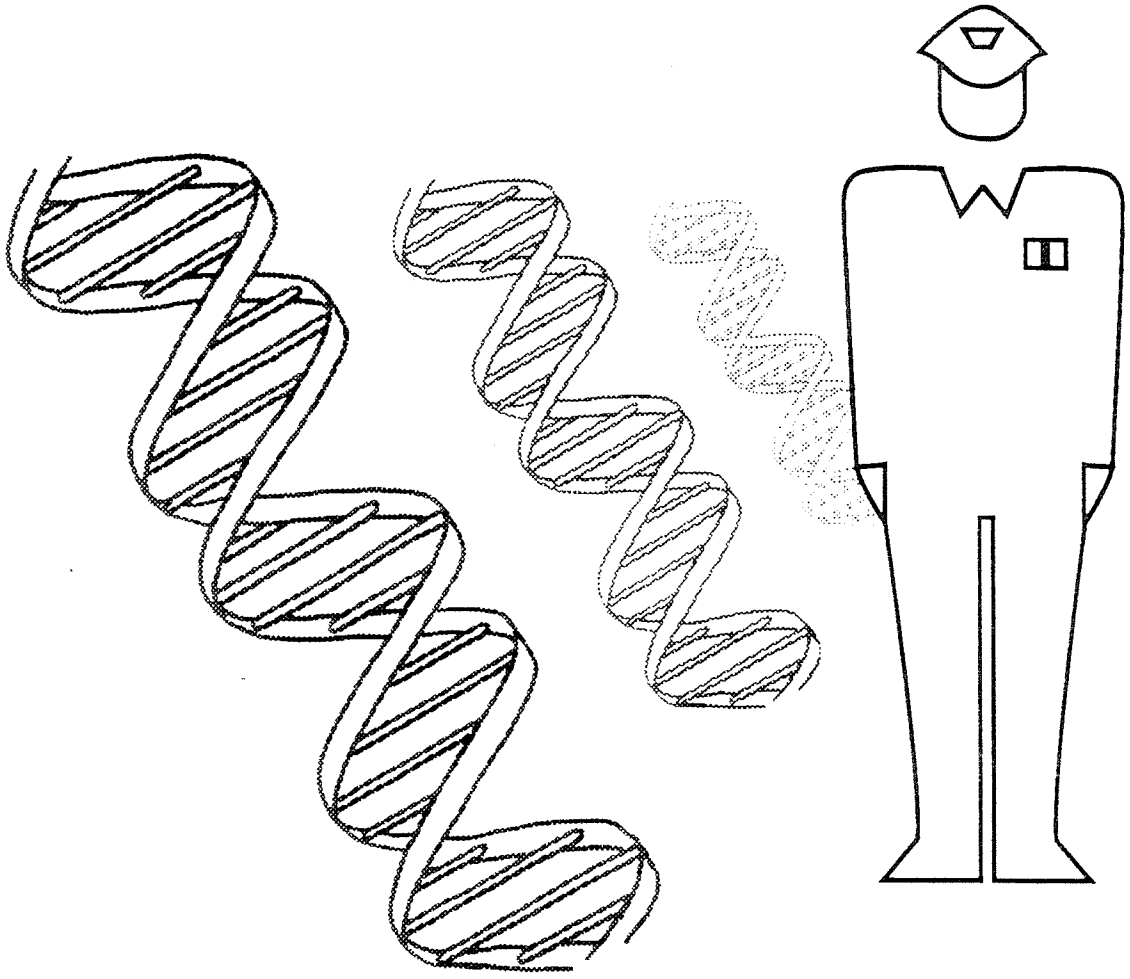
Will there be a future use of DNA TECHNOLOGY in California Law Enforcement?



An Independent study by Arthur James Farrar
Lieutenant, Ventura Police Department
California Command College, Class 11
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WILL THERE BE A FUTURE USE OF DNA TECHNOLOGY IN CALIFORNIA LAW ENFORCEMENT?

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ABSTRACT

This study examines the future impact of DNA technology on California Law Enforcement. The author reviewed the relevant literature, conducted nationwide interviews, used a Nominal Group Technique (NGT), examined trends and events, constructed alternative future scenarios, suggested policies, strategic and transition management plans. Analysis of the data revealed that DNA technology is being introduced into local law enforcement agencies without benefit of prior research, planning or operational considerations. The data showed the need to identify emerging high technology applications, promote research efforts, involve employees in the decision making process, integrate the technology into on-going strategic plans, inform the public of the value of the technology and seek cooperative agreements for the use of DNA. The study is intended to give police executives sufficient information to consider before introducing DNA technology in their organization. Also included are interview summaries: trend and event summaries; forecasts; figures and graphs; appendixes; references.

WILL THERE BE A FUTURE USE OF DNA TECHNOLOGY IN CALIFORNIA LAW ENFORCEMENT?

by

Arthur James Farrar
Commission on POST
Order number 11-0203

EXECUTIVE SUMMARY

This study focuses on an emerging issue in the exploding area of high technology -- DNA. The application of DNA technology was examined through an extensive literature search, nationwide interviews and the use of a Nominal Group Technique (NGT) futures forecasting process. The panel was composed of representatives from the medical, scientific, legal and law enforcement professions. They developed and prioritized a list of the most significant trends and events surrounding the issue.

The trends included the level of funding for research and development; the number of competitive/alternative technologies; the demand for DNA financing by the defense bar; the level of public demand for law and order; and, the level of standardized approach to DNA use. The events included Axell Case upheld by California Supreme Court; DNA technology problems resolved; criminal defenses abandoned; national standards adopted; and, DNA samples required for all sexual offender registrants.

The panel also forecasted the probabilities, positive and negative impacts upon the issue. All of the events were viewed as having a very positive influence with no significant negative impacts identified. The forecasts were used to examine the impacts of the trends and events upon each other. The results of the forecasting were used to create scenarios and to define future policies that would address the development of the issue. One of the scenarios was selected to be used to develop policies suggestions. A strategic plan was developed to guide the organization to the desired future.

The strategic planning process uses techniques to identify strengths and weaknesses to address specific mission statements through the policy alternatives. Four policies were identified, after analyzing the model agency, that would guide the strategic plan. They included integrating high technology into the existing strategic plan; executive/managerial involvement in promoting inter-agency agreements on the use of DNA; high profile political position supporting the use of DNA; support for POST's efforts to provide future training to law enforcement officials.

A transition management component of the strategic planning effort assessed the level of commitment of people involved in the change process. Responsibility charting clearly depicts the roles of the involved parties. The techniques are intended to minimize anxiety and confusion during the change process. Although a model agency has been used for this study, the techniques can be applied to other local jurisdictions.

The study concludes by emphasizing the need to research, plan and prepare for the use of high technology in law enforcement in the future. As the acceptance of the process evolves, agencies must adopt public information programs to illustrate the effectiveness of the technology in law enforcement applications. Public acceptance will generate additional funding sources for agencies to use to adapt the technology for additional uses. The limitations of this study precluded addressing legislative, political and operational issues that should be further explored by other researchers. For example, these areas will dictate enabling legislation; political support for the regional and national data bases; and field procedures - elementary protocols for handling the evidence samples.

In this age of rapidly expanding technological developments, law enforcement agencies must move swiftly to research, plan and prepare for operational applications of scientific advances such as DNA.

FOREWORD

"THE FUTURE"

The future is not the result of choices among alternate paths offered.

It is a place that is created first in mind and will, created next in activity.

The future is not some place we are going to, but one we are creating.

The paths to it are not found, but made and the activity of making them changes both the maker and the destination.

-- author unknown

DEDICATION

TO

Nan, Steph

and

Matt

who put up

with

it all.....

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INTRODUCTION

Background

"Police agencies throughout the world are entering an era in which high technology is not only desirable but necessary in order to combat crime effectively."[1] This is the headline from a recent article in the FBI Law Enforcement Bulletin. Unfortunately, technological advances such as DNA fingerprinting are rapidly changing the face of law enforcement without the benefit of prior research, planning and operational considerations.

"Since 1986, DNA fingerprinting has been used by police in more than 2,000 investigations in the United States, and results of such tests have been admitted into evidence in at least 185 criminal cases in 38 states."[2] California law enforcement agencies are no exception. A recent homicide case in Ventura, California was successfully investigated and prosecuted with the cooperation of the local district attorney.[3] The case involved extensive use of DNA evidence. Through scientific analysis of trace evidence left at the scene of the homicide, a private lab was able to link the murder suspect to the crime.[4]

In the illustration provided in Appendix A, the DNA fingerprinting process is outlined. In essence, the process is a method of identifying a suspect from minute traces of blood, hair, semen or tissue. DNA or deoxyribonucleic acid is a molecule found in all cells in the body. It contains the body's genetic code. The DNA pattern is different for each person except identical twins.

Although the Ventura Police Department and the Ventura County District Attorney were successful in their first combined investigation and prosecution attempt in a major case, it wasn't without considerable challenge. By reviewing this case, scanning literature and interviewing experts across the nation, it is apparent that future investigations will need to be planned, financed and operationally guided in order to be successful.

DNA technologies are new, powerful tools for law enforcement to clear the innocent and convict the guilty. The use of DNA technology deserves careful research. Thus, this study was undertaken to provide a framework for future decisions on the use of DNA.

Since the scientific complexity of this topic can easily overwhelm an individual, this study focuses on one key issue and three (3) sub issues. The key issue is: WILL THERE BE A FUTURE USE OF DNA TECHNOLOGY IN CALIFORNIA LAW ENFORCEMENT? The sub issues are:

* How will agencies finance the use of DNA technology?
* Who will set the physical standards for the use of DNA?
* What legal standards will be necessary to use DNA?

This study focuses upon the most significant and major issues. The futures wheel in Appendix B identified other sub-issues which are appropriate for future research.

METHODOLOGIES

This is a future study, involving an extensive literature scan, interviews, research and issue development. A Nominal Group Technique (NGT) was used to identify, select and prioritize critical trends and events affecting the issue. Further analysis involved a cross-impact analysis of alternative futures scenarios and policy considerations.

Following the futures forecasting, a model police agency is described in a selected scenario to develop strategic planning concepts. A suggested mission statement, situational analysis and Modified Policy Delphi are developed. Strategies to support agency policies are suggested.

Following the strategic planning component, the study identified transition management techniques. A suggested management structure is proposed to test the previously identified policies and strategies. The level of commitment planning is assessed, the "critical mass" is identified and responsibility charting is illustrated to insure success.

The study concludes with a review of the issues, conclusions, recommendations and future implications.

FUTURES STUDY

Literature Review

An extensive review of the literature, both manual and electronic, was conducted. This consisted of local, regional, state and federal research libraries. Although the topic is relatively new to the criminal/forensic literature, much scientific research has been conducted and documented in biological research laboratories. The transfer of DNA technology to forensic laboratories has just begun. The transfer of this technology has captured the interest of the popular media. Newspapers, magazines and television have all featured DNA technology as an emerging trend in law enforcement.

"Since November 1987, when a Florida criminal conviction based on DNA typing received national attention, interest in using DNA tests in crime laboratories throughout the country has soared..."[5] With the advent of DNA tests in criminal trials and their life and death consequences, the U.S. Congress through its Senate Committee on Labor and Human Resources requested a study be conducted.[6]

In July of 1990, the Office of Technology Assessment released the publication **Genetic Witness: Forensic Uses of DNA Tests.** The comprehensive publication reviews the technologies and their applications; the validity, reliability and quality assurances; DNA as evidence; computer technology and informational privacy; and, (the status of) DNA typing by federal, state and local crime laboratories.

It presents policy options for congress to consider addressing: standards for forensic uses of DNA typing; funding of crime laboratories, forensic personnel training and forensic research; the advisability of establishing computer databanks of DNA test results; standardization of DNA analysis for improved data collection; and, privacy considerations of collecting, using and storing DNA data or samples.[7]

In researching for their study, the OTA staff members made site visits, interviews and reviewed written materials from public and private laboratories throughout the U.S. They concluded that a focus of debate is what standards and additional quality control may be needed to be used in forensic DNA testing, but that no scientific doubt remains that existing technologies can accurately detect genetic differences between humans.[8]

Interviews

The status of DNA technology transfer was investigated by the author at the local, regional, state and federal jurisdictional levels during the last six (6) months. A local police department, county sheriff's crime lab, regional crime lab, state research DNA lab and the FBI research lab were contacted. At each site, local representatives discussed the questions contained in an interview instrument designed to elicit standard information (See Appendix C).

Common themes emerged: Legal and forensic standards for nationwide use of DNA; dependable financing for equipment and personnel needs; and, comprehensive training for officers in evidence recognition. From the results of the literature search and the discussions with experts in the field, the issue and sub- issues were identified for the Nominal Group Process.

Nominal Group Technique

Nine volunteers representing medical, scientific, legal and law enforcement professions were invited to participate. The panel included a medical examiner, three (3) criminalists, a prosecutor, a defense attorney, a senior D.A. investigator, a supervising police investigator and a law enforcement manager. All of the participants had a working knowledge of the topic. Several of the members had first-hand experience with the homicide case cited earlier. Prior to the group meeting, participants were mailed information on the process and the selected issue and sub-issues. The information packet contained suggested reading material to help the participants prepare for the process and to focus on the issue.

The panel generated thirty trends and twenty-three events related to the issue (See Appendixes D & E). Using the NGT process, the panel then rank ordered the importance of the trends and events. The panel decided on the importance of each trend after examing and discussing it carefully to determine its ability to be prioritized for future strategic planning.

The events were examined to determine the ability of policy to impact upon them. The panel then reduced the candidate lists to five trends and events each. The rank ordered trends and events were:

Trends

1. **Level of funding for research and development:** the amount of financial resources directed to DNA technology specifically assigned to research and development of existing and future applications.

2. **Number of competitive/alternative technologies:** the current and future DNA technologies that are constantly evolving.

3. **Demand for DNA financing by defense:** the number and costs of defense requests for independent analysis of DNA evidence.

4. **Level of public demand for law and order:** the public's expectation that scientific developments will be immediately employed in law enforcement to suppress crime.

5. **Level of standardized approach to DNA use:** government efforts will continue to establish local, state and national standards for DNA use.

Events.

1. **Axell Case upheld by California Supreme Court:** Appellate court review of homicide case supports the use of DNA technology throughout California.

2. **DNA technology problems resolved:** the nagging concerns about working with radioactivity are resolved.

3. **Criminal defenses abandoned:** the defense bar no longer argues that DNA technology/identity is unreliable.

4. **National standards adopted:** an agreement is reached establishing national standards to process foresnic DNA.

5. **DNA samples required for all sexual offender registrants:** a nationwide system is established to record DNA samples for all sexual offenders that results in a serial offender's arrest/conviction.

