HOW WILL ADVANCEMENTS IN DNA TECHNOLOGY IMPACT SEX CRIME INVESTIGATIONS IN LARGE URBAN AGENCIES BY 2007?

A Project presented to
California Commission on
Peace Officer Standards and Training

by

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Sacramento, California

June, 2002

32-0651

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

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

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

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CHAPTER ONE

ISSUE IDENTIFICATION

Introduction

Forget about circumstantial evidence. Forget about eye witness identification. Everyone knows witnesses make mistakes. Forget about looking for the smoking gun. Instead, genetic evidence will enable law enforcement officers to place a suspect at the scene of a crime with one in a million accuracy.

Sexual assaults represent 5.5 percent of all violent crimes reported in the United States during 1994. One in every four women will be raped during her lifetime. A sexual assault occurs once every 6.4 minutes. The National Crime Victimization Survey estimates that there were approximately 433,000 rapes and sexual assaults in 1995 in the United States. Each year more than 60,000 rapes are committed against women older than fifty years of age.[1] In these violent crimes, blood, hair, semen or other tissues are often left at the scene from either the victim or the suspect. Forensic scientists can now examine this biological evidence and determine with almost certainty whether it came from a given individual.[2] New procedures in DNA analysis require only small samples and yield quick results.

Currently, there are DNA data banks on line to assist criminal investigators in suspect identification. One such data bank is the Combined DNA Index System (CODIS). It contains DNA profiles obtained from subjects convicted of sexual assault and homicide.[3] Detectives can search this data bank against evidence obtained in their cases to identify a suspect.

The challenge for law enforcement administrators will be determining the best strategies to utilize this continuously advancing technology to investigate sexual assault crimes.

Therefore, the issue statement for this project is: How will advancements in DNA technology impact sex crime investigations in a large urban department by the year 2007?

For this project, sex crimes are identified as those crimes defined in the California Penal Code 290, which includes rape, sodomy, lewd acts with a child, oral copulation, and penetration with a foreign object.

This project explores the issue of the DNA technology as it relates to law enforcement and provides information that can be used to develop a strategic plan, or policy for a large urban police department. The project's title is nonspecific to a particular law enforcement agency. However, the Fresno Police Department will be used as the example of a large urban police department. The information developed in this project is relevant for consideration by similarly sized law enforcement agencies.

The first chapter, Issue Identification, provides information regarding the current state of DNA analysis, DNA data banks that are available and their relevance to the investigation of sexual assault crimes. Chapter II, Futures Study, provides information on a probable future by forecasting trends and events that could occur, impacting the issue. In Chapter III, Strategic Plan, provides a discussion on the developments of a strategic plan to move the issue of using DNA technology forward from the present to a future desired state in the organization. Chapter IV, Transition Management, discusses the method for initiating change within the organization. Chapter V, Conclusion, provides a summary, recommendations for the future, and implications for leadership.

Historical Perspective

DNA fingerprinting, as it is commonly called, received wide recognition during the much

publicized criminal and civil trials of O.J. Simpson. This matter held the nation's attention from 1995 until 1997. In both of these cases, the DNA evidence established that Simpson, who was accused in the double murders of Nicole Brown Simpson and Ronald Goldman, was present at the scene at the time of the murders.[4] In Simpson's criminal trial, the defense attorneys chose not to attack the credibility to the DNA evidence, instead focusing on the possibility of evidence mishandling, laboratory contamination, or the planting of evidence by crooked police detectives.[5] Even though the DNA evidence failed to convict Simpson at his criminal trial, it was powerful in the civil trial one year later. In the civil trial, Simpson was found liable for the deaths of both Ron Goldman and Nicole Brown Simpson.[6] Again, Simpson's defense lawyers refused to debate the credibility of the DNA evidence.

After years of debate, lawyers and scientists now ultimately agree that DNA testing has the power to positively match blood, semen, hair, and other biological evidence recovered at crime scenes to a given individual.[7]

DNA Profiling

A person's genetic code is contained in their DNA. DNA profiling is the process of using human DNA for identification purposes. DNA is a nucleic acid found in the center of a cell. It is the primary component of chromosomes, the structures that transmit hereditary information generationally. Each DNA molecule is a long double stranded chain made of components called nucleotide. This genetic material is unique to an individual, except in the case of identical twins, and it provides a source of identification that is unparalleled reliability. DNA samples can be taken from blood, hair, semen, saliva, or even small flakes of skin. In sex crime investigations, semen or pubic hairs left behind by the suspect and collected from the victim or the crime scene

can easily provide DNA evidence needed to identify a suspect. After laboratory processing, the DNA profiles appear like bar codes on an X-ray image. Expert analysis can either exonerate a suspect or provide irrefutable evidence of guilt.[8]

