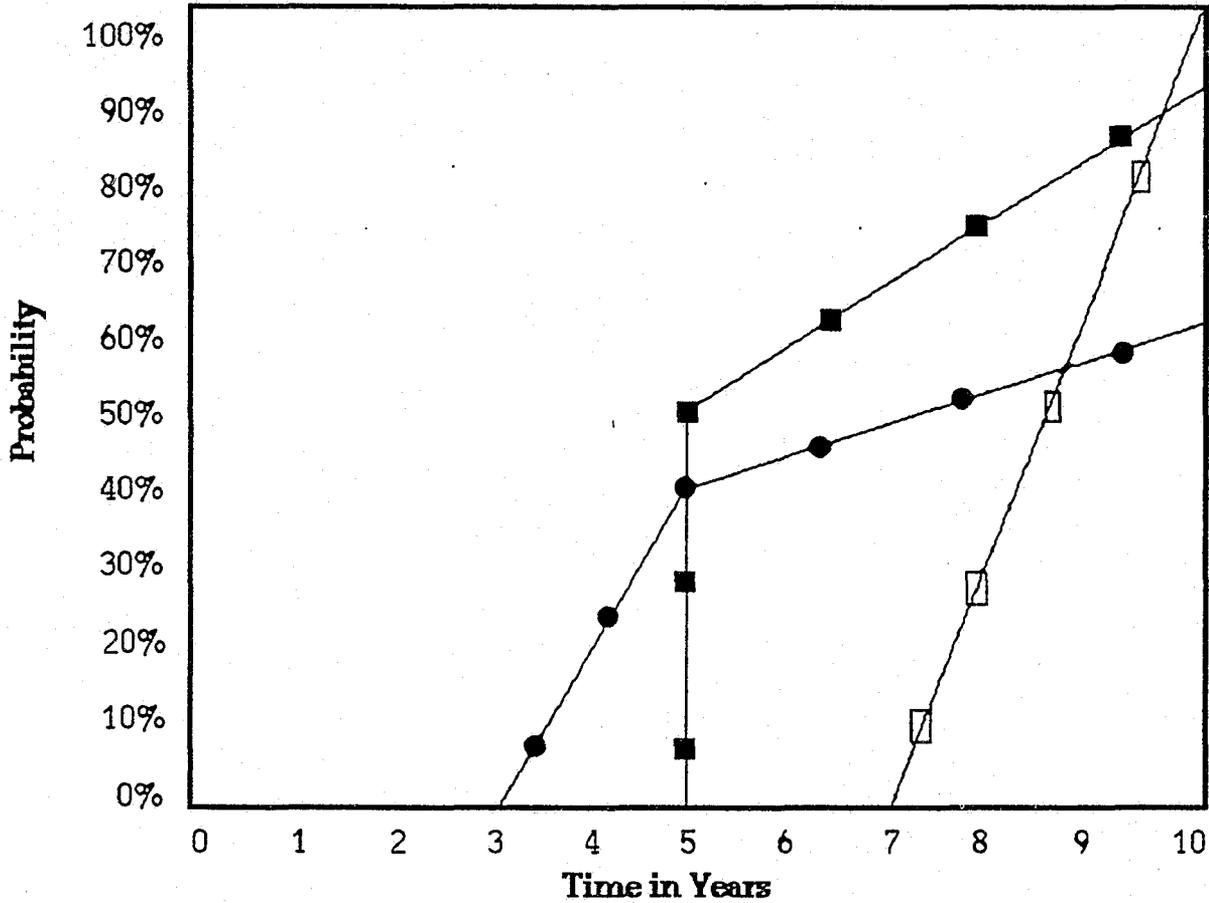
N-7



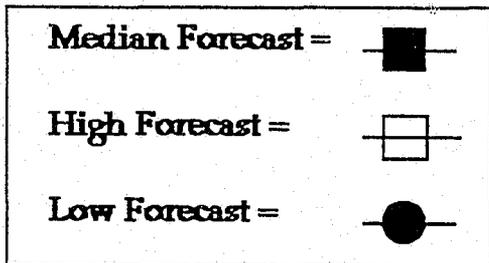
EVENT 5

DNA coding recorded as part of arrest process in California

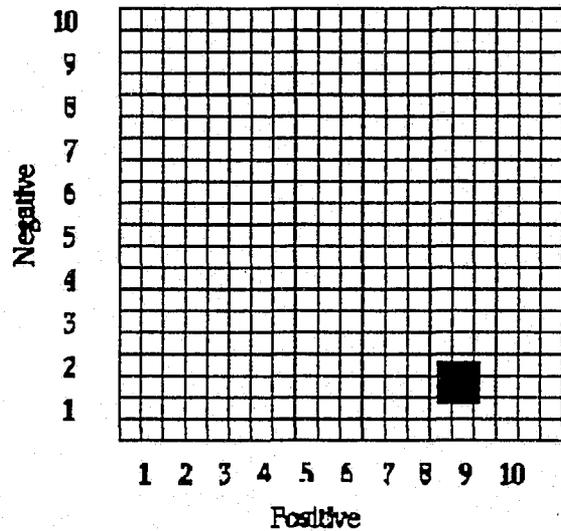
Percent Probability Forecast



Legend



N-7



APPENDIX G

CROSS IMPACT ANALYSIS PANEL

- One Police Chief from a Bay Area Mid-Sized Police Agency
- One Police Lieutenant from a Mid-Sized Bay Area Police Agency
- One Police Captain from Mid-Sized Bay Area Police Agency.

APPENDIX H

CANDIDATE POLICIES

Selected policies highlighted in bold.

Police agencies to employ the most advanced of genetic technology in the solution of criminal investigations by training their employees in DNA technology, evidence collection, storage and analysis techniques.

Police agencies to develop liaison with biotechnology industry to keep abreast of technology and recent developments.

Police agencies will support the development of DNA analysis capabilities in the County Criminalistics Laboratory and encourage the certification and regulation of all laboratories by professional accreditation.