Forecasting

By projecting their expertise and experience, the panel next forecasted how the level of each trend might change and the probability of occurrence for each event might increase through the next ten years.

The results of these forecasts are summarized in the following charts and pages:

TABLE #1

FORECAST TREND EVALUATION

Trend #	TREND STATEMENT (Abbreviated)	LEVEL OF THE TREND ** (Today = 100)			
		5 Years Ago	Today	* Five years from now	* Ten years from now
1	LEVEL OF FUNDING FOR R & D	33	100	168 / 244	288 / 319
2	NUMBER OF COMP /ALTERNATIVE TECHNOLOGIES	56	100	261 / 312	385 / 513
3	DEMAND FOR DNA FINANCING BY DEFENSE	3	100	266 / 192	311 / 190
4	LEVEL OF PUBLIC DEMAND FOR LAW AND ORDER	90	100	233 / 216	341 / 325
5	LEVEL OF STANDARIZED APPROACH TO DNA USE	24	100	178 / 207	220 / 268
			100		
			100		
			100		
			100		
			100		

** Panel Medians

* Five years from now: "will be" / "should be"

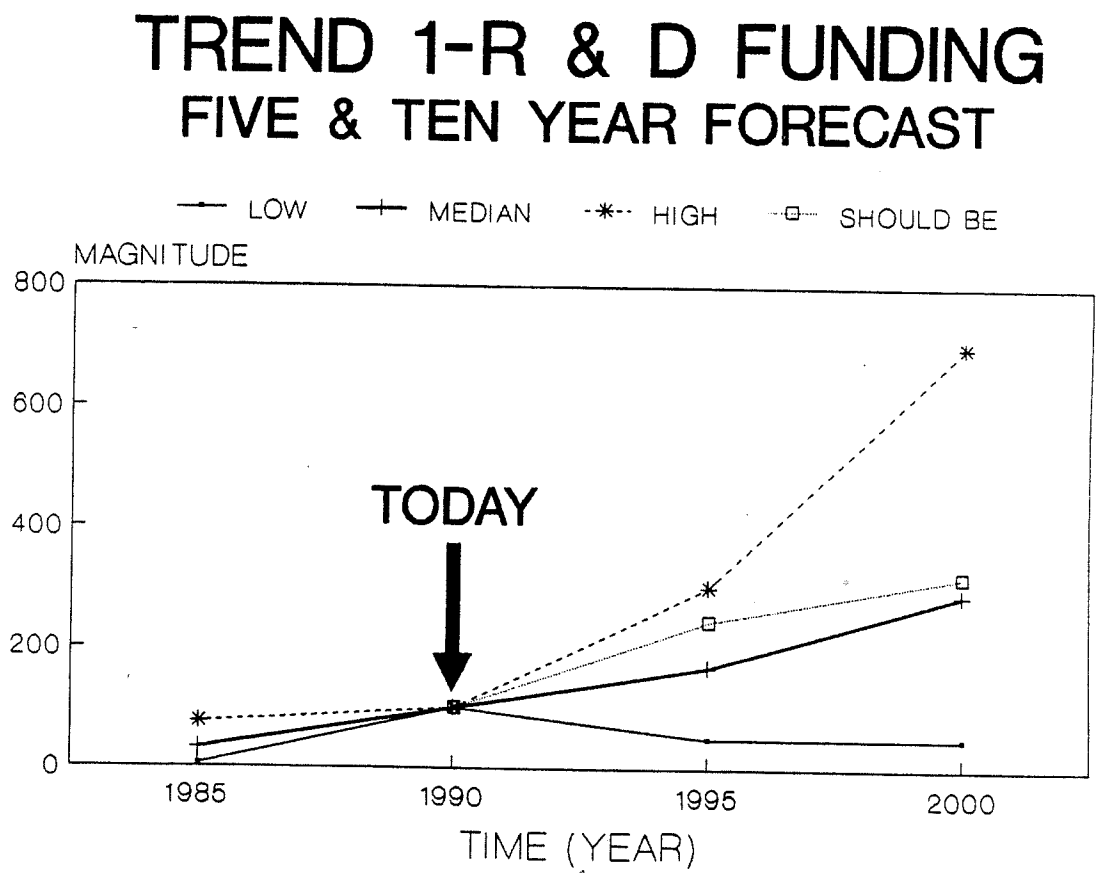
* Ten years from now: "will be" / "should be"

The NGT panel compared the rank ordered trends to an assumed level (100) of the trend for today. It then estimated the level of the trend for five years ago, five years from now, and ten years from now. In addition, it forecasted what was thought "would be" and what "should be" if it were able to influence the future. The chart reflects the group median responses and is calculated using the highest and lowest forecasts in the range of estimates. The range provides additional insight into the panel's opinions and reflects the strengths of its convictions.

T1 Funding: Although the forensic technology was in its infancy five years ago (33%) and has grown rapidly since, the panel forecasted a significant rate of increase (68%) by 1995 and that it would continue to increase through the year 2000 (188%) almost doubling above that of today.

In discussing their desired forecasts, the panel saw even higher rates of increase (244%) by five years from now and (319%) by ten years from now. It felt that continued success with the use of the technology would in turn contribute to increased funding for research and development.

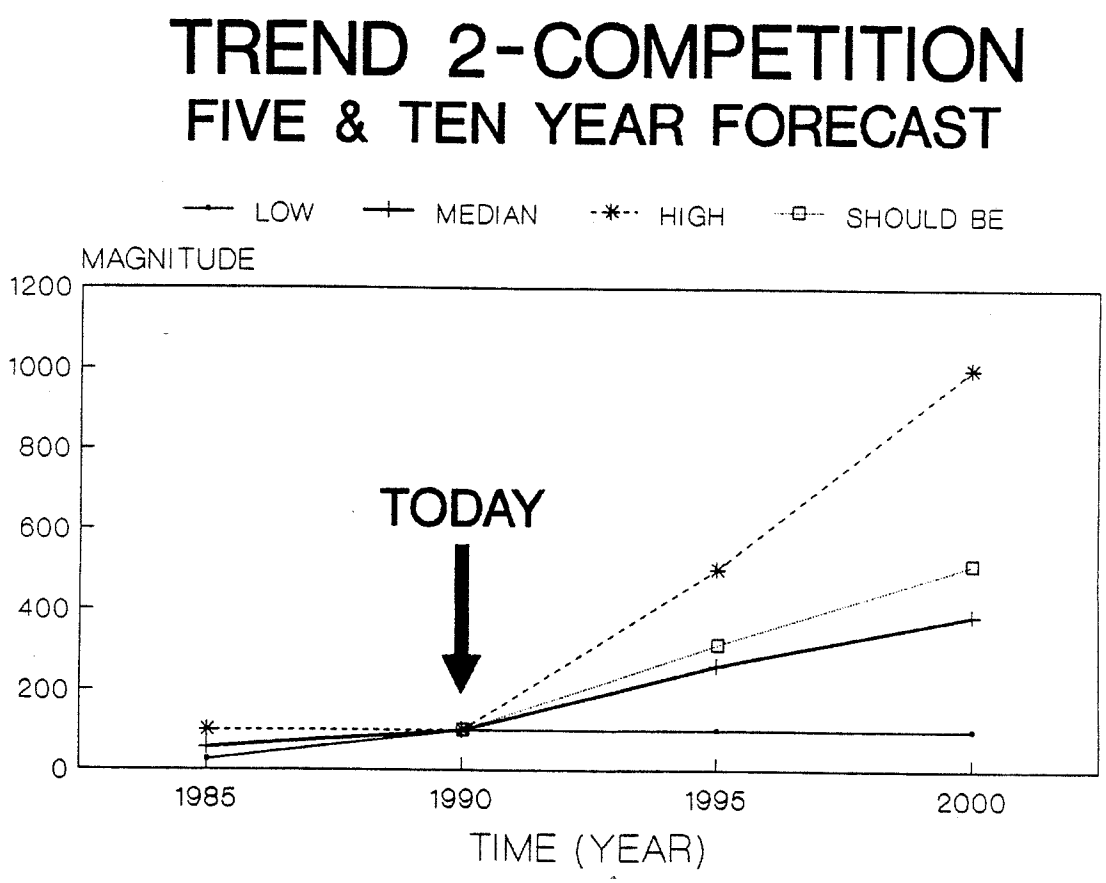
FIGURE #1



NOMINAL FORECAST OR THE "WILL BE"

T2 Competitive/alternative technologies: Many of the scientific/medical panel members felt that the current state of the art on DNA technology was on the verge of a significant breakthrough. Due to time constraints, costs and hazards connected with the current restriction fragment length polymorphism (RFLP) process favored by many labs (illustrated in Appendix A), and the rapidly developing new technology in the field, they forecasted a very high percentage of increase in the next five years (161%) and through the year 2000 (285%). The group clearly felt that the new technology, probably computerized, would have a very positive impact on law enforcement.

FIGURE #2

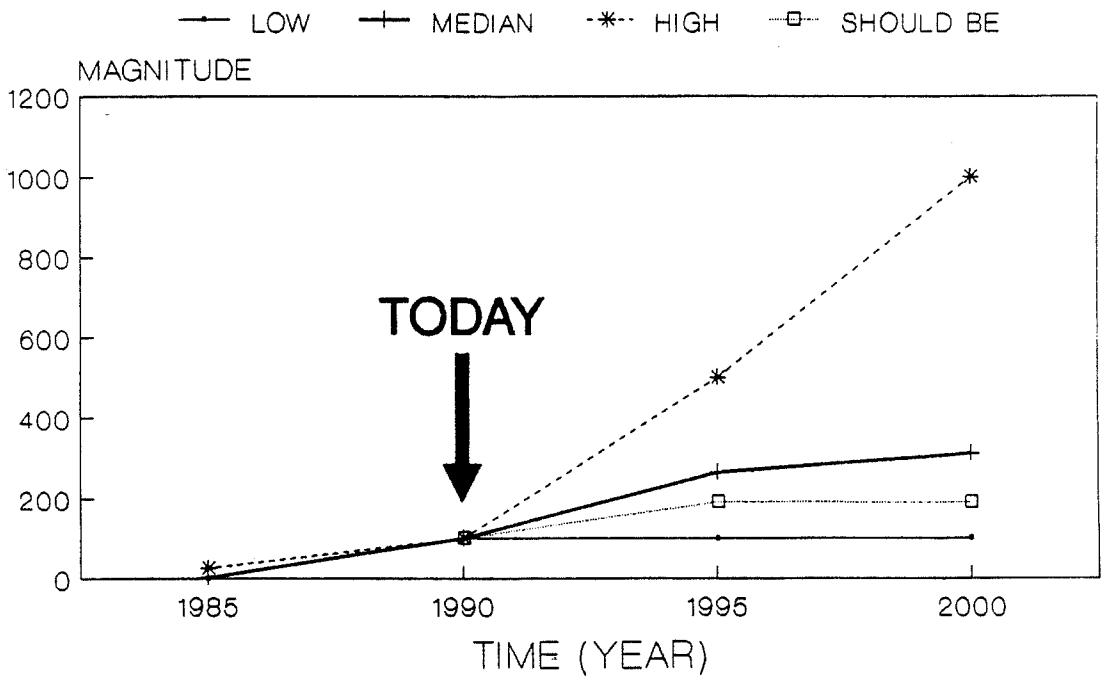


NOMINAL FORECAST OR THE "WILL BE"

T3 DNA financing by defense: Although viewed as almost nonexistent five years ago (2.7%) by the panel, this trend is forecasted to have significant impact upon the future. The legal experts on the panel reflected on the expansion of defense rights with regard to discovery in criminal cases. They concluded that there was a very strong probability that five years from now (166%) defense counsels would have their requests for DNA analysis financed by public funds. Ten years from now they forecasted an even higher probability (211%). The panel is convinced that as DNA evidence is widely accepted in U.S. criminal courts that defense counsels will have even wider access to the evidence than they do now.

FIGURE #3

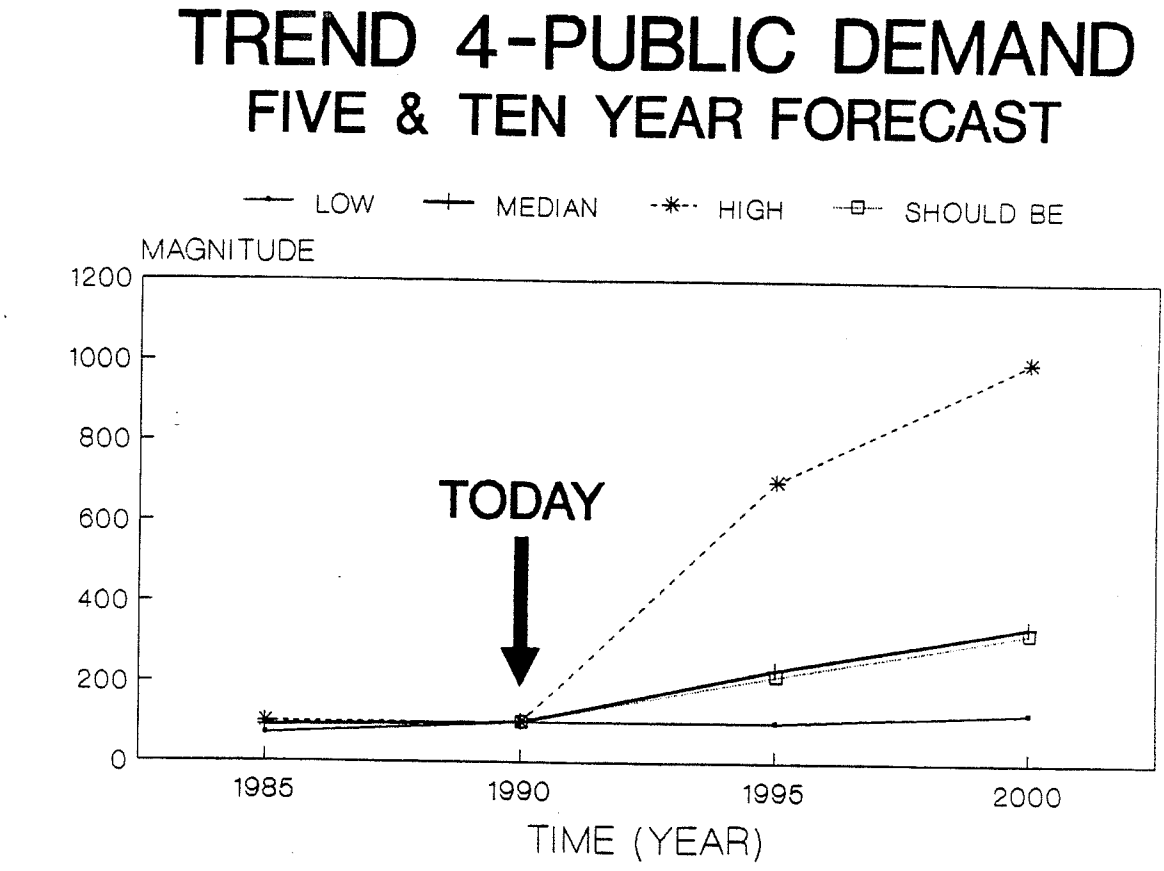
TREND 3-DEFENSE FUNDING
FIVE & TEN YEAR FORECAST



NOMINAL FORECAST OR THE "WILL BE"

T4 Demand for Law & Order: This trend, although rated as quite high five years ago (90%), is expected to continue to increase as the nation battles drug and gang wars. High profile, violent events are forecasted to focus attention on the uses of high technology to solve particularly heinous crimes. DNA fits the definition of high technology. The panel forecasted the trend to increase (133%) in five and (241%) in ten years.