Law enforcement's use of DNA technology in criminal investigations began in 1986 in the English midlands. Police asked for help from Dr. Alec Jeffereys of Leicester University in England. Jeffereys, who coined the term DNA fingerprints, was asked to verify a suspect's confession for responsibility in the serial rape and murder of two young girls. The DNA tests proved that the suspect could not have committed the murders. Because the crimes were so heinous and the public outrage was so great, the police were able to voluntarily obtain blood samples from more than 5,500 men in the region. However, none of the samples matched those recovered from the victims and the crime scenes. At the same time the police were considering expanding their DNA dragnet to include men living in more distant regions, a new clue was uncovered. A conversation was overheard in a local pub, where one man revealed that he had donated two samples of blood, one in his own name and one in the name of a co-worker. Police questioned the man, who readily identified his co-worker. The co-worker was arrested. His DNA was analyzed and found to match the suspect's DNA. The co-worker confessed and was convicted of the crimes.[9]

In a 1987 British investigation, thirty two year old Robert Melias became the first person convicted for the crime of rape based on DNA evidence. Melias was convicted of raping a forty three year old disabled woman. DNA analysis of semen left on the victim's clothing positively identified him as the suspect.[10]

The first use of DNA in a criminal case in the United States was that of Tommy Lee

Andrews. Andrews was convicted of rape in the Circuit Court of Orange County Florida after tests revealed that his DNA obtained from a blood sample matched that of semen traces recovered from a rape victim. The 1989 multiple rape and murder trials of Timothy Wilson Spencer in Virginia, were the first cases in which DNA evidence led to guilty verdicts resulting in the death penalty. The guilty verdicts were largely based on DNA evidence matching his DNA to that of semen found in several victims. These convictions were upheld by the Virginia Supreme Court.[11]

In 1993, the U.S. Supreme Court, in the case of Daubert V. Merrell Dow Pharmaceuticals, Inc., revised the criteria for the admissibility of scientific evidence by rejecting the earlier admissibility standard set by the case of Frye V. United States. In Frye, the admitting of scientific evidence required that the evidence had a general acceptance by the relevant scientific community. In deciding the Daubert case, the Court said that the baseline rule for admissibility of scientific evidence was established by Rule 402 of the Federal Rules of Evidence. Rule 402 says, in part, "all relevant evidence is admissible, except as otherwise provided by the constitution of the United States, by Act of Congress, by these rules, or by the rules prescribed by the Supreme Court pursuant to statutory authority." The real test for admissibility of scientific evidence, said the Court, is for the trial judge to decide if the expert is testifying to scientific knowledge that will assist the trier of fact to understand a fact at issue. The judge must decide the whether the expert's testimony rests on reliable foundation and is relevant to the issue.[12] The standard of admissibility of scientific evidence set by the Court's ruling in this case effectively cleared the way for the use of DNA evidence in court.

Because of the successes associated with DNA profiling, the DNA Identification Act of

1994 provided substantial funding to improve the quality and availability of DNA analysis for law enforcement identification purposes. This act also provided for a DNA index that would allow for quick matches with DNA samples already on file for law enforcement purposes only.[13]

A study conducted in 1996 by National Research Council of the National Academy of Sciences suggested that DNA identification would be widely used to exonerate persons who had been wrongly accused or convicted. Not only can DNA identification be used to convict the guilty, it can be used to free the innocent.[14]

In 1996, the National Institute of Justice released a report entitled, "Convicted by Juries, Exonerated by Science". This comprehensive report lends statistical support to the earlier suggestions made by the National Academy of Sciences. This report announced that DNA testing was the most significant technical breakthrough in twentieth-century forensic science.[15] This report chronicled twenty eight cases in which post conviction DNA testing exonerated defendants. In each of these cases, the defendants had received lengthy sentences.[16]

During the past year, numerous cases have been reported in the media about convictions that have been overturned because of DNA testing. The Fresno Bee reported on May 8, 2001, that DNA testing cleared a man jailed for fifteen years on a charge of rape. The case dates back to May 8, 1985, when a woman was raped inside her apartment by a man she described as having blond hair. Jeffery Pierce, who has blond hair, was doing landscaping work in the apartment complex. At the time of the incident, the police pointed out Pierce to the victim from a short distance away, but she ruled him out as her attacker. However, ten months later she identified him in a photo line-up. He was arrested and charged with rape. When Pierce was convicted, his wife divorced him and moved away to raise their infant twin sons. Last year, after maintaining

his innocence for fifteen years, Pierce won approval to have the evidence in the case submitted for independent DNA testing. Pierce was positively ruled out as the perpetrator, and his conviction was overturned. Pierce will soon meet his two sons, whom he has only seen through photographs since they were infants.[17]

DNA testing has also been used with increased frequency to identify and convict suspects. In Houston, forty year old Michael Blane Brasher was charged in the 1982 rape and strangulation death of a fourteen year old female. Brasher was a prime suspect at the time but nobody could identify him. Last year Brasher provided a blood sample in connection to a traffic arrest, and DNA testing matched it to semen collected from the girl's body.[18] In Orlando, Florida, Franklin Reed was arrested for the rape and murder of a thirteen year old girl. Reed was originally cleared of suspicion, but a recent blood sample he provided matched DNA evidence in the crime.[19] DNA identification can clearly rule out an innocent person, however if a person is guilty, DNA evidence can often establish guilt when no other evidence can.