To incorporate within the Department's Strategic Plan an objective to use genetic evidence to its maximum potential.

To incorporate within the Department's Master Training Plan an objective to train all Field Evidence Technicians in genetic evidence applications and techniques.

Police agencies will develop in-house procedures regulating the use of and release of genetic information.

Police agencies will collectively support local and State legislative funding of DNA programs pertaining to training, data collection, and laboratory certification.

Police Chiefs within county to create policy setting Regional Task Force to examine issues surrounding use of genetic evidence.

Police agencies to support the collection of DNA specimens from all arrested felons, and the expansion of the CAL-DNA system.

Appendix H
Candidate Policies - Continued

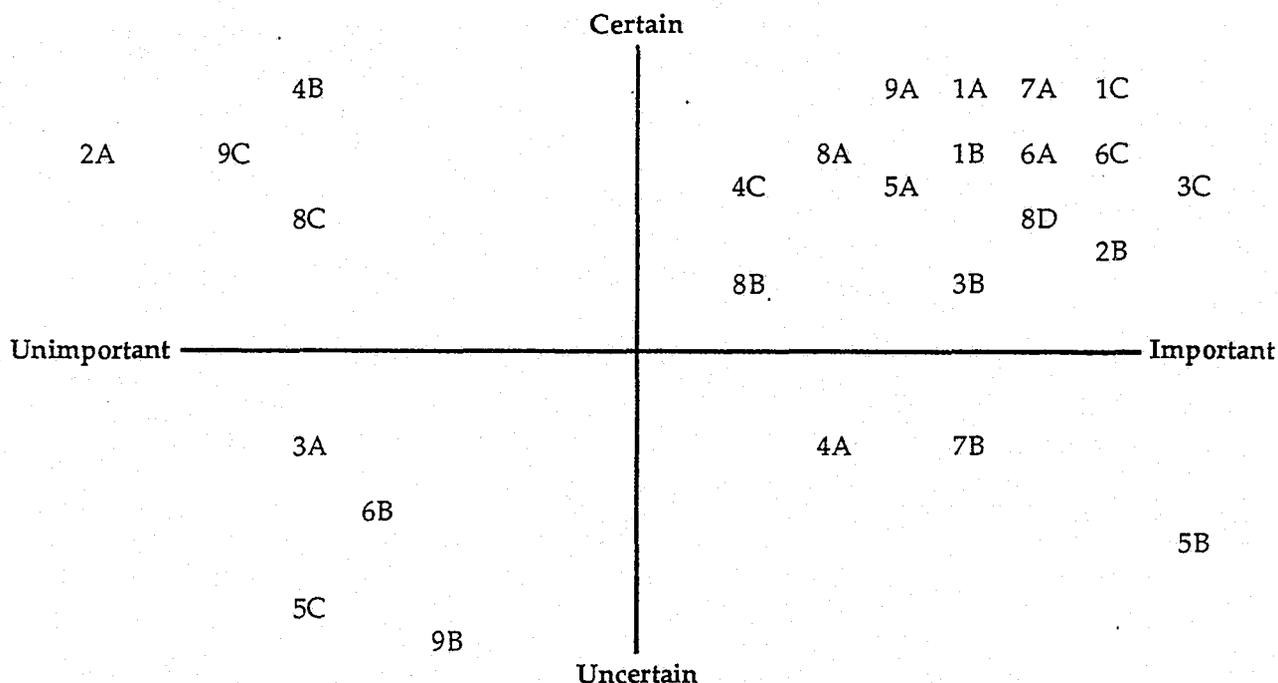
Law Enforcement agencies to divert drug asset seizure monies toward expanding genetic evidence applications.