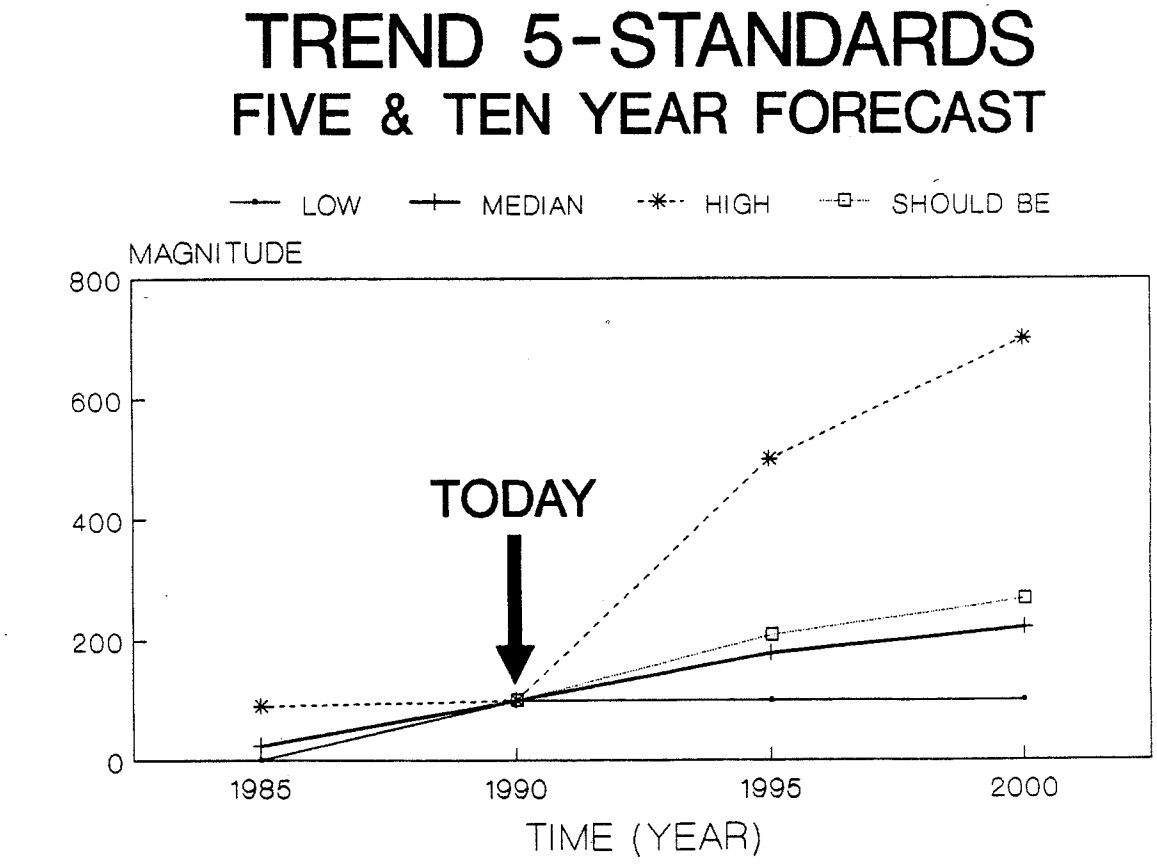
FIGURE #4



NOMINAL FORECAST OR THE "WILL BE"

T5 Standardized approach to DNA: This trend was estimated as low five years ago (24%). The panel sees this area as the main stumbling block to nationwide criminal justice use of DNA technology. The competing processes (RFLP and Polymerase chain reaction - PCR) and differences between public and private lab procedures compound the problem. It forecasted continued slow development in the next five years (78%) and until 2000 (120%). It expressed disappointment that the federal and state governments hadn't taken a significant lead role in expanding the use of DNA. It reviewed continued funding cutbacks and apparent reluctance to commit both personnel and resources to the technology.

FIGURE #5



NOMINAL FORECAST OR THE "WILL BE"

Event Evaluations

The panel next evaluated events to estimate probabilities for each one. It was asked to determine the year in which each event probably would occur and then to forecast the probabilities of occurrence for five and ten years from now. Lastly, it was asked to estimate the positive or negative impact of each event on the issue.

The panel's median forecasts are displayed below:

TABLE #2

EVENT EVALUATION

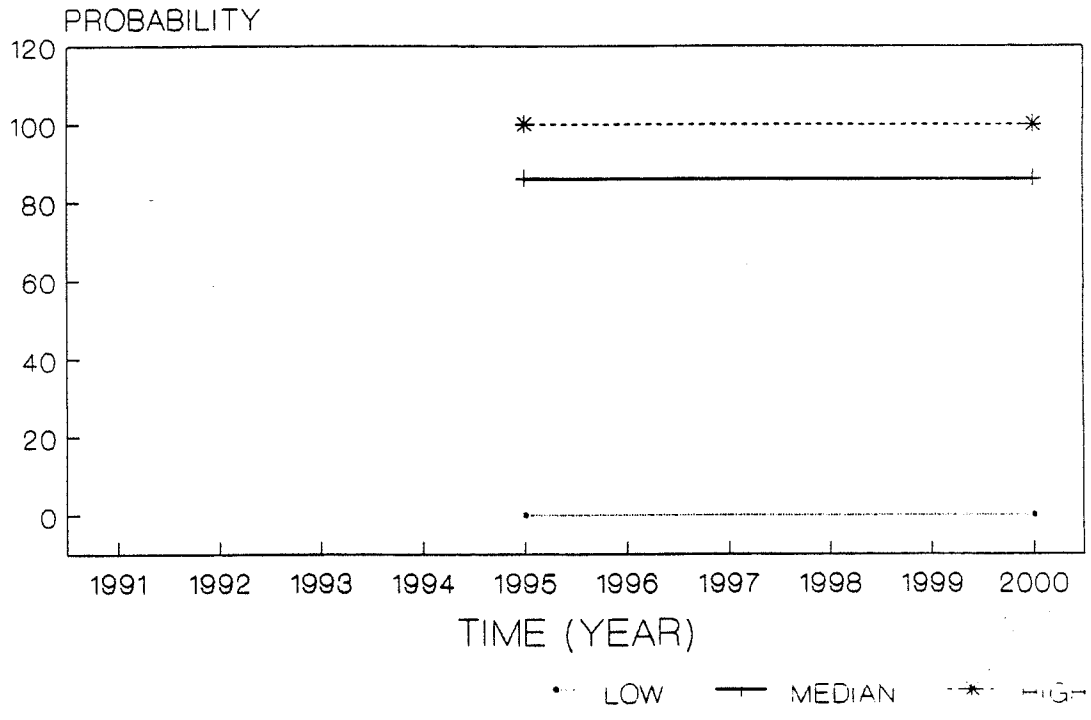
Event #	EVENT STATEMENT	* YEARS UNTIL PROBABILITY FIRST EXCEEDS ZERO	* PROBABILITY		IMPACT ON THE ISSUE AREA IF THE EVENT OCCURRED	
			Five Years From Now (0-100 %)	Ten Years From Now (0-100%)	* POSITIVE (0-10 scale)	* NEGATIVE (0-10 scale)
1	AXELL CASE UPHELD	1.25	86	86.25	9.75	Ø
2	DNA TECH. PROBLEMS RESOLVED	4.38	64.37	90.62	9	1.1
3	CRIMINAL DEFENSES ABANDONED	2	87.3	96.10	6.8	.75
4	NATIONAL STANDARDS ADOPTED	6	47.50	88.12	7.8	1.56
5	DNA SAMPLES REQUIRED	3.37	75	97.50	8.8	Ø

* Panel Medians

E1 Axell case upheld: The panel felt that the Axell homicide case could be upheld next year. It saw a strong probability (86%) that it would be upheld in five years and a continuing probability by ten years from now. It felt that that review by the California appellate courts, through the California Supreme Court would have a very strong positive (9.75) impact upon the issue of DNA use in California law enforcement. (Refer to page 21 for table on positive/ negative impacts).

FIGURE #6

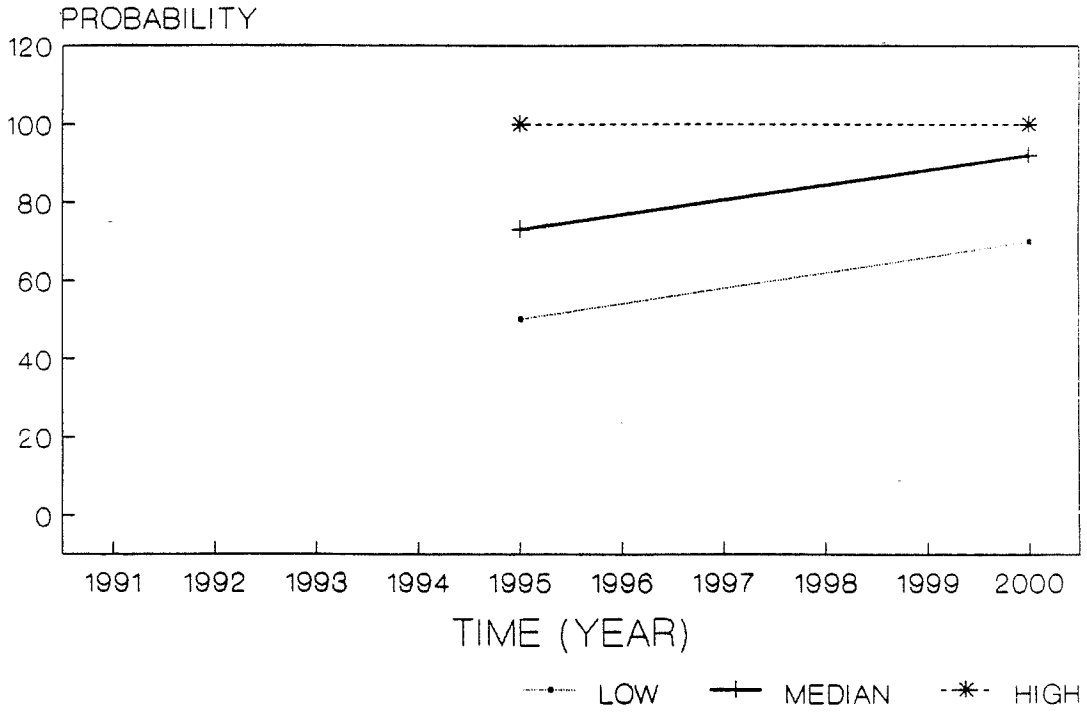
EVENT 1-AXELL CASE UPHELD
PROBABILITY FORECAST



E2 DNA Technology Problems Resolved: Several panel members forecasted the resolution of operational/personal safety concerns related to the processing of DNA evidence. These concerns centered around the risk of using radioactive materials to process DNA. They estimated that in a little more than four years we would see a high probability (73%) of problem resolution with almost complete resolution (93%) by ten years from now. Again, they estimated that this event would have a very positive (9) and very little negative impact on the issue.

FIGURE #7

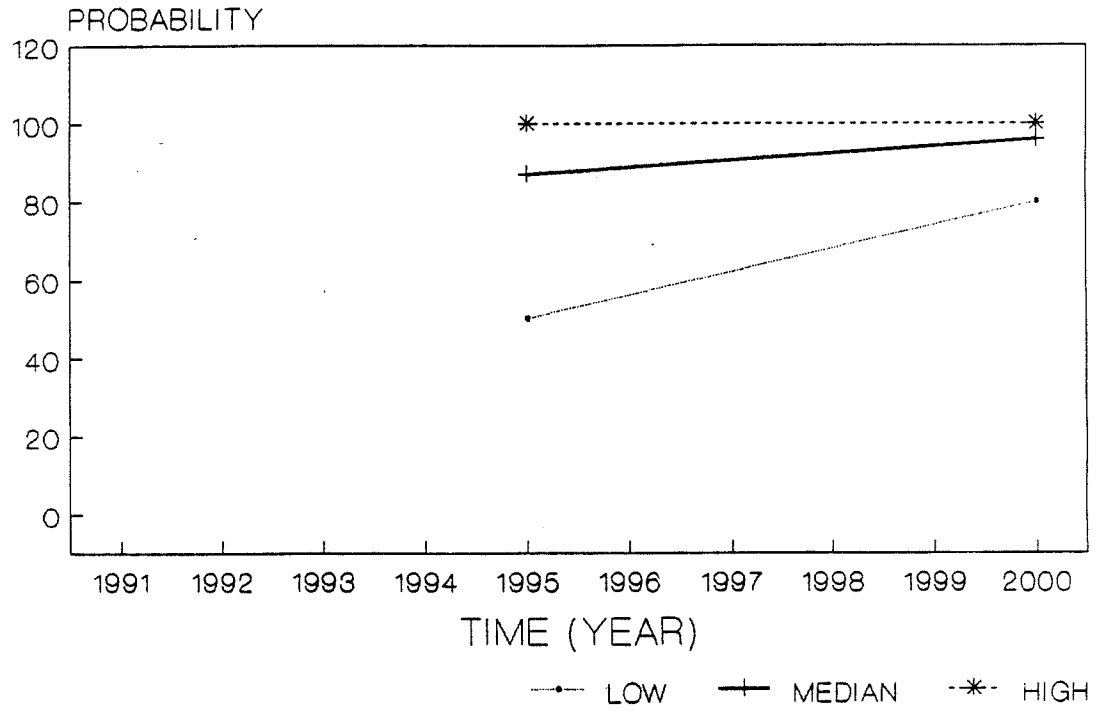
EVENT 2-PROBLEMS SOLVED
PROBABILITY FORECAST



E3 Criminal Defenses Abandoned: One of the most interesting event forecasts to arise out of the NGT technique was this one. The panel members felt that within two years and with virtual certainty within five (87.3%) and ten years (96.10%), challenges to DNA identity/evidence processing would be abandoned by the defense bar. The reasoning was that DNA technology would have been proven reliable and accurate through a significant number of criminal law cases. This would result in the defense bar conceding the DNA identity/evidence and only arguing that the defendant had a right to be where he was and/or that the physical evidence was transported to the crime scene legitimately. The panel felt that the positive impact (6.8) would outweigh the minimal negative (.75).