Automated DNA Typing

To understand the importance of DNA typing in criminal investigations requires some fundamental knowledge of the DNA testing processes. Each molecule of DNA consists of a long spiral that has been described as looking like a long twisting ladder. The handrail structures of the ladder string together the rungs, which are called bases. These bases are composed of four types of nucleic acid and combine in pairs known as nucleo-tides. It is the sequencing of these pairs that forms the genetic coding of the DNA.[20] In humans, DNA is found in all cells containing a nucleus. Each of these cells usually contains the full complement of an individual's DNA, called the genome, that is unvarying from cell to cell. The genome consists of about three

billion base pairs, of which three million vary from person to person. It is these varying base pairs that represent a virtually incalculable number of possible combinations. The person to person differences within a segment of DNA are known as alleles.[21]

DNA typing focuses on isolating and identifying these alleles fragments in a sample and comparing one sample with another. For example, a semen sample retrieved from a rape victim might be compared to the DNA sample obtained from a suspect. If identical fragments appear in each sample, a match is declared. The standard technology used for DNA typing has been RFLP-VNTR (restriction fragment length polymorphism-variable number of tandem repeats). This analysis process has been less than adequate for forensic use. The RFLP-VNTR analysis requires abundant, clean specimens. Evidence samples recovered from crimes scenes are often not of sufficient quality or quantity for adequate analysis. Samples are generally of very minute quantity, and have often been compromised by exposure to heat, light, and humidity. Further, this process of DNA analysis can take as long as several months to perform.

During the past few years there have been exciting and dramatic changes in DNA analysis. A new process for testing DNA has been developed to overcome the drawbacks of RFLP-VNTR analysis and enhance the use of DNA analysis in forensic investigations. This improved process is known as PCR-STR (Polymerase chain-reaction, short tandem repeats) and has enabled forensic scientists to identify DNA from objects that just a few years ago would not have been considered.[22] Sweat, skin flakes and other microscopic trace evidence is suitable for analysis. This process involves the replication of a minute DNA sample to obtain sufficient quantities for analysis. The original extraction of DNA can be replicated several million times within a short period of time. The replication techniques allow DNA typing results to be

obtained from even extremely minute and degraded samples. An important feature of this process is that it may be automated by using flourescent chemicals in the replication process. A laser generated flourescent signal from the alleles can be transmitted to a computer and analyzed to produce DNA profile information. Robotic workstations are currently available to process DNA samples. The entire process of DNA analysis can be automated, thus eliminating the possibility of error or intentional manipulation of data. The components and processes necessary for automation are currently available but have yet to be integrated. If these processes become automated, every criminal case with biological evidence could be analyzed without the normal concerns of cost, time and technical limitations.[23]

A team of engineering and genetic students at the University of Michigan in Ann Arbor, Michigan has created a laboratory on a chip. This device is a glass and silicon chip, the size of a paper clip, that analyzes DNA quicker and cheaper than conventional laboratory methods. The chip includes a system for metering, measuring and mixing microscopic liquid DNA samples with reagents, and moving the sample through a climate controlled reaction chamber, where the DNA molecules are separated by size and the results are read by an onboard fluorescence.[24] All components are contained on a single glass and silicon wafer, except for the external light and a PC board containing control circuitry. This chip has promise to be the key component in simple, low cost, portable DNA analysis that will replace current technology and make DNA analysis widely available. The benefits of this type of technology are increased speed, low cost of equipment and decreased cost of labor. The cost of the DNA testing chip, purchased in large quantities may be as low as six dollars per device.[25] Another DNA chip has been developed at the Whitehead Institute for Biomedical Research. This device can perform a DNA analysis in

two minutes.[26] That technology is one hundred times faster than the analysis performed in the O.J. Simpson case. This rapid and accurate DNA testing holds extreme promise for law enforcement as it allows for portable analysis in the field and at crime scenes.

Tracking and Testing of Sex Offenders

There are about 234,000 convicted sex offenders under the care, custody or supervision of correctional agencies on a given day. Nearly sixty percent are living in the community under some form of supervision. The recidivism rate for sex offenders is high. An estimated twenty four percent of those persons serving time for rape and nineteen percent of those serving time for other sexual assaults had been on probation or parole at the time they committed their commitment offense.[27]

Because the recidivism rate for sex offenders is high, there are currently two state statutes that serve to safeguard the public by increasing law enforcement's ability to track sex offenders: Penal Code 290 and Penal Code 296.