Law Enforcement to perform a pilot study using specific region (S.F. Bay Area/L.A. Basin) targeting parolees, criminals identified in SHOP (Serious Habitual Offender Programs) for DNA fingerprint, and focus for using genetic identification techniques.

Police agencies to study appropriate applications for genetic evidence, defining what types of crimes are suitable for such technologies, what time limitations might be present, and cost considerations.

Police Agencies to develop automated system to access genetic data from DOJ, FBI and other sources.

APPENDIX I Stakeholder Assumption Map



Legend

1. Police Department
 - A. Want to use this technology to solve crimes & convict criminals.
 - B. Having a repository or data bank of DNA data is desirable.
 - C. Desire standardization and uniform applications of Genetic Technology.
2. The Courts
 - A. Fear litigation backlog if DNA evidence weaknesses are found or standards challenged.
 - B. Optimistic at possibility for quick & conclusive trials if DNA is firmly established by Supreme Court ruling.
3. Defense Attorneys
 - A. Fearful that indisputable evidence, such as DNA would put them out of work by making criminal defenses virtually impossible in biological evidence cases.
 - B. Fear that the "aura" of infallibility of this high technology science might unduly sway juries away from other opposing evidence.
 - C. Concern for violation of client rights. This crosses the point where constitutional guarantees against self incrimination/privacy intrusions apply.
4. Prosecuting Attorneys
 - A. They worry about trouble with expert witness & lack of law enforcement education on subject
 - B. Optimistic about easy & conclusive trials in biological evidence cases
 - C. Concern over costs incurred in applying this technology.
5. The Crime Victim
 - A. Would welcome new, conclusive means to solve crimes & convict criminals.
 - B. If victim exemplars are required, information available from DNA & biological evidence to the police, health insurance carriers & employers would be feared.
 - C. Concern that this expensive use of technology would cause deterioration in funding for victim assistance programs.
6. The American Civil Liberties Union
 - A. The type of information available from DNA evidence to the police, health insurance carriers & employers would be feared.
 - B. Monies allocated to this technology would be taken away from more deserving social service programs.
 - C. Constitutional issues, if DNA tells your life story, they will seek an application for right to privacy and self incrimination issues.
7. The Biotechnology Industry
 - A. Fed by profits and obligation to do public good, they will flourish in this use of technology by law enforcement or anyone who wishes to employ it.
 - B. Would view Law Enforcement applications trivial compared to medical applications
8. Crime Laboratories
 - A. Would welcome new weapon in their technology rich crime fighting arsenal.
 - B. Worried that new equipment would strap them financially and other programs would suffer.
 - C. Storage problems for biotechnology evidence would be burdensome.
 - D. Providing training in molecular biology to criminalists and providing experts to testify would be costly and time consuming.
9. Criminals
 - A. Would resist submission to collection and analysis of biological specimens as violation of civil and personal rights.
 - B. Would fear that prison populations would become the guinea pigs of experimentation for genetically engineered drugs and therapies, analogous to what is done today in the pharmaceutical arena (consent from the vulnerable).
 - C. Would be against anything that made their apprehension and prosecution easier.

APPENDIX J

Modified Policy Delphi - Scenario Identification

- Police Chief from a Bay Area Mid-Sized Police Agency
- Five Police Lieutenants from a Mid-Sized Bay Area Police Agency
- Three Police Captains from Mid-Sized Bay Area Police Agencies.

APPENDIX K

RESPONSIBILITY (RASI) CHART

	Police Chief	District Attorney	Crime Lab Director	Public Defender	Admin. Captain
Develop Lab Standards	S	S	A	S	S
Develop Privacy Policy	A	S	I	I	R
Training of Organization	A	S	R	*	R
Liaison with Industry	S	S	S	*	R
Select Task Force Members	A	S	S	S	R
Court Use of DNA Evidence	S	A	R	S	S
Legislative Lobby	R	S	S	I	S

LEGEND

R= Responsibility (not necessarily authority)

A= Authority (right to veto)

S= Support (put resources towards)

I= Inform (to be consulted before action)

*= Not relevant to the particular action

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