FIGURE #8

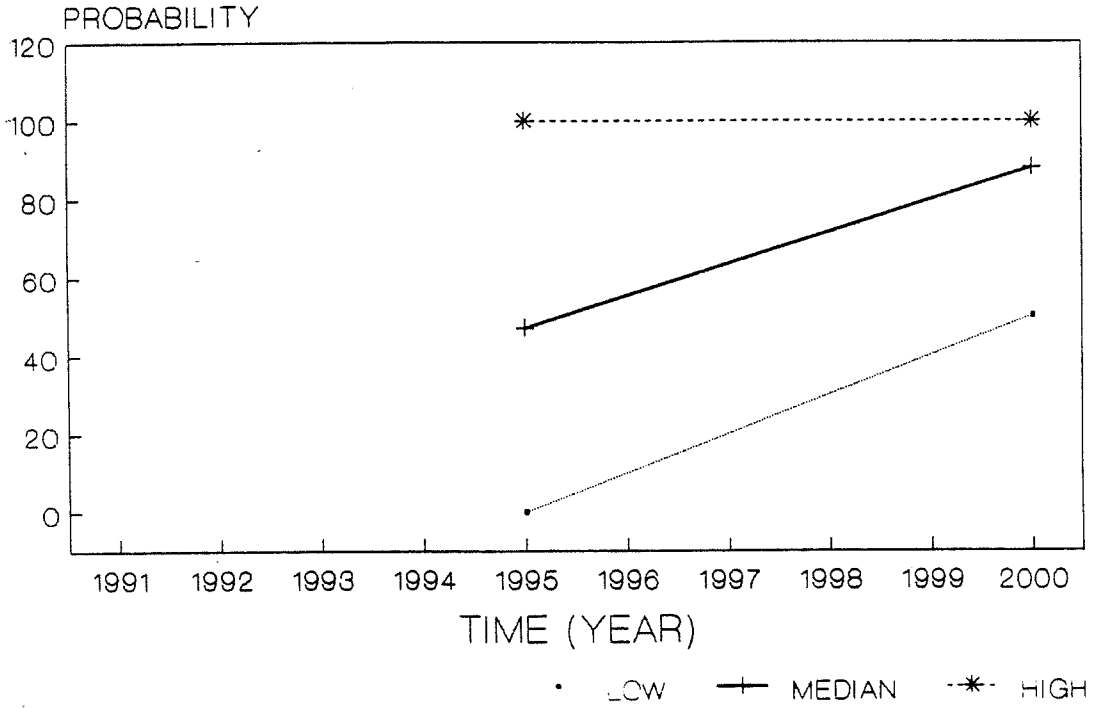
EVENT 3-DEFENSE CHANGED
PROBABILITY FORECAST



E4 National Standards Adopted: Although this event is highly desirable, the panel felt that little significant progress would be made on the national/state level for the next six years. It estimated that five years from now the probability was moderate (47.50%) and would increase a little less than 25% in ten years (71.20%). It did feel that the positive impact (6.8) would overshadow the lengthy development period they forecasted.

FIGURE #9

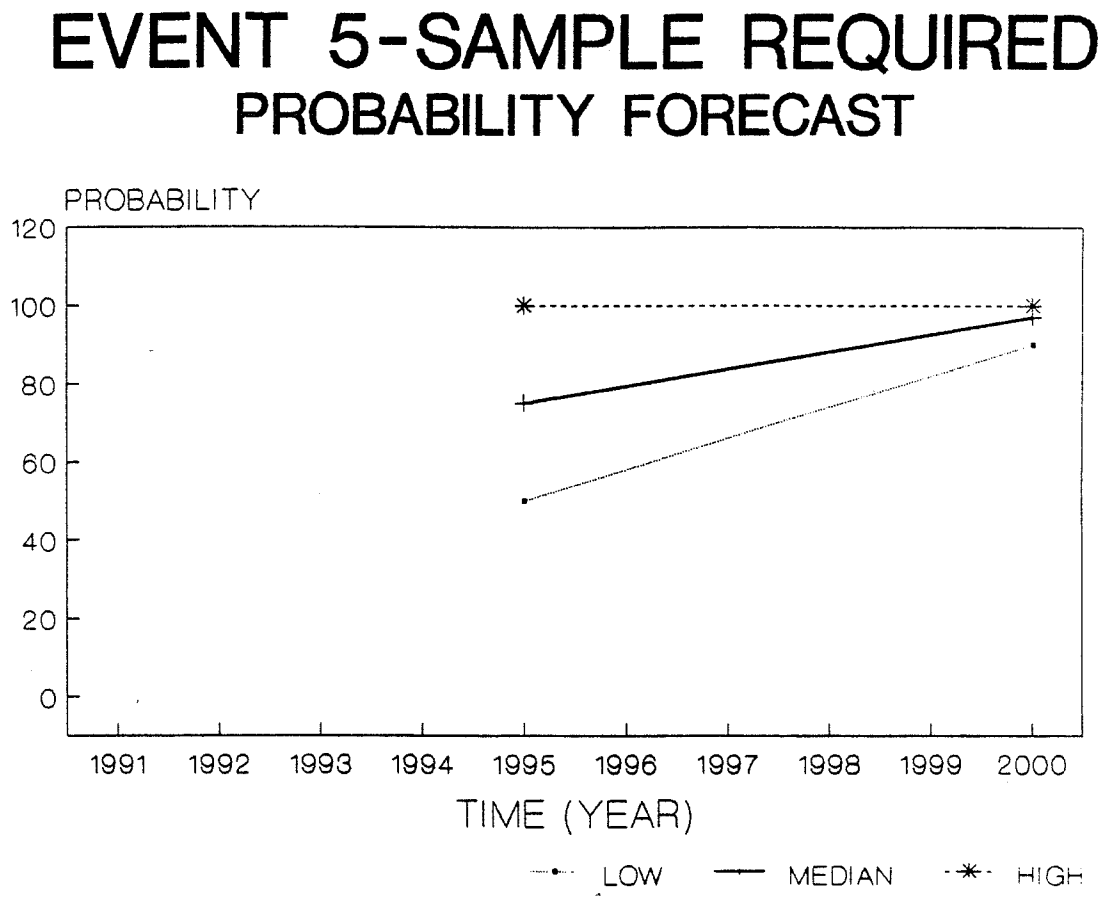
EVENT 4-STANDARDS
PROBABILITY FORECAST



E5 DNA samples required for all sexual offender registrants:

The panel felt that a mandated nationwide program for taking DNA samples from convicted sexual offenders had a high probability of occurring. It forecasted that in three years a groundswell of support would begin the push for the DNA databank's establishment. It estimated that in five years (75%) a very high probability existed that a partial data bank would be operating and that in ten years (97.50%) a nationwide data bank would be operating. It viewed this event as having a very positive impact on the issue.

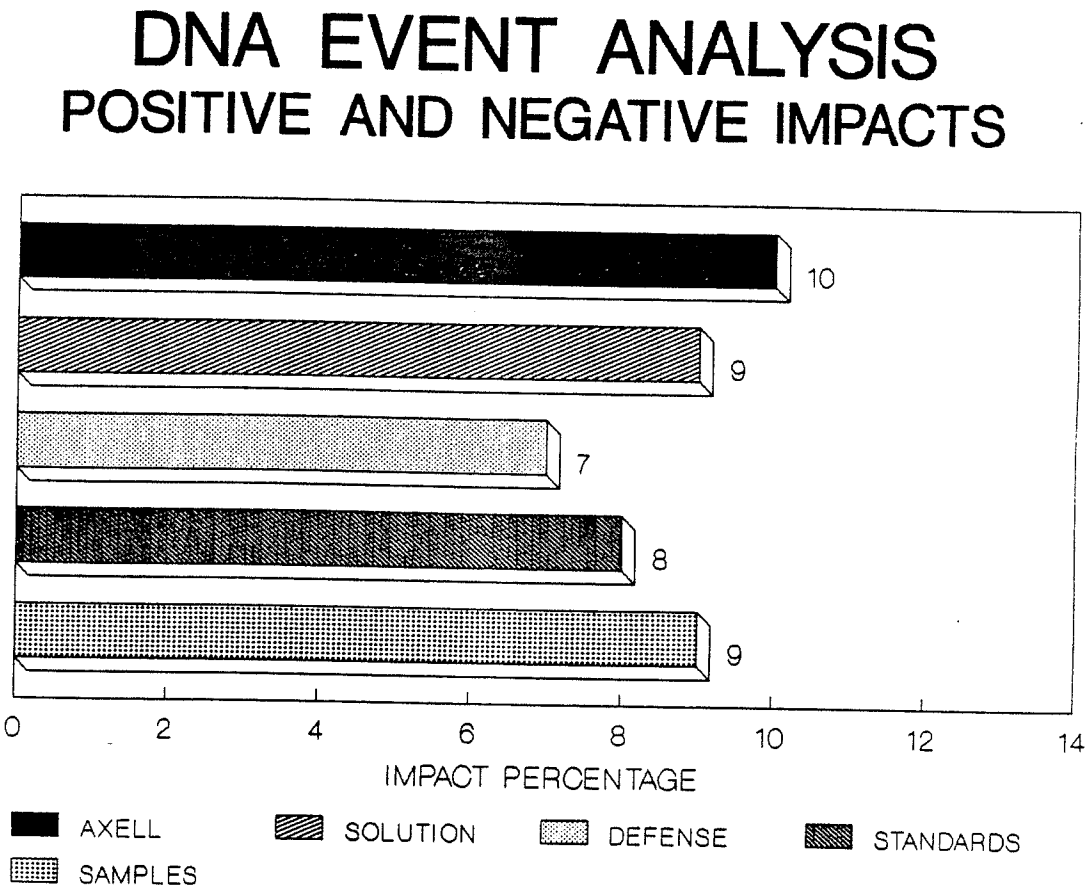
FIGURE #10



This table illustrates the previous Events positive impacts upon issue. There were no significant negative impacts.

TABLE #3

EVENT IMPACT



Following the preliminary work of the NGT panel, additional forecasting estimates were completed. Using the Cross-Impact Analysis Matrix (Table #4), assessments were made of event impacts on other events and how trends were either positively or negatively influenced by other events which occur by the year 2000.

Thus, cross-impacting illustrated which events were "actors" (those that influence many other events and trends) and those that were "reactors" (those influenced by other events). These assessments help to focus on policy considerations with regard to those events that are the most influential to the issue.

TABLE #4

CROSS-IMPACT MATRIX

MATRIX (Panel Medians)

Maximum Impact (% change ±) / Years to Maximum

**	E1	E2	E3	E4	E5	E6	E7	T1	T2	T3	T4	T5	T6	T7	"IMPACT" TOTALS A
(E1)	X	+10	+25	+5	+10			+25	+5	+25	+25	+25			E1 9
E2	Ø	X	+15	+5	Ø			+10	+50	Ø	+10	+50			E2 6
E3	+50	+25	X	+50	Ø			Ø	-25	-90	+25	+95			E3 7
(E4)	+10	+25	+50	X	+50			+75	+50	+25	+5	+90			E4 9
E5	Ø	+50	Ø	+50	X			Ø	+75	+90	+25	+50			E5 6
E6															E6
E7															E7

"IMPACTED" TOTALS

	E1	E2	E3	E4	E5	E6	E7	T1	T2	T3	T4	T5	T6	T7
R	2	4	3	4	2	1	1	3	5	4	5	5	1	1

** Legend

E1 AXELL CASE UPHELD
E2 DNA TECHNOLOGY PROB. SOLVED
E3 CRIMINAL DEFENSES ABANDONED
E4 NATIONAL STANDARDS ADOPTED
E5 DNA SAMPLES REQUIRED
E6 _____
E7 _____

T1 LEVEL OF FUNDING FOR R&D
T2 COMPETITIVE/ALT TECH
T3 DNA FINANCING FOR DEFENSE
T4 DEMAND FOR LAW AND ORDER
T5 STANDARD APPROACH TO DNA
T6 _____
T7 _____

NOTES: N=9

The "actors" were clearly visible because each had a significant number of either positive or negative impacts (hits) upon the other events or trends. E1, Axell case upheld (9 hits), had a significant impact across the board on both events and trends and was viewed as a potential watershed legal decision for California and the continued use of DNA technology. If technological problems are resolved it will probably be because of legal decisions supporting the process which lead to further refinements. It is felt that criminal defense challenges will subside, the establishment of national standards will be encouraged, and that other jurisdictions will be influenced to start processing DNA samples. With regard to trends, appeallate court affirmation will surely spur additional funding for research and development, may encourage additional private sector experimentation and defense counsel private lab testing, demands for processing improvements and a standard approach to the evidence processing.

E4, National standards adopted (9 hits), also had the highest significance across the board. Indirectly, it could assure appeallate courts that standards do exist from state to state, within labs and in the research arenas. This event could focus additional attention on the hazards involved in working with radioactivity and DNA evidence and lead to other improved methods and processes. The impact of establishing national standards, as discussed earlier, could spur on the defense bar to abandon challenges to DNA and also set the stage for national criminal databanks. With trends, establishment of national standards could logically lead to additional funding for on-going research and development programs as well. The private sector could be drawn into the R&D aspect by financial incentives to improve the technology. This

event might be the benchmark date for the defense bar to abandon challenges to the evidence and to support DNA as a pre-screening device prior to the prosecution filing a criminal complaint in court. Establishing national standards would take significant strides toward insuring reliability and consistency among public and private labs.

E3, Criminal defenses abandoned (7 hits), would be the likely prospect if pending cases are upheld through appeallate review, technology improves, and national standards are subscribed to by labs. Trends, such as competitive/alternative technologies may be adversely impacted as would financing levels for defense analysis which could be expected to diminish. The demand for law and order could be expected to continue and as more cases are successfully concluded by prosecutors and defense lawyers no longer challenge the evidence, the push for standards nationwide can be expected to continue.

The "reactors" among the trends and events were identified because they were significantly influenced by specific occurrences. The most significant events and trends are discussed in rank order by the number of hits.