California Penal Code 290 requires that certain specified convicted sex offenders must register with the chief of police in the city he or she resides. If the offender lives in an unincorporated area, he or she must register with the sheriff of the county of residence. The registration requirement is for life and must be updated annually on the offender's birthday. Offenders must provide registration information within five days of coming into a city or county or changing locations within a jurisdiction. They are required to provide their home and work addresses, vehicle make and license, and physical identifiers such as tattoos, marks and scars.

California Penal Code 296 provides that any person who is convicted, pleads guilty, no contest or who is found not guilty by reason of insanity of any of the crimes set forth in PC 290,

must provide a blood specimen, a saliva sample, right thumb print and a full palm impression of both hands specifically for law enforcement identification. Also required to submit samples are those persons committed to state hospitals and treatment facilities as mentally disordered sex offenders and persons deemed to be sexually violent predators pursuant to the Welfare and Institutions Code. If the offender is sentenced to a state correctional institution, the Director of Corrections shall collect the samples from the offender at the intake process or as soon as administratively possible. Additionally, those persons who are current sex registrants, but who have not provided a sample because the offender was released prior to the enactment of the state's DNA and forensic identification data base and data bank program, are required to provide samples. [28] At the time the person registers or updates their registration, records are checked to determine if the registrant has previously submitted samples. If not, they are given an appointment to proceed to the county jail facility in the county they reside to provide specimens, samples and print impressions.

The tracking of convicted sex offenders, coupled with obtaining their DNA samples, lends assistance to law enforcement professionals as they investigate sex crimes.

DNA Data Banks

Having a DNA profile from a scene or DNA sample from a convicted offender is not all that is needed. It is necessary to have a method to compare these DNA records.[29] Traditionally, DNA analysis has been used in cases where law enforcement had identified the suspect. DNA evidence provided additional evidence to link the suspect to the crime. Until recently, law enforcement had not used DNA analysis to identify suspects, where none were known. In the last few years, many states have made investments in the creation of data banks of DNA from

those convicted of certain prescribed felonies. With these data banks, law enforcement can now use DNA technology not only to assist in establishing the guilt of known suspects, but also in solving crimes where the offender's identity was unknown and the case impossible to solve by other means.[30] Almost every state in the country now has a DNA database law that requires convicted sex offenders to submit a blood sample for DNA profiling. In 1998, the California legislature, citing the importance of DNA identification in sex crimes, created the DNA and Forensic Identification Data Base and Data Bank Act. The purpose of the data bank is to assist federal, state, and local criminal justice agencies, with the rapid detection and prosecution of persons responsible for sex offenses and other violent crimes. The Department of Justice is responsible for administering the DNA laboratories and for ensuring that the Department of Correction and the Department of the Youth Authority submit the required DNA samples.

In California, there are over 20,000 unsolved sexual assault cases with biological evidence that have not been analyzed for the presence of DNA. The Governor's Office, along with the Office of the Attorney General, has established the Cold Hit program. This program was designed to analyze biological evidence in all sexual assault cases, with special emphasis on those cases in which the statute of limitations is due to expire. Funding from the state has allowed local law enforcement agencies to process backlogged evidence through public and private laboratories for entry into the state DNA data bank. Currently, there are 168,047 DNA profiles in the DNA data bank. When the DNA profile from an unsolved crime sample matches a profile in the database, it results in a cold hit. A cold hit is a case that has been solved through DNA testing that would not have otherwise been solved. To date, there have been thirty six cold hits.[31]

In February 2001, the Cold Hit program produced a record of five hits in one day. One of the men identified by DNA match, wanted on rape charges, is currently in a Texas jail awaiting trial on a similar charge. Two other men are linked to rapes in southern California. One man is linked to a rape in the San Francisco area, and a fifth man is linked to a rape and murder of a woman in the Sacramento area over twenty years ago.[32]

The FBI has developed a system called the Combined DNA Index System (CODIS) for storage and comparison of DNA records. Their project is to merge all state data banks into a centralized data base. The California Department of Justice is responsible for providing a liaison to the FBI for exchange of DNA records.[33] DNA comparisons between states and across the nation will become increasingly common.

DNA technology is extremely well suited for forensic use in sex crime investigation for several reasons. First, the sex offender population is largely known and tracked by law enforcement officers and DNA profiles of these known offenders are available to law enforcement through a statewide data base. Secondly, sex crimes generally yield evidence that is rich in DNA. Finally, technology is available to quickly and accurately analyze the DNA from crimes scenes and compare it to data banks of known offenders.