E2 DNA technology problems resolved (4 hits):

State and federal appeallate court approval of a criminal case, a lessening of defense challenges, the adoption of national standards and significant federal legislation leading to a nationwide DNA data base are all events that would influence the technological problems inherent in DNA processing. The occurrence of these events were increase the probability of additional research and development to improve the existing technology.

E4 National Standards adopted (4 hits): The decision to establish a nationwide DNA databank for all sexual offender registrants could be linked with a proposal to standardize the DNA processing methods for uniformity of reporting and testimony in criminal trials. The movement would logically lead to reduced challenges by defense counsels once the standards were established. To a lessor extent, court approval of DNA and improvements in the technology could be expected to impact this event.

E3 Criminal defenses abandoned (3 hits): The establishment of the national standards would also have a significant and probable immediate impact on this event. Currently legal challenges are made to the concept, reliability, and accuracy of the process. Standards would address the validity and reliability aspects. Defense counsels would be further encouraged to drop the challenges with an endorsement by appealate court review and improvements/upgrades in the technology.

T2 Number of competitive/alternative technologies (5 hits): This trend would be influenced by a decision to establish a nationwide DNA databank. It is expected that private sector interest would be increased due to the need for expansion in current technology, the market for hardware and software, and future expansion capabilities. The adoption of national standards would also influence this trend and possibly lead to breakthroughs on the current technology problems. The trend could be adversly influenced by the lessening of defense challenges to the process.

T4 Level of public demand for law and order (5 hits): Given the current crime problems in the U.S., this trend could be expected to be reflected in

judicial opinions supporting the use of high technology for law enforcement. It could also be seen in diminished funding for public defenses of criminals as well as broad public support for DNA databanks and electronic data bases on convicted felons. To a lessor extent, the trend could impact the need for a national set of standards and technological changes.

T5 Level of standardized approach to DNA use (5 hits): This trend would have a substantual impact on the movement to establish national standards if the current level of useage was already somewhat uniform across the country. As it is, the trend is one of the key elements in the process. As more and more labs come on line in the 1990's and begin processing DNA, the standards that they begin using may well dictate the process for the rest of the country. This could lead to diminished defense challenges, technical problem resolution, databanking and judicial approval for these events.

Scenarios

Following the analysis of numerical data, it is helpful to transform that data into word pictures to begin to "see" the shape of the future. These brief essays of possible futures, known as scenarios, have a unique and precise perspective. That perspective is determined by the underlying assumptions.

In the following scenarios, a possible future is constructed based upon the data generated through the NGT process. Coupled with imagination and prior research efforts, these "fast forward" views serve to illustrate the possibilities on the horizon.

Nominal Scenario

This scenario is a story describing what is most likely to occur in the year 2000. Its basis is the panel's "will be" projections without any possible events intervening or policy changes.

The newspaper headline read "Newest Genetic Identification Process Approved by U.S. Supreme Court". The date is December 30, 1999. By now, of course, DNA technology is widely accepted. The legal admissibility of the evidence has been reviewed by the U.S. Supreme Court and upheld several years ago. The court had rejected a preliminary challenge to the scientific theory of DNA early in the century. That challenge had been unsuccessfully advanced by the American Civil Liberities Union. In the intervening years, genetic research had continued and technology had improved slowly.

Many of the forecasted DNA trends, first identified by a panel conducted by a researcher in 1990, had been researched and policies incorporated into the department's five year strategic plan to take advantage of the emerging technology.

Unfortunately that process had not produced benefits for the organization. Insufficient funds were available to prioritize the DNA project in the strategic plan, although early recognition of the emerging technology had resulted in a successful prosecution of a capital case in the city. That case had served as the basis for initial appeallate court review in California.

Federal, state and local agencies had been researching the technology and they eventually combined their efforts and financial capabilities into practical law enforcement applications. These limited research and development efforts also resulted in the introduction of newer techniques that reduced costs, shortened the turnaround time and were both reliable and accurate.

Successful prosecutions on major cases led to wide spread public support for improved law and order techniques. Politicians passed laws to require standard applications and processing of DNA evidence to insure accuracy. These developments were the basis for a slow and steady increase in the number of arrests and successful prosecutions.

The decision made in 1990 to postpone additional research, financing and operational applications of DNA was instrumental in keeping the Ventura Police Department and other law enforcement agencies who failed to implement the technology behind the leading edge. That decision was still affecting the department ten years later as it struggled with an increased population and crime rate. Although adjacent jurisdictions had adopted the technology and were successfully applying it almost daily, department officials had elected to wait and see if DNA was "effective" before beginning additional research, planning, seeking financing and taking steps to implement the technology. Consequently, when news of the latest genetic technology was announced, the department was in no better position to utilize it than it was in 1990.

The delays in research and planning had disqualified the Department from making grant applications (which were well advertised in professional/research publications). Thus, readily available state and federal funds were forfeited

to other regional agencies. Also, since the department declined to invest its own funds into a development program and strategy, or in co-operative agreements with other agencies, DNA had lost much of its initial attraction. Without solid management support, investigators soon tired of asking to use the technology in their investigations. They viewed the indifference projected by management as lack of support for the technology and reverted back to previous methods of time consuming investigative steps.

When the latest computer technology discovered the identity of a serial rapist through a regional data base search, the department was profoundly embarrassed to discover that it had arrested and released the suspect a few months earlier. But, because of the indifference of management and investigative staff, and the lack of training, no one had processed the crime scene evidence thoroughly. If appropriate steps had been taken months earlier, the suspect DNA would have been submitted for analysis and entry into the regional and federal data bases.

The media "attacked" the agency for negligence and unacceptable management practices. It printed the stories of the subsequent victims and concluded that because of the department they were needlessly victimized. After the stories appeared, the department was served with legal notice of civil suits for damages. The settlements amounted to more money than what would have been spent in the intervening years for just moving ahead with the program in 1990. Sadly, the chief of police was ultimately held responsible for the problems and forced to resign.

Normative Scenario

The Normative scenario focuses on the "should be" trend forecasts. It also moves forward in time to a position where the players describe their feelings, thought processes and behavior in an organizational setting that has been improved by the application of desirable and attainable futures.

As the division manager entered her office on Monday morning, December 30, 1999, her desk top terminal was blinking with an incoming message. She acknowledged the message and heard the voice synthesizer announce a teleconference would begin in 15 minutes. The topic would be one that had made newspaper headlines recently. Evidence found by a field officer at the scene of a homicide in the city had been matched with an automated DNA sample from the statewide sex offender registrant file. The conference would involve departmental executives in an update session on the investigation. The issue would be the accuracy and validity of the evidence search and the followup investigation and arrest of the suspect.

As the division manager prepared for the conference, she reflected on the changes in the department in the last few years. Since her appointment as a civilian services manager, she had seen several significant advances in technology. One was DNA. Early in 1990, she had been asked to participate with the department's strategic planning group. It was then that she first learned about the possible impact of DNA on the future of the agency.

Very little was known about DNA as only a handful of cases had been prosecuted successfully. The Ventura Police Department command staff recognized its potential and planned for its use. In five year increments, the strategic plan called for research, policy considerations, financing options and operational guidelines. In early 1991, the first cases were upheld by state appellate courts and the technology was validated. She remembered that after that year there was a flurry of activity surrounding DNA.

Initially, the courts established legal standards for the use of DNA in criminal cases. Challenges continued for only one or two years against the theory, then ceased. Additionally, POST had taken the lead in in-service training and mandated orientation, technical and administrative workshops in the topic. The public was initially skeptical of the technology, however, over the first few years of the decade violent crimes and drug wars escalated and the public clamor for more law and order brought increased focus on high technology techniques. Before long the criminal justice system and the public accepted the technology and genetic prints were as widely valued as human fingerprints were early in the last century.

As the technology was reduced in price and more widely available, local governments and city police departments used some of their discretionary funds along with grants and loans to establish DNA databanks on their own criminals living in the city.

About 1993, a ground swell of public support for nationwide DNA databanks emerged. The concept of identifying missing or runaway children was the impetus for this action. No significant opposition arose. Since then, convicted sex offenders have had DNA samples collected and state labs forward DNA information to law enforcement authorities. This was the first time that the on-line databank had identified a suspect in a pending investigation.

The services division manager was expected to validate the computer's search and confirm the hit for the investigative unit. She was comfortable in the task and confident of the identification, knowing what had preceded in the intervening years in the development, testing and validation of the software, hardware and technology. She was grateful for the actions of the previous management teams over the years to enable the police department to identify a suspect in the case.

The services division manager scanned the data and activated her terminal for the conference, focusing on the identity of the suspect and was saddened to see that it was a 16 year old boy who was implicated in the killing of a 5 year old earlier in the week. Once the conference began, she heard the investigators tell each of the participants that their preliminary field investigation had been unsuccessful. There were no eye witnesses to the crime. No other leads had surfaced in the case and the family and the community was outraged by the discovery of the victim's body in a local park.

The investigators were anxiously awaiting the outcome of the DNA computer scan for further leads. As she identified the suspect for the investigators, the division commander recognized that the goals established by the department in 1990 had been realized on that morning in 1999.

Hypothetical Scenario:

The Hypothetical scenario describes and integrates the forecasted trends and events as if they had occurred. It graphically explores the worst case future for the reader.

The lead story on the local news radio station the morning of December 30, 1999 was "defense attorney uncovers DNA evidence error -- multiple county homicide convictions in jeopardy." The worst nightmares of police executives and criminal prosecutors are heard in the excerpts of the press conference conducted the previous day by the chief of police and county prosecutor. Jointly, they announced a suspension of prosecutions in cases involving DNA while county and state authorities studied the allegations. Both re-affirmed their support for DNA and expressed an added concern for public safety during the suspension.

Privately, later in a discussion, both the chief and the D.A. acknowledged knowing prior to the first use of DNA that there could be a remote chance of processing errors when using private labs. They had both been assured that that probability was very remote and had elected to proceed with DNA technology.

The revelation that one particular private lab had been responsible for accuracy errors on several cases which had resulted in convictions was devastating. At least two capital cases had been successfully prosecuted on DNA already this year. Private labs had been doing the bulk of the work after the government established national standards to handle the excess load and, apparently, the quality controls had not been sufficient to preclude errors in the testing process.

As a result, the private labs had cut corners and independent testing of the samples for the defense had revealed the errors. These revelations would have a disastrous impact on the pending grants and loans, training and implementation plans that the chiefs and sheriff had spent large sums of money to prepare for the introduction of DNA/ID remote terminals in the patrol units.

Both executives lamented their fate. If only they had demanded careful research, scientific validation, national and regional standards, quality control audits, training and political support for regional and national data bases, they might have avoided the crisis that faced them now. Once the technology was legally accepted, both executives wished they had convinced their peers and superiors to forge ahead with a regional crime lab operation rather than using private sector labs. That decision would have been costly in 1990 dollars, but wise nevertheless. The intervening years could have been used to train field and lab personnel, invest in capital equipment, solidify public and political support and conclude high profile violent criminal investigations successfully.

Luckily, the executives learned that the suspension of the prosecution of the cases would be brief. The executive director of the county crime lab notified them that the initial media coverage of the news on DNA was inaccurate. Apparently, the private lab involved in the cases was negligent in their record keeping.

County crime lab re-testing of the evidence confirmed the accuracy of the identities. The executive director suggested that the private lab be censured, but that the suspension be lifted immediately and that DNA be used again as soon as possible. He initiated the renewed call for quality control audits included in the county-wide strategic planning on the use of DNA and continued development and planning to deploy DNA/ID terminals in police patrol units. He was supported by concurring opinions from state and federal authorities which re-assured the general public.

As a result, within a matter of days, the chief and the D.A. appeared at another press conference and announced the lifting of the suspension on DNA evidence and the immediate steps to be taken to insure future quality control and the decision to proceed to field installation of DNA/ID terminals. The following morning the radio newscast opened with the headline "DNA detective alive and well and back on the track of crooks in the community...".

Policy Considerations

After considering all the possible future scenarios, it is easier to see what trends and events are needed to produce a desirable future. Policy

selections are crucial to bringing about the desired future. Policy selections also help to identify targets for strategic planning to follow.

Policy Alternatives

A policy to integrate DNA technology into the strategic plan. The plan would be reprioritized to permit research and implementation.

1. A policy to develop and implement standards for DNA use by department personnel. This policy would divert existing finances to assign a priority to this effort.
2. A policy to seek grants at the state/federal government level. This effort would be focused on allowing the agency to pioneer DNA use.
3. A policy of inter-agency cooperation on DNA technology. The agency would actively pursue field testing, training and orientation programs offered by the private and public sector to become a leader in the use of DNA.
4. A policy on public information to highlight the development of DNA technology in law enforcement. The purpose would be to better inform elected officials and the community about the advantages of the new technology for law enforcement. The result should be increased funding in future years.

STRATEGIC MANAGEMENT PLAN

Normative Scenario

After reading and digesting the possible scenarios and considering the policy alternatives, it is desirable to select one scenario and a model agency to develop strategic planning (long range) concepts.

The normative scenario (a desirable and possible future) will include a proposed mission statement, situational analysis and Modified Policy Delphi. Strategies to support proposed agency policies are also developed.

The Agency: The Ventura Police Department is a full service municipal law enforcement agency. It is composed of 122 sworn officers and 72 civilian employees. The agency serves a Southern California beach community of approximately 92,000 residents. It is responsible for over 20 square miles of jurisdiction. The City is the location of the county seat. It has a small ethnic representation, predominately Hispanic. The community is supported by agriculture, petroleum industries, light industrial businesses, tourism, and a strong retail business sector. The community has sufficient revenue to support a broad array of governmental services in addition to public safety.

The Ventura Police Department has been selected as the model agency because it has had recent experience with the use of DNA technology and can provide the organizational background necessary for other executives to review to guide the introduction of high technology into their organizations. Unfortunately, this agency also experienced the use of this high technology without prior research, planning or operational considerations. The lessons learned from this experience will, hopefully, assist other executives in their future decisions.

Since the objectives of this strategic planning section are to isolate critical elements of the selected normative future scenario, to increase the likelihood of others to take place, and to prevent the remainder, the organizational environment of the Ventura PD provides an excellent framework.

This strategic plan will define strategies important to the introduction of high technology, such as DNA, that other organizations should consider before using the technology.

Internal and External Environment Assessment

In order to assess organizational conditions, a situational audit is appropriate. The Weaknesses, Opportunities, Threats and Strengths that Underlie Planning (WOTS UP) analysis begins the process of strategic planning. It examines the organization's environment. External pressures, such as threats and opportunities, that may include previously identified trends and events, influence the organization's ability to respond to the issue. Strengths and weaknesses are internal facts of life that represent known resources or limitations that the organization must deal with in reaching its goals and objectives and striving to address new issues. The original Ventura PD/WOTS UP analysis, conducted in 1987 was updated for this research purpose:

Opportunities:

1. Since 1987, the department has functioned under the guidance of a strategic plan.[9] A major component of that plan is technological innovation. DNA technology lends itself directly to this area of department emphasis.

2. The department has established a Command Advisory Board (CAB) consisting of a cross-section of employees to assist the command staff officers in the strategic planning process. In addition, the department has formed employee committees to address issues including recognition, equipment, and physical fitness.

3. The strategic planning process has provided direction and financial support for the department's long range efforts. It is anticipated that future requests for acquiring high technology capabilities will be approved.

4. The department is active in county-wide law enforcement groups such as executive leadership, training, crime prevention, planning and research. These forums provide the opportunity to prepare joint powers/memorandum of understandings agreements for areas of common cooperation such as concurrent jurisdiction, POST basic training facilities and technological advancements.

5. The department has access to discretionary funds acquired through drug asset seizures over the last few years. Coupled with extensive experience in obtaining and administering grants and loans from other governmental agencies, the organization has demonstrated its ability to attract and retain outside funding for innovative law enforcement applications of technology and personnel.

6. Recently, the department acquired the ability to expand its income stream with a program of additional fees for services incurred by extraordinary circumstances. For example, fees for emergency response to driving while intoxicated incidents are collected to off set expenses incurred for providing these "non-essential" services. These innovations demonstrate the organization's capability to confront challenging circumstances successfully. This additional income can be channeled into other budgetary priorities such as DNA.

Threats:

1. A crime rate that reflects the penetration of the drug and gang war conflicts common to Southern California. The perception of crime is greater than the per capita rate for communities of similar size in California.

2. An economic slow down in Southern California can threaten the financial picture for the City of Ventura.

3. Cost of housing may prohibit some new officers from living in their employing community and can also contribute to job mobility and shortened lengths of service.

4. Technological change can alter the basic role and responsiblities of police officers and may cause increased specialization and lower morale.

5. Traffic congestion may impede the delivery of emergency services in the community and lower the "customer/citizen" satisfaction rate.

Strengths:

1. The department is a culturally diverse, well-educated, progressive organization.

2. It operates out of a state of the art law enforcement facility, with extensive automation and up to date equipment.

3. It experiments with and utilizes a vast array of new and innovative equipment. It was a pioneer with the county use of CAL-ID, the automated fingerprint system.

4. It focuses on its personnel resources with an aggressive program of pre and in-service training; supervisory, management and executive leadership development courses; interpersonal training; and employee assistance programs (EAP).

5. It is a leader in countywide law enforcement training to reduce drug demand in youngsters (DARE Programs).

6. It is an innovator in civilianizing positions within law enforcement. It fields a variety of uniformed, civilian employees that perform tasks that were previously done by sworn officers.

Weaknesses:

1. Insufficient research and long range planning. DNA technology is an excellent example of the need for on-going research to prepare the organization for future changes that can substantially enhance its performance.

2. Changes in the nature of the work, e.g. automation, and the pace at which change occurs.

3. Difficulty recruiting/retaining sworn officers because of lack of affordable housing in the community that they serve.

4. Changes in the "work ethic" of the employee groups. Law enforcement is no longer a career just another job.

Strategic Assumption Surfacing Technique

After assessing the organization, it is important to look outside the department in an attempt to determine what impact policy decisions might produce. The Strategic Assumption Surfacing Technique (SAST) helps to identify the outside groups and define the implications for them. SAST uses specific terms to identify the groups.

Stakeholders are individuals, groups or organizations who have a relationship to the issue. They may be affected by what the organization does with DNA technology, or they may be able to affect the issue directly themselves or they may just have an interest or concern.

Snaildarters are unexpected stakeholders, often less than obvious at first glance, or those who appeared to be unconcerned, but who have the potential to dramatically alter or influence policies. A list of stakeholder candidates with some potential snaildarters was generated by this research:

Police managers	Police suprvisors
Field Training Officers	Police association (POA)
City Council	City management
U.S. Congress	State legislature
Media (SD)	City residents (SD)
Minority groups (SD)	POST
American Civil Liberties Union	Criminal defense bar

Many of these stakeholders and snaildarters have been previously discussed and their assumptions considered. Several deserve additional attention here. For example, police managers and supervisors are usually assumed to be supportive of department policies. They want to provide quality services and they care about their subordinates. Nevertheless, they need to be assured that policies will not detract from accomplishing their day to day practical goals. They need to be involved in the decision-making process and convinced of the policies usefulness. This extends to field training officers and to the rank and file of the association as well.

In a like manner, the city council and management team needs to be appraised of policy development to assure support and avoid controversy. Since many of the city residents will receive their information from the media, it is important to include media representatives in the information loop when appropriate as well.

Special attention should be paid to informing minority group representatives of policy development when it is perceived that the procedure or action may adversely impact their group. (Appendix F contains a visual display of this technique).

Mission Statement

An assessment of the WOTS-UP analysis and the SAST process leads to the development of a clarified mission statement for the organization. The macro-mission focuses in on the revised purpose of the department: The delivery of law enforcement services to the City of Ventura. The micro-mission relates to the futures issue being considered for inclusion in the strategic plan: To integrate the latest high technology (DNA) into the delivery of services in Ventura.

Execution

To reach the goal in the micro-mission, a number of policies will be required. Several have been identified in the futures forecasting process, others were developed in the interviews of personnel working with agencies which are using DNA technology. These policy alternatives will lead to the development of a strategy.

Policy Alternatives:

1. The department should update its strategic plan to integrate high technology such as DNA.

2. DNA technology should be further researched to refine procedures and standards for department use.

3. Financing should be researched to minimize negative budgetary impacts on the department.

4. Alternative/innovative funding should be researched to promote the use of DNA.

5. Inter-agency cooperative agreements should be pursued to permit cost-sharing among local law enforcement agencies.

6. An aggressive public information program should be developed to inform community residents, elected officials and department personnel about the new technology.

7. Management and supervisory personnel should become better informed, more participative in strategic planning and involve more people in the decision making process.

8. The department should take a strong stand supporting national standards for the utilization of DNA technology.

9. Appropriate legislation at the state and national level should be supported to encourage local agencies to use DNA technology.

10. POST should be encouraged to examine this emerging technology and to expand training on the subject at all levels.

11. POST should be encouraged to provide training in "futures" studies to all California law enforcement supervisors, managers and executives.

Modified Policy Delphi:

The proposed policies were evaluated in a Modified Policy Delphi. Each was examined and rated for both feasibility and desirability. The combined totals were calculated and provide a measure of relative value for each policy if included in a broad strategy. (The results are graphically displayed in Appendix G.)

Another round of review refined the policies. Similar or overlapping policies were consolidated. The remaining policies were carefully examined for their relationship to the issue of future use of DNA technology. Stakeholder (and snaildarter) implications are also considered at this point.

Policy Assessments:

Policy One: **The Ventura Police Department should integrate high technology innovations into its strategic plan.** The department can begin the

process in its next round of strategic planning update sessions. A program consisting of research on the technology, its application to the agency, financing opportunities, proposed procedures and standards for use could begin immediately.

An internal information program for department employees could be used to develop an external public information program as well. The department should be prepared to share its vision for the use of this technology with the community and elected and appointed officials to promote future funding for the program change.

Policy Two: **Ventura Police Department executives and managers should be involved in promoting inter-agency agreements on the use of DNA.** Following the pattern set by other California agencies, the department can become an aggressive user and promoter of the technology. Innovative agreements for operational cost sharing and research and development efforts can be good for all county agencies. The county laboratory director is enthusiastic about the prospect of using the technology, but lacks the political support and start up funding to begin the work.

Pooling of resources (asset seizure funds, general operating revenues, line item accounts), a memorandum of agreement and the support of the community are several of the proposed steps that can be considered to begin the process countywide.

Policy Three: **The Ventura Police Department should take a high profile supportive political position on the use of high technology such as DNA.** It can use its experience in the Axell case to promote state and national legislation. On the state level, it can vigorously promote and pursue legislation that will re-direct existing resources (fines and forfeitures) into a state-wide program supporting DNA technology patterned after the CAL/ID automated fingerprinting system.

On the national level, it can influence its local congressional representatives to pursue options outlined in the study authored by the Office of Technology Assessment, "Genetic Witness: Forensic Uses of DNA Tests".[10]

Policy Four: **The Ventura Police Department should support POST's efforts to prepare law enforcement officials to understand and manage future issues.** The department should actively encourage POST to provide training at all levels on high technology such as DNA. Further, POST should be encouraged to make available orientation courses on futures studies to law enforcement supervisors, managers and executives. Lastly, POST should be encouraged to develop a network of command college alumni and private consultants who can assist local agencies with strategic planning. This knowledge transfer should encourage departmental supervisors and managers to actively support and promote strategic planning efforts and objectives. It should also encourage them to actively participate in department future planning efforts and become a part of the decision making process.

Recommended Strategy:

The Ventura Police Department should integrate a broad, comprehensive

Stakeholder concerns should be addressed in the preliminary stages.

Resources Required:

1. Broad organizational support will be essential to implementing the strategy.

2. Financial support will be required. City appointed and elected officials support will be crucial.

3. Long-term commitment of executives, managers and supervisors to remain on the cutting edge of technology will be vital.

4. Internal resources may be sufficient to introduce the change, but outside consultants could be employed to assist, especially with in-service training on techniques such as evidence collection and crime scene preservation.

TRANSITION MANAGEMENT PLAN

Following the formation of a strategic plan, a series of steps to begin the transition is required. The transition plan will involve identifying the key stakeholders and assessing their level of readiness and capability for change. The stakeholders commitment to the strategic plan will be assessed and ideas for influencing their commitment will be explored. Lastly, a suggested management structure will be proposed to motivate the change, guide the transition phase, chart progress and evaluate program results. Supporting technologies to assist the implementation phase will also be reviewed.

approach to the use of high technology throughout the agency. This approach would enhance the current mission statement by introducing and promoting the use of the latest scientific advances available to assist the agency in delivering quality law enforcement services to the community.

STRATEGY IMPLEMENTATION

Action Steps:

1. Identify what technology is needed: Define the technology. Narrow the scope of initial efforts to DNA processing.
2. Define a process to integrate the technology into the strategic plan. Consider using a small committee to approach the change process.
3. Prepare a program change proposal for the next strategic planning session.
4. Revise the mission statement to integrate the use of high technology into the action components.
5. Prepare alternative funding strategies.
6. Prepare information/training sessions for all employees.
7. Contact state and national law enforcement organizations to encourage support for high technology legislation.
8. Contact POST to support high technology training and futures studies.

Time Line:

Many of these steps can begin immediately and continue concurrently. Some will be delayed while the program change proposal is being considered for inclusion in the revised strategic plan. Others will take a considerable amount of time.

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COMMITMENT PLAN

The Critical Mass

The critical mass is the minimum number of persons or groups whose active support is needed to insure that a change occurs. If opposition develops within the critical mass, change will be blocked. It is vital then to identify the minimum number of actors within the critical mass and gain their commitment. The transition plan must focus on actions and techniques to influence these commitment levels.

Many stakeholders have been identified as being significant to the issue of DNA technology use in California law enforcement. Individuals and groups that often overlapped were exerting and reacting to influences from their own groups and others. Obviously, it is important to identify which stakeholders most influence others and which can deliver the cooperation of others within their spheres of influence. Table #5 illustrates the probable relationships and individual actors -- these are the critical mass:

TABLE #5

ACTORS IN CRITICAL MASS

POLICE MANAGEMENT	POST
Police Managers/Supervisors	Trainers
Field Training Officers	Consultants
CITY MANAGER	CITY RESIDENTS
City Council	Minority Groups
POA	

Readiness/Capability:

Since individuals do not necessarily share the same level of readiness for change nor the same capability to participate in the process, the transition plan attempts to assess both readiness and capability to devise a specific action plan for each stakeholder. Table #6 illustrates assumptions made for each critical actor:

TABLE #6

ASSUMPTIONS FOR CITICIAL MASS

	READINESS			CAPABILITY		
	HI	MED	LO	HI	MED	LO
Police Management		X		X		
City Manager		X			X	
POA			X	X		
POST		X		X		
City Residents		X		X		

Commitment:

In order to determine each actor's level of commitment, the individual's level of support for the change effort and the strategic plan must be assessed. After assessing the level of commitment, it is important to identify any shift in that level that might be necessary to assure the plan's success. Then, strategies for influencing those actors whose level of commitment should be changed are prepared. Table #7 illustrates the probable level of commitment for actors in the critical mass:

TABLE #7

PROBABLE LEVEL OF COMMITMENT

FOR ACTORS IN THE CRITICAL MASS

	TYPE OF COMMITMENT			
	Block Change	Let Change Happen	Help Change Happen	Make Change Happen
Police Management		O		X
City Manager		O		X
POA	O			X
POST		O		X
City Residents		O		X

O = Present X = Change

Influencing the Critical Mass:

Police Management: The police management team (chief through lieutenant/civilian managers) exerts considerable influence over other stakeholders in the department. Supervisors, field training officers and trainees are excellent examples. Strong support from management is critical to the attitude of other stakeholders. The management group shows a moderate level of readiness but a high capability for change. They need to be moved from "let it happen" to the "make it happen" level because of their clear influence over other groups. They should be convinced by a comprehensive presentation on the value of the technology to the organization and to themselves.

City Manager:

If this change is to occur, the city manager must endorse it and actively solicit the support of the city council for funding of the program change. The city manager shows moderate readiness and capability for change. He'll need strategic planning information and financial options researched before he can be convinced to approach the council with the program change. He should be moved from a "let it happen" position to a "help it happen" level. Knowing the city manager's "customer" service philosophy and his desire to deliver the best possible services to city residents is helpful in formulating a technique to influence him. It would be important to communicate potential improvements in law enforcement services and to encourage him to be involved in the revisions to the existing strategic plan.

POA:

The sworn peace officer's bargaining unit is an important actor in the critical mass and influences other groups as well. It currently shows low readiness for change, but high capability. Traditionally, this group has been resistant to changes in policies, procedures and technology. It often views change as threatening and fails to see any benefit to their organization. They are depicted in a "block change" position and should be moved to a "help change happen" position. This is a sizeable shift in position. Techniques should involve early and extensive executive board involvement in the revision to the strategic plan.

Employee information sessions should include a separate presentation for the POA. They should be helped to understand how DNA technology can assist members in performing their duties. Lastly, POA members should be assisted to understand how technology can be used to work for their own benefit as well as others.