Law enforcement leaders must be ready and willing to put these advancements in DNA technology to work in their agencies to impact sex crimes investigations. Making use of this continuously evolving technology will result in more effective law enforcement and safer communities.

CHAPTER TWO

FUTURES STUDY

Introduction

_____It cannot be clearly predicted what impact the advancements of DNA technology will have on the investigation of sex crimes, but it is possible to project a possible future by forecasting significant trends and events that could impact the issue, strategies or projected scenarios.

Nominal Group Technique

The Nominal Group Technique (NGT) was utilized to forecast future trends and events for this study. This process is frequently used by leaders in developing a vision of a possible future and a strategy to create it. An NGT is a structured format for group brainstorming. It is designed to encourage input from all members in the group, with all participants having equal weight in the identification and analysis of events and trends impacting the issue. The NGT process generates more ideas and reduces the conforming influence that occurs in most group meetings.[34]

_____The following three parts of this chapter describe the preparation, process and results of the NGT exercise.

Preparation

A panel of seven individuals was selected. The group represented diverse collection of individuals that due to their position within the criminal justice system would be impacted by the

issue. The NGT panel included:

- Detective sergeant specializing in crime scene investigation
- President of California Sexual Assault Investigators Association
- Technical Services Manager, Fresno Police Department
- Senior Criminalist, Fresno County Sheriffs's Department Forensic Laboratory
- Detective, specializing in sex offender registration, Fresno Police Department
- Chief Prosecuting Attorney, Fresno County District Attorney's Office
- Supervising Agent in Charge, Bureau of Investigation, Department of Justice Office, Fresno Office.

_____The Nominal Group Panel convened at the Fresno Police Department's Annex on November 13, 2001. Three staff persons from the Fresno Police Department assisted in the facilitation of the meeting. The NGT began with an explanation of the issue statement and the reason for the study. The materials included an explanation of the NGT process, a definition of trends and events, and explanation of the panel member's role in the Nominal Group Technique.

Trends

The panel members were asked to identify trends that would impact the issue. A trend was defined as a series of events that are related, occur over time and can be forecasted. The trends were written on an easel pad and then posted on the walls so all members could view them. Thirty-four trends were initially identified by the panel members.

The panel then discussed each of the trends. During this discussion some trends were combined, some were modified and some were eliminated. The discussion continued until all

panel members understood what the listed trends represented. The members were then asked to independently identify the top five trends that would impact the issue statement: how will advancements in DNA technology impact sex crime investigations in a large urban law enforcement agency by 2007? Each member numerically rated their top five trends. The number values were compiled and the original list of thirty-four trends was reduced to the following nine trends:

1. Cost effectiveness of DNA analysis. Some believed that cost of analysis would be a deterrent to widespread use of DNA analysis. Two panel members believed cost was declining so quickly that it would serve to increase use of DNA testing. Panel members believed that the improved technology and the automation had resulted in a decrease in cost of analysis.
2. Capacity to perform DNA analysis of small degraded biological samples. One panel member expressed surprise at the poor condition of samples that were able to yield results after DNA analysis. They discussed how the technology had advanced so that DNA analysis was possible with samples that just several years ago would have been considered impossible. Members agreed personnel processing crimes scenes would need to broaden the focus of their search for evidence to include specimens that before would have been overlooked as insignificant.
3. Speed of DNA analysis. The panel members said that the time taken for DNA analysis was sometimes too slow to be considered useful. Often times filing decisions or acceptance of pleas in proceedings occur before analysis of DNA

evidence. New technology has reduced the time it takes to obtain results. DNA analysis is being considered with greater frequency due to the speed of analysis. The panel discussed that, years ago, when DNA was first submitted for analysis, it took six to eight months for results, and now results are available within a week. The panel expected this trend to continue, with analysis and reporting becoming even quicker, and therefore more viable for investigations.

4. Gap between required and available local agency resources, both workforce and materials. Members discussed resources and expenses required for DNA analysis. They offered concern about the personnel needed to facilitate DNA analysis on a large scale. They discussed the materials and personnel that would be required if DNA analysis became widely used versus the current available resources.

5. Number of court appeals for DNA testing in post conviction cases. The panel said many cases were tried and defendants convicted for crimes without DNA analysis because it was not available. They offered that appeals could stall the courts. One member offered that a great deal of evidence in these cases had probably been destroyed or was unavailable. Two panel members said not only would defendants appeal their case if DNA analysis was not performed, but the public would expect DNA analysis and would be suspicious of cases when DNA analysis was not conducted.

6. Training in crime scene processing and evidence collection. Panel members said that expertise through training was necessary. They believed that most law enforcement officers had a lack of understanding of DNA technology and the

relevancy of DNA to crimes scenes. They believed that this lack of understanding had resulted in a disregard of evidence. Training must keep pace with the technology in order to be effective. Panel members felt the training needed to be widespread to include patrol officers, detectives and personnel who collect evidence at crimes scenes. They discussed the complexity of determining relevancy of biological evidence at crime scenes.

7. Education of elected officials, Chiefs of Police and Sheriffs in DNA technology. Members said that many agency department heads do not understand DNA technology. Some members said agency department heads do not understand the relevancy of using DNA technology to fight crime. To ensure that sufficient resources and policies are devoted to DNA analysis, agency heads and elected officials need an understanding of the relevancy of DNA analysis in addressing crime. One member said DNA technology was the most significant crime fighting tool, and that legislators and agency heads had failed to recognize that.

8. Level of frustration of local agencies with the State of California over DNA analysis and data base use. Members said many local agencies depend on the Department of Justice (DOJ) for all DNA analysis. Local agencies are unaware of the DOJ's policies and practices. Within DOJ there is fragmentation of responsibilities for collection, analysis , and database entry and retrieval with regard to DNA evidence. Local agencies are unaware of the different bureaus responsibilities.

9. Inadequate oversight to ensure full use of DNA technology. Members said that

even though county sheriffs have a responsibility to collect DNA samples from offenders, many counties have never submitted a sample for entry into the state's database. There are no requirements regarding when DNA samples must be taken from those in prison. Often samples are taken at the time a prisoner is released and occasionally it is later determined the prisoner is responsible for other crimes. Panel members believed there needed to be one commission or agency responsible for managing a statewide program with guidelines and sanctions. Panel members believed a systems approach was necessary in managing DNA testing.

Each member was given a Trend Summary Sheet, and asked to independently project a direction for each trend. The group was told to assume the trend was currently rated at a numerical value of 100. They were then asked to assign a numerical value to what the trend was five years ago, what the trend will be five years into the future and what the trend will be ten years into the future. They were also asked to rate the level of concern for each trend, with 1 being the lowest level of concern and 10 being the highest level of concern. The Trend Summary Table, Table 2-1, illustrates the median scores attached to the trends.

Table 2-1

DNA Trend Summary Table

Trend Statement	Trend Projection				Level of Concern 1-10 Scale
	-5 Years	Today	+5 Years	+10 Years	
1. Cost effectiveness for DNA analysis.	40	100	150	150	8
2. Capacity to analyze minute and degraded samples.	50	100	200	200	6
3. Speed of DNA analysis, time required to complete the analysis.	50	100	500	1000	9
4. Gap between existing and required resources for widespread DNA testing.	50	100	150	250	5
5. Number of post conviction court appeals when DNA available, but not analyzed during the investigation.	20	100	250	250	5
6. Training required for personnel in crimes scene processing and evidence collection.	40	100	125	150	8
7. Education of elected officials and department heads in DNA technology.	0	100	150	150	5
8. Level of frustration of local agencies with State over DNA testing and data bank use.	0	100	150	50	6
9. Inadequate oversight for inter-agency coordination regarding use of DNA technology.	75	100	150	50	6

Table 2-1 illustrates that the level of concern for three trends was significantly higher than the other six trends. The three trends with the highest ranking for level of concern were:

- Cost of DNA analysis
- Speed of DNA analysis

- Training in crime scene evidence collection

The panel members discussed Trend # 1, Cost of DNA analysis. They felt that costs associated with DNA analysis were declining as technology became automated and more advanced. They projected that this trend would continue. In five years they projected the trend would increase, and ten years the trend would double. The members rated the level of concern for the trend to currently be high. They discussed the shortage of resources for widespread DNA analysis. They were concerned about competing needs and expressed concerns that the federal and state governments' emphasis on terrorism may pull resources away from widespread DNA testing. However, they believed that in the future, the technological advancements will drive the costs down, and as the costs decline for DNA testing, the level of concern will also decline.

In discussing Trend #3, Speed of DNA analysis, the panel expected the trend to gain in momentum, moving from a rating of 100 today, to 500 in five years, and 1000 in ten years. The panel believed that technological advancements over the next ten years would allow for DNA analysis to be almost instantaneous. They believed that within five years, law enforcement officers would be issued a handheld device for DNA profiling. They rated the level of concern for this trend high at this time, an eight, but they believed the level of concern would diminish as instantaneous analysis and profiling became the norm.

The panel members rated Trend #6, training required for crimes scene investigation, with a high level of concern. They believed that training would need to be widespread throughout the criminal justice administration. Specifically, they believed all line level law enforcement officers would need a basic understanding of DNA profiling and the DNA technology to perform adequately at the scene of crimes. They believed evidence technicians and detectives would

require more advanced training and that this training should be coordinated so that the prosecutors would receive the same training and have the same understanding. They also felt training for the agency head was necessary so that the agency leadership could take a lead role in promoting the use of DNA technology. The panel believed that agency heads should be knowledgeable regarding available technology.