POST:

POST influences many stakeholders in law enforcement. POST's support, particularly the executive director, for the program change to use DNA technology can result in access to valuable resources, including outside experts/consultants. In addition, POST's endorsement of a department initiative such as the use of high technology carries considerable weight in political circles. POST also sets minimum standards for basic training centers and controls the presentations on futures studies as well. POST shows moderate readiness and high capability and is seen in a "let it happen" position. This level of commitment is appropriate for POST, but a move to "help it happen" could insure a successful change effort.

City Residents:

This group is composed of neighborhood councils and also includes a small minority segment. Although it has different viewpoints, each component desires the best possible law enforcement services for their neighborhood. With moderate readiness and high capability for change, residents are in a "let it happen" position. Since their support is critical to the change effort, they should be moved to the "help it happen" position. The department must demonstrate to these groups that the application of high technology is both cost effective as well as in concert with high service level expectations. The

active and vocal support of city residents will influence the city manager and council to fund the program change.

MANAGEMENT STRUCTURE

Moving from the present to the future state takes planning and a unique structure specifically designed for the tasks. It is transitory in nature and zeros in on the change process. Its focus keeps it from being diverted by other concerns.

The nature of this change requires the special talents of a project manager. Implementing previously agreed upon policies and strategy, the project manager functions with the delegated authority and is appointed to the task by the chief executive. The project manager becomes the "champion" of the change, but works with a cross section or task force of other employees to receive feedback on the issues, policies and plans.

He is given the authority to acquire and use resources to keep the project on track. The project manager must command the respect of the department's leadership and have excellent interpersonal skills. His working advisory group or task force is comprised of both sworn and civilian employees and could be expanded to outside agency representatives as the strategy dictates.

Supporting Technologies

Several specific methods/tools can be combined with the general approaches to transition discussed earlier. These techniques are suggested to support implementation and reduce anxiety and confusion during the transition period.

1. Responsibility Charting (RASI): A simple process for identifying roles in a transition uses a RASI chart. (Table #8 illustrates a sample chart.) Asked to anonymously complete the chart, the member's aggregate totals are then calculated to identify the group's consensus of individual roles in the change process. It describes the project plans and job descriptions and can be expanded to include additional members or tasks as the project proceeds. It clearly establishes responsibility, approval or veto privileges, support or resources, and need to be consulted or informed.

TABLE #8

RESPONSIBILITY (RASI) TABLE

ACTORS

DECISION/ TASK	PROJECT MANAGER	POLICE MANAGEMENT	CITY MANAGER	CITY COUNCIL	POA	POST	TASK FORCE	RESIDENTS GROUPS
DEFINE TECHNOLOGY	R				I		S	
PREPARE PROGRAM CHANGE	R	S	I	I	S	I	S	I
INTEGRATE INTO STRATEGIC PLAN	R	S	S	S	S		S	I
REVISE MISSION STATEMENT	R	S	S	S	S		S	I
ID ALT. FUNDING SOURCES	R	I	I	I	I	I	I	I
IN-SERVICE TRAINING	I	A	I	I	I	S	S	I
POLITICAL SUPPORT	S	I	S	A	I	I	S	S
EXPAND POST TRAINING	I	I	I	I	I	S	I	I

R = RESPONSIBILIY (NOT NECESSARILY AUTHORTY)

A = APPROVAL (RIGHT TO VETO)

S = SUPPORT (PUT RESOURCES TOWARD)

I = INFORM (TO BE CONSULTED)

2. In-service Training: Formal training, to include sufficient background material, to allow the project manager and his working group to increase their knowledge and expertise as well as to be a resource for others during the transition period.

3. Normative Scenario: A review of the desired future state for the organization can motivate the working group and other stakeholders to participate in the change effort.

4. People Involvement: The project manager using the working group can encourage other individual involvement in the process of revising the strategic plan, studying the technology and preparing for the program change.

5. Sharing a Vision of the Future: Openly communicating the vision of where the organization can change allows others the opportunity to explore the ideas also. The more that others understand the vision, the more likely they will contribute to it rather than resist it.

6. Letting go of the past: Managing change requires knowledge of the "letting go" process. Most people don't like moving from their comfort zone. Moving into a change requires passing through a neutral zone, the area between the old and the new. This is the beginning of the transition. Project managers must be alert for those that don't let go. They may reject involvement and begin to block the change unless they receive assistance in passing from the old to the new.

7. Celebrating Victories: Special occasions/events at significant points during the transition period will help people with the "letting go" process. They can see progress and generate enthusiasm for new accomplishments and focus on the future state better. Symbols, logos, mottos and celebration parties can become important events in the change process.

8. High Visibility and Frequent Communications: The project manager's role is to champion the cause and insure progress on the change. He frequently must communicate with organizational groups and maintain a high profile on the topic. He is the spokesperson for the organization and must insure that a positive outlook is maintained throughout the process.

9. Deferring other Changes: Once decided and included in the strategic plan, the program change should be the focus of the organization's energy. Less important distracting changes and/or proposed programs should be postponed to avoid detracting from the major change underway in the strategic plan.

10. Progress Checkpoints: Measuring progress should be done frequently. Little successes should be celebrated and communicated throughout the organization. Progress toward the goal should be widely publicized for all stakeholders to share in the success.

CONCLUSIONS, RECOMMENDATIONS, AND FUTURE IMPLICATIONS

Conclusions

The purpose of this study was to explore the role of DNA technology in the investigation and prosecution of criminal laws in California in the future. Using experts from medical, scientific and legal and law enforcement professions, probable trends and events centering around the issue of **WILL THERE BE A FUTURE USE OF DNA TECHNOLOGY IN CALIFORNIA LAW ENFORCEMENT** were examined. The consensus of that group was that there definitely was a use for DNA in California in the future. The panel concluded that DNA would need significant financial and political support from police executives to be widely accepted. Several events and trends were isolated that will impact agencies that elect to use DNA in the future. Focusing on those events and trends resulted in the selection of priority policy suggestions to be considered by police executives who wish to use DNA in their organizations.

The importance of integrating DNA technology into long range (strategic) planning/operations and assertive public information programs on the value of DNA in crime suppression, investigation and prosecution was clearly demonstrated.

The introduction of these policy considerations address the sub-issues of financing, standardization and legal acceptance of the technology. It is clear that financing is and will continue to be a significant stumbling block to the use of DNA in California. It is also clear that a few innovative agencies in

the United States have succeeded in overcoming the financial obstacles. They have used a combination of public and private funds to begin using the technology. Others will have to follow the pattern set by these pioneering agencies until state and federal programs mature sufficiently to provide services throughout the U.S.

National efforts to identify/specify standards for laboratories to adhere to in processing DNA have recently been summarized by the Office of Technology Assessment for the U.S. Congress. It can reasonably be expected that further congressional action will follow this year. In the meantime, informal groups and private industry standards continue to regulate the processing of DNA. Efforts by states, such as the California Department of Justice Bureau of Forensic Sciences, to establish regional laboratories to process DNA for local law enforcement agencies should be encouraged.[11] At this point, there is no national standard for the use of DNA. A combination of public and private sector representatives from local, state and national jurisdictions continue to research this issue as this study is concluding.

The final sub-issue of legal standards for DNA is a rapidly developing area also. Up to this point, DNA evidence has been accepted or rejected on a case by case, locale by locale basis. The panel's legal experts forecasted appellate court acceptance in California in the near future. They foresaw wide ranging acceptance for the evidence after that legal precedent is published in California. Then, they forecast that DNA will cease to be challenged for validity. If that is the case, this sub issue will diminish in importance.

In order for police departments to be prepared to use DNA in the future, agencies will need to become familiar with the varieties of emerging technology If DNA is used, preliminary successes will need to be widely publicized in the media for the public to support additional financing for local, state and federal initiatives to expand the use of DNA technology.

Police executives will need to work cooperatively to seek additional research, planning, financial and implementation assistance. However, individual agencies can actively support these efforts by integrating this emerging technology into their long-range local plans, selectively use the process and demonstrate for others the applicability of DNA technology on the reduction of crime now and in the future.

Recommendations

Due to limitations on the length of this study, no attempt was made to examine additional sub-issues in depth. Future researchers could examine the legislative, political and operational issues surrounding the use of DNA technology.

For example, as this study was concluding in the fall of 1990, legislation had been authored and passed by the California Legislature to permit pilot county funding for existing DNA programs.[12] This piece of legislation was vetoed by Governor George Deukmejian. Research into this proposal and other existing state funded programs could provide information to assist police executives in future decisions on financing options.

The political arena could be researched to explore in-depth alternative start up strategies that have been successful in the U.S. Innovative approaches such as public/private partnerships; foundation/grant support; fee based services; and funding initiatives from special interest groups should be documented and learning points publicized.

Operational considerations deserve additional exploration as well. Specifically, what impact will the focus on the importance of trace evidence (such as DNA) have on field operations? For example, will agencies have to sacrifice response times for more extensive crime scene investigations? Or, can civilian evidence technicians, substituting for sworn investigators, handle the tasks necessary to secure DNA evidence in the future?

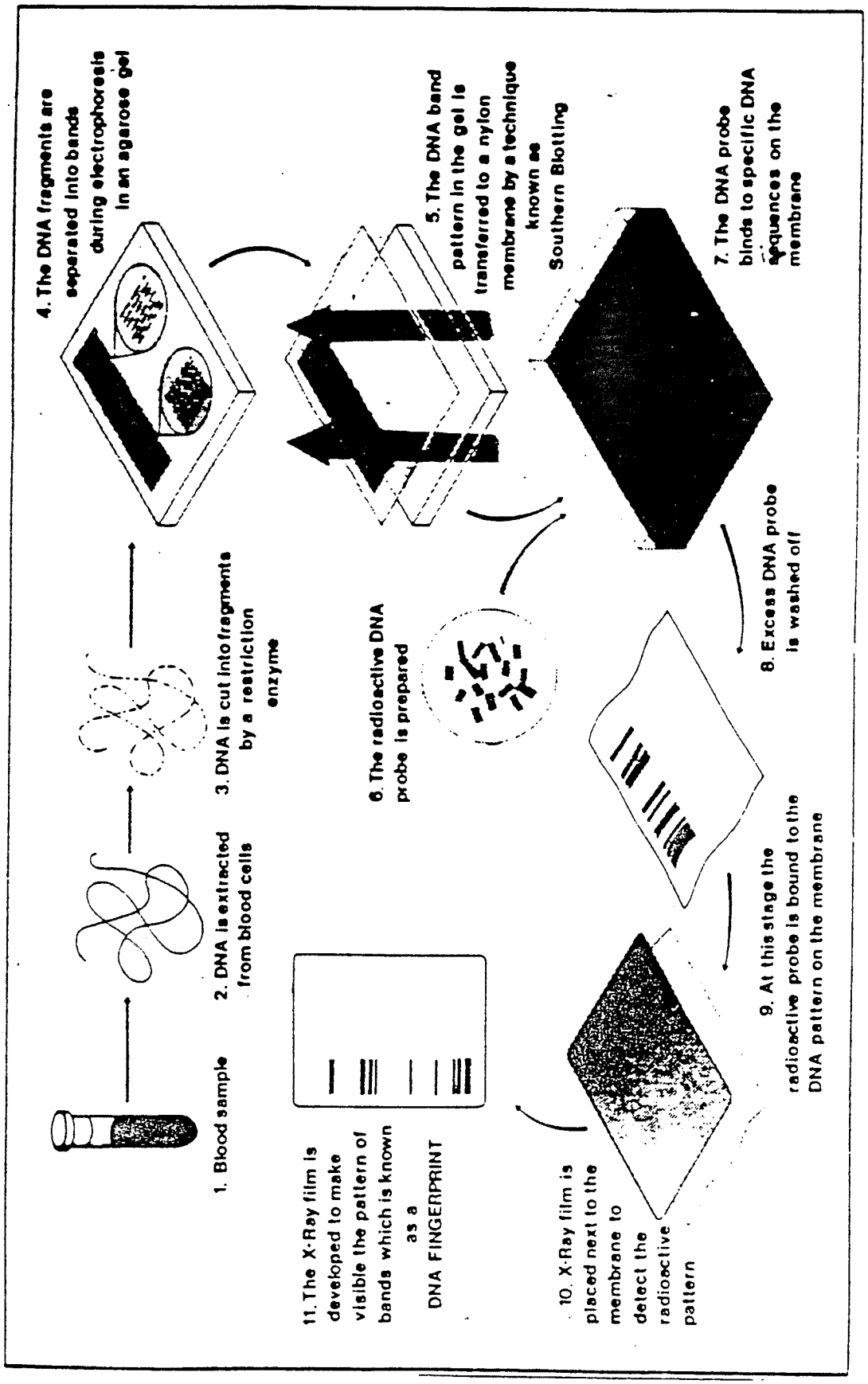
Finally, the organization and introduction of automated DNA data bases will have profound impact upon the future. Although this NGT panel prioritized other trends and events higher, the automated data base issue surfaced several times in their discussions. They believe that data bases will be a natural out growth of the emerging technology in much the same manner that fingerprint classification records evolved from local to national data bases in this century. It would be helpful for other researchers to review that evolutionary process and provide guidance to law enforcement to expedite the development in the years ahead.

Future Implications

DNA technology is truly leading edge future law enforcement. The capability to identify and eliminate possible suspects in major criminal

investigations is challenging law enforcement to integrate the capability into its organizations as quickly as possible. The prospect of additional advancement through research and development, improved operational capabilities, and courtroom successes with this development is exciting. The emergence of new advances in forensic investigations is becoming commonplace. The problem is that law enforcement finds it difficult to keep abreast of the technology curve. The future holds much promise for DNA use from the crime scene, to the laboratory, to the courtroom and beyond. It is up to those of us in California law enforcement to manage that emerging future for the benefit of our citizens and communities. It will take a firm resolve to seek out and utilize the best of the emerging high technologies in the future. With diminishing resources, executives will be challenged to research, promote and employ only the most cost-effective technologies. DNA appears to be one of the most desirable scientific advancements to become available to law enforcement since the introduction of human fingerprinting. Like fingerprints, DNA technology will need widespread support to become generally accepted. California law enforcement can provide the basis for that support by continued research and careful operational application.