Events

The panel members were then asked to identify events that would have a significant impact on the issue. An event is defined as a single incident that can have significant impact on the issue. The same process that was used to identify trends was used to identify events. The group initially identified 19 events. After discussion, and independent rating by the panel members, the number of events was reduced to nine events. The nine events identified by the group using this process were:

1. Hand held device for instantaneous DNA analysis is developed for law enforcement use. The panel believed that a device such as this would have a positive impact on the ability of officers to quickly use DNA technology to further criminal investigations in the field. They envisioned using the device to search the automated data banks, as well as the ability to run DNA analysis from the field.
2. Supreme Court invalidates DNA testing in criminal cases. The panel felt that if DNA testing was ruled inadmissible in court that DNA technology would no longer be relevant in criminal investigations. One member felt DNA would still

be important to identify missing persons. Members believed that DNA technology was advancing so rapidly that it would continue to be of importance in medical and scientific applications. Panel members strongly believed that DNA analysis was the most compelling evidence in a criminal case. Although they did not believe there was a probability of this event occurring in the forecast range, they believed that because this event would have a tremendous impact on the issue it was worthy of consideration.

3. National DNA data base created for use in identification for everyone. Members believed that the creation of a data base with DNA profiles for everyone, with mandatory DNA samples taken at birth, would be an almost foolproof way to identify persons.

4. Costs for DNA testing becomes negligible. The panel believed that many cases with DNA evidence are not being submitted because of the costs involved. They believed that if the cost was not a factor, there would be an increase in DNA analysis, and an increase in crimes solved. The panel discussed how automation of DNA analysis would drive down the cost and that highly skilled laboratory technicians would no longer be needed.

5. Evidence more credible than DNA is identified. The panel considered that fingerprints used to be the best means of identification and were at one time considered the most significant means of placing a suspect at the scene of a crime. At that time, DNA technology had not been considered. Panel members believed it was possible that some means of identification, inconceivable today, may take

the place of DNA technology. Although the panel members did not believe that this would occur during the forecasting window, they believed it could possible occur beyond the forecasting horizon, and therefore, was worthy of consideration.

6. DNA altered in the laboratory. Panel members felt that the scientific technology was advancing so rapidly that as quickly as a legitimate use was developed, an illegitimate use would also be found. Members felt that if DNA could be altered in the lab, it would damage the credibility of DNA as evidence. The ability to alter DNA would make DNA analysis questionable in the minds of juries. They thought that automation would limit the human involvement in DNA analysis and lessen the opportunity for alteration of evidence.

7. The automated DNA data base is attacked. Several members who were familiar with computer technology believed that the state's DNA data bank was vulnerable to attack. They surmised that this attack could easily come from within the agency because of the lack of appropriate backgrounds on personnel working in and around the database. Attack could also come from outside the agency. Computer hackers have long shown how vulnerable computer databases are to attack.

8. DNA is cloned in the laboratory. Members believed that as quickly as technology was becoming available to assist in criminal investigations, there would be efforts to misuse the technology. They believed DNA would soon be cloned and that this technology of cloning DNA would compromise the DNA technology used in criminal investigations, or at least confuse juries and make it difficult to establish

credibility of DNA evidence.

9. National steering committee formed to coordinate use of DNA technology. Members discussed that industry standards and procedures for using DNA technology varied between jurisdictions. A national steering committee could set guidelines and sanctions for all jurisdictions to follow.

The panel was then asked to rate the events on probability of occurrence and impact on the issue. Using an Event Summary Sheet, they were asked to provide answers for five questions. First, they were asked, "How many years from now could the event first occur?" They were then asked to rate the probability of the event occurring within 5 years, and then the probability of the event occurring in ten years. They were also asked to rate the impact the event would have on the issue, using a scale of 1-10, with 10 being the most impact, and whether the impact would be positive or negative. Table 2-2 illustrates the scores the panel provided in this assessment. Median scores were recorded for all ratings except for rating the impact. The average score was used to rate the impact.