APPENDIX A

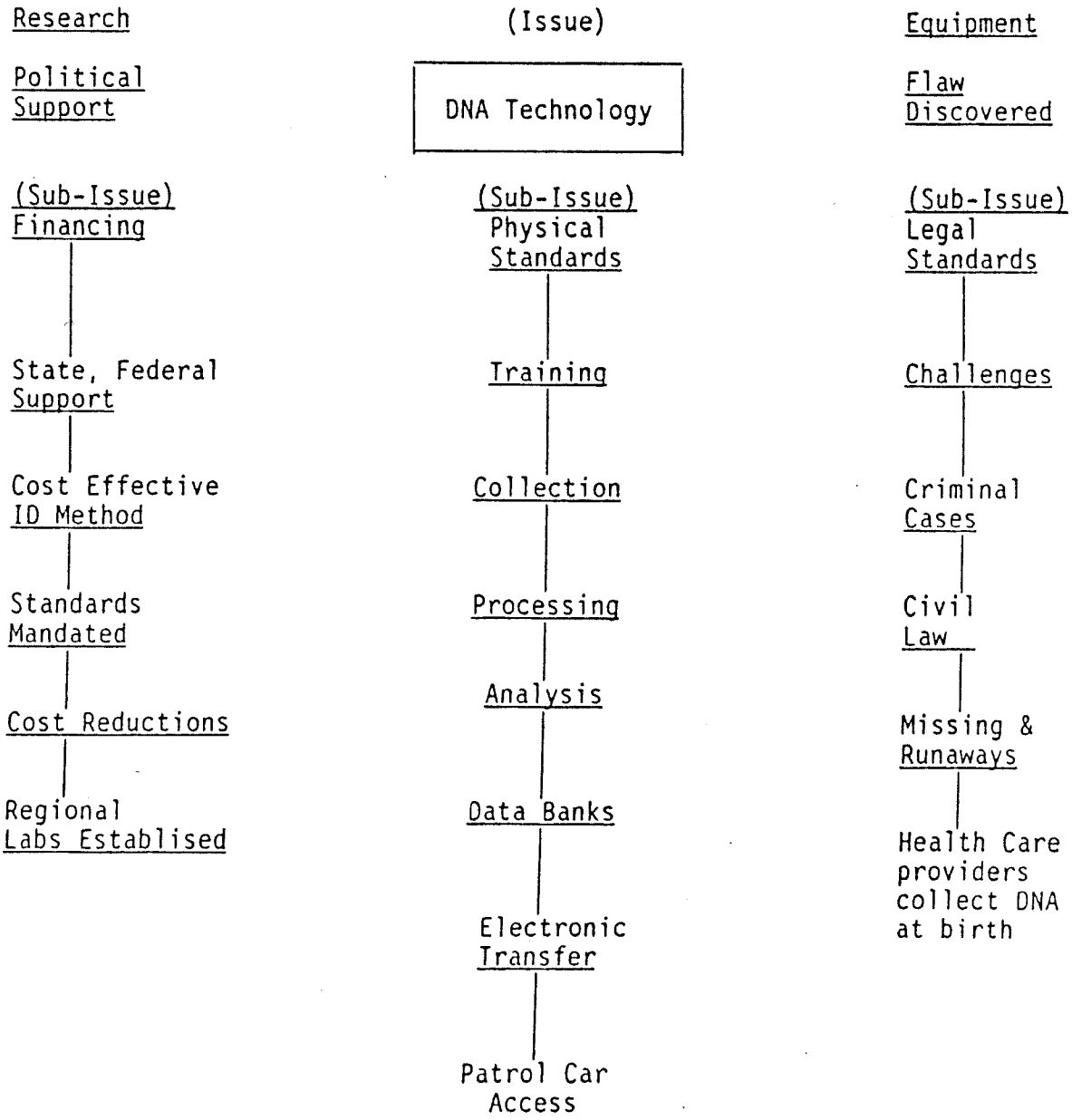

1. Blood sample
2. DNA is extracted from blood cells
3. DNA is cut into fragments by a restriction enzyme
4. The DNA fragments are separated into bands during electrophoresis in an agarose gel
5. The DNA band pattern in the gel is transferred to a nylon membrane by a technique known as Southern Blotting
6. The radioactive DNA probe is prepared
7. The DNA probe binds to specific DNA sequences on the membrane
8. Excess DNA probe is washed off
9. At this stage the radioactive probe is bound to the DNA pattern on the membrane
10. X-Ray film is placed next to the membrane to detect the radioactive pattern
11. The X-Ray film is developed to make visible the pattern of bands which is known as a DNA FINGERPRINT

MODIFIED

APPENDIX B (Futures Wheel)

1990

Public Awareness



2000

APPENDIX C

DNA QUESTIONNAIRE RESPONSES

The following are brief summaries of the opinions of the experts interviewed for this study:

1. **WHAT ROLE WILL LOCAL POLICE ASSUME IN AN EFFORT TO UTILIZE DNA TECHNOLOGY IN THE FUTURE?**

   Participation and coordination with advisory committees; support for legislation, funding and coordination of local efforts; financial assistance to county wide efforts; facility access for inter agency operations; selective consumers of DNA services; protectors, collectors and preservers of physical evidence.

2. **HOW WILL AGENCIES FINANCE THE USE OF DNA?**

   Selective use of technology through existing budger funds; service provider can absorb; service fees; fines and forfeitures; private foundations (grants); consumer acquiring free services from FBI, CA/DOJ, or local lab.

3. **WHO WILL SET THE PHYSICAL STANDARDS FOR THE USE OF DNA?**

   Uncertainty; American Society of Crime Lab Directors (ASCLD); The Working Group on DNA Typing Methods (TWGDAM); California Association of Criminalists(CAC); American Academy of Forensic Sciences; Federal Bureau of Investigation; National Institute of Standards and Technology (NIST); National Crime Information Center (NCIC); Royal Canadian Mounted Police (RCMP) (has an excellent program).

4. **WHAT LEGAL STANDARDS WILL BE NECESSARY TO USE DNA?**

   Case law; Kelly-Frye rule: TWGDAM standards; relevancy test.

5. **WHAT TRENDS AND EVENTS DO YOU SEE IMPACTING THE USE OF DNA?**

   Increased acceptance by courts; increased demand by courts and juries; increased ease of testing; increased power of discrimination/ individualization; increased sensitivity; possibility of developing racial and physical profiles of sources; rapid changes in technology; DNA sequences; decrease in private lab processing; fees for service; review of previous cases resulting in release of wrongly convicted suspects; costs coming down, speed of turnaround increasing.

6. **WHAT IS THE STATE OF THE TECHNOLOGY TODAY?**

   RFLP DNA typing most widely used; PCR DNA typing is developing; limited and widely scattered use in U.S.; extensive research underway in the public and private sectors.

7. **WHAT OTHER ISSUES DO YOU SEE THAT ARE IMPORTANT TO THE STUDY?**

   Training for police personnel in the recognition, protection, recording, recovery and preservation of physiological evidence; DNA typing will have

greatest impact on violent sex crimes; training to increase sensitivity in these investigations to encourage reporting and cooperation in investigation and prosecution; planning for future expansion; legislative initiatives to fund DNA typing at local level; more competition in the private sector; conservative criminal justice system slow to change; cost-benefits will be proven; collaboration to bring about positive changes in the process; tax increase; reduced staffing and personnel shortages as process becomes automated; salary savings used to fund DNA typing; dependable, long term financing for salaries and equipment.

APPENDIX D

TRENDS

1. Level of cost avoidance in law enforcement.
2. **Level of funding for research and development.**
3. **Number of competitive/alternative technologies.**
4. Level of awareness of DNA.
5. **Level of public demand for law and order.**
6. Level of fragmentation of development effort.
7. Level of competition between service providers for personnel.
8. **Demand for DNA financing by defense.**
9. Level of standards for DNA.
10. Demand for DNA as proof or confirmation.
11. Demand for sample sizes.
12. Level of acceptance by general public and others.
13. Level of "old" case resolution.
14. Number of violent parolees in the community.
15. Level of defense experts in the industry.
16. Availability of storage space for samples.
17. Level of scientific training required of law enforcement personnel.
18. Level of reluctance (to testify) by "legitimate" expert witnesses.
19. Level of local expertise development.
20. Level of use of "hazardous/radioactive" equipment.
21. Continued refinement in the process and use of DNA.
22. **Level of standardized approach to DNA use.**
23. Level of violent crime.
24. Level of case litigation.
25. Demand for DNA ID.

26. Level of confidence in DNA data banks.

27. Number of "backlogged" cases for DNA.

28. Level of DNA knowledge by criminal justice professionals.

29. Level of data base profiles.

30. Number of types of DNA applications.

APPENDIX E

EVENTS

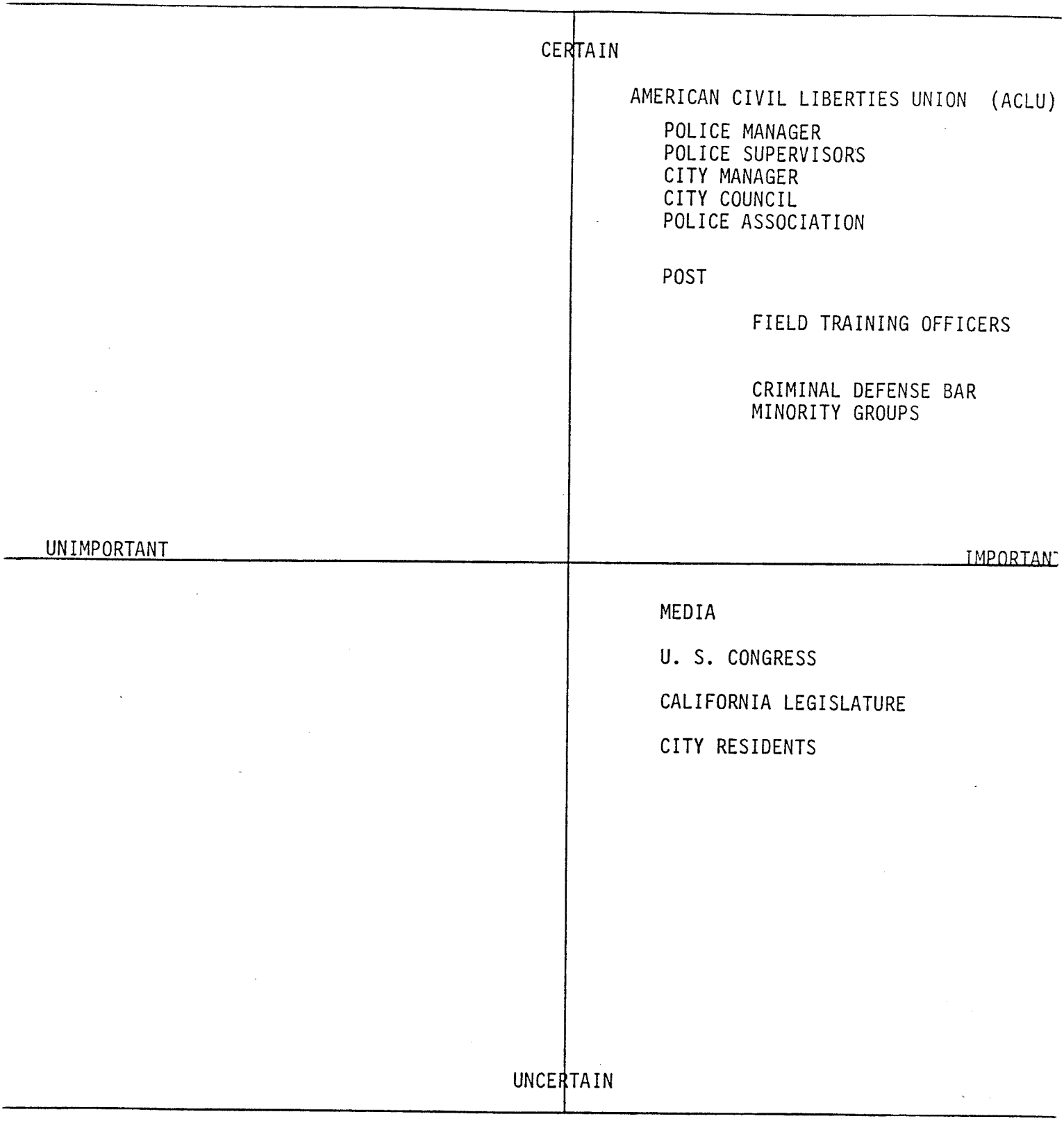
1. **Criminal defenses abandoned.**
2. **National standards adopted.**
3. **(Main) DNA technology problems resolved.**
4. U.S. military depots DNA bank for all service personnel.
5. DNA evidence used to clear major political figure of crime.
6. FBI refuses to accept any California DNA cases.
7. U.S. Supreme Court rules no DNA in jury trials.
8. Racial groups call DNA testing biased.
9. Private labs question government lab DNA test validity.
10. **Axell case upheld by California Supreme Court.**
11. Alternative profiling technology adopted.
12. PCR technology upheld by California court.
13. Due process abandoned due to DNA technology.
14. DNA used successfully after air disaster.
15. Use of standard procedures allow binding arbitration in DNA results.
16. AIDS epidemic among lab personnel stops DNA testing.
17. Right to privacy prevents DNA collection at birth.
18. California Department of Justice starts DNA testing for local law enforcement.
19. Public/government labs increase pay for increased expertise.
20. Universal data base on file.
21. Funding provided for local labs through state.
22. DNA technology used to determine citizenship.
23. **DNA samples required for all sexual offender registrants.**
24. DNA abandoned as simple, inexpensive, discriminating technology developed.
25. Lab error in DNA test results in wrongful death execution.

26. Sample size of DNA caused changed course of action by lab technicians.

27. Sufficient lab facilities available.

APPENDIX F

STRATEGIC ASSUMPTION SURFACING TECHNIQUE (SAST) MAP:



CRITERIA APPLIED TO PLOTTING:

1. Importance to issue and organization
2. Level of certainity of assigned assumptions

APPENDIX G

MODIFIED POLICY DELPHI

POLICY	RANK	FEASIBILITY	DESIRABILITY	TOTAL
1. STRATEGIC PLAN INTEGRATION	1	3	3	6
2. REFINE PROCEDURES/STANDARDS	7	1.25	3	4.25
3. RESEARCH FINANCING	3	2.50	3	5.50
4. INNOVATIVE FUNDING	6	2	2.50	4.50
5. INTER-AGENCY AGREEMENTS	4	2.25	3	5.25
6. PUBLIC INFORMATION	5	1.75	3	4.75
7. PARTICIPATIVE MANAGEMENT	9	1.50	2	3.50
8. SUPPORT NATIONAL STANDARDS	8	1	3	4
9. SUPPORT LEGISLATION	10	1.25	2	3.25
10. POST TRAINING ON DNA	2	2.75	3	5.75
11. POST FUTURES TRAINING	11	1	2	3

NOTES: SCALE - DEFINITY INFEASIBLE = Ø TO DEFINITEY FEASIBLE = 3

VERY UNDESIRABLE = Ø TO VERY DESIRABLE = 3

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