Table 2-2

Event Summary Table

Event Statement	Years until Probability Exceeds Zero	Probability		Impact on Issue if Event Occurred	
		+5 Years	+10 Years	Impact on Issue 1-10 Scale	Positive or negative Impact +/-
1. Hand held DNA profiling device is developed for widespread law enforcement use.	5	50 %	100 %	9	+
2. Supreme Court invalidates all DNA testing in criminal cases.	0	0	0	10	-
3. Creation of National Data base for DNA, DNA taken at birth, used for identification.	10	0	5 %	10	+
4. Cost for DNA profiling becomes negligible.	10	0	100 %	8	+
5. Evidence better than DNA is discovered.	0	0	0	3	-
6. DNA is altered in the lab.	5	50 %	100 %	4	-
7. Automated DNA data base is attacked.	2	100 %	100 %	5	-
8. DNA is cloned.	1	100 %	100 %	3	-
9. National steering committee formed to coordinate use of DNA technology.	2	75%	100%	10	0

Cross Impact Analysis

Several days after the NGT, three individuals present at the NGT participated in a Cross-Impact Analysis exercise. The group was comprised of panel members and non panel members. In this exercise, the individuals were asked to assess the impact the events would have on the trends. To accomplish this, the individuals were asked to answer a series of questions regarding the impact the events would have on each trend. Specifically, they were asked, "If event #1 occurs, what impact will it have on trend #1"? They assigned a numerical rating of 1-5 for the impact, with 5 having the most impact. They were also asked to determine whether the event would have a positive or negative impact on the trend. This process was repeated for each of the trends and events. The panel members independently recorded this information on a Cross-Impact Analysis Sheet.

The cross impact analysis exercise illustrates how events can impact and alter trends. To create a future, it is important to understand how events can influence trends. Once this is understood, events can be either encouraged or discouraged to impact the trend in a manner that creates a desired future state.

Table 2-3

Cross-Impact Analysis

Events	Trends								
	T1	T2	T3	T4	T5	T6	T7	T8	T9
E1	+5	+4	+5	+5	0	+4	+4	+2	0
E2	-3	-2	-2	0	-5	-4	-4	-4	-4
E3	+5	+4	+4	-3	+5	+3	+3	-3	0
E4	+5	+4	+4	+5	+3	+5	+4	+4	0
E5	-3	-2	-2	0	0	-1	-1	-1	-1
E6	+1	0	-2	0	0	+2	+2	0	0
E7	-4	-3	-4	-5	0	0	+5	+5	+5
E8	-3	-3	-3	0	0	+2	+2	0	0
E9	+5	+4	+4	+3	0	+5	+5	+5	+5

Table 2-3 indicates that the majority of the events would have some type of impact on the trends associated with the issue. Six of the events were identified as having an impact rated four or higher on the majority of the identified trends. Those events and their effect on the trends will be discussed further.

Event#1, is identified as the development of a hand held portable device for instantaneous DNA analysis for law enforcement use. This event would have a positive impact on all of the identified trends with the exception of trend #5, which had to do with court appeals in post conviction cases. The occurrence of this event would have a significant and positive impact on the other trends.

Event #2, in which the Supreme Court invalidates DNA testing in criminal cases, would have a significant negative impact on the majority of the trends. However, when reviewing the information illustrated in Table 2-2, the NGT panel members did not rate the probability of this event as ever occurring during the forecast range. However, the panel did not preclude this event from outside the forecasting range. Therefore, if this event were to ever appear probable, it would be advisable to take action to prevent the event from occurring.

Event #3, the creation of a data bank for identification of all persons, with DNA samples being taken at the time of birth, would have a significant effect on all trends, but again when considering Table 2-2, the NGT panel members considered there was only a only 5 percent probability that this event would occur within the next ten years.

Event #4, the cost for DNA analysis becomes negligible. NGT panel members rated the probability of this event occurring as high, with 100 percent probability within the next ten years. This event had the highest positive impact on all of the trends associated with the issue. This is clearly an event that should be encouraged.

Event #7, assumes the automated DNA data base is attacked. This event would have a significant negative impact on the majority of the trends. In looking at Table 2-2, the NGT panel members felt that this was an event that had a 100 percent probability of occurring within the next five years. Therefore, this event that should be actively discouraged from occurring. Planning to avoid this event will be necessary to safeguard the issue.

Event #9, assumes a national steering committee is formed to coordinate the use of DNA technology. Table 2-3 indicates that this event would have a significant positive impact on the majority of identified trends. In reviewing Table 2-2, the NGT panel members believed that

there was a 100 percent probability that this event would occur within ten years. The event can clearly be identified as an event that should be encouraged. Planning should occur that moves this event towards occurrence.

Alternative Future Scenarios

Three alternative future scenarios were developed based on the literature review, scanning process and NGT process. The scenarios portray an optimistic and desired future: a pessimistic and unpleasant future; and a surprise free, status quo future. These scenarios demonstrate the need for strategic planning to obtain a desired positive future state, and the need to avoid an undesirable future, resulting from the lack of planning and foresight.

Scenario One - Optimistic

Fresno Police Department, 2007

Officer Dooley is one of the new officers assigned to the Technical Evidence Team at the Fresno Police Department. Many of the senior officers on the Department call him the new breed and complain that police work will never be the same. They are right.

As a member of the Technical Evidence Team, Officer Dooley is responsible for performing DNA analysis on biological evidence located at crimes scenes. He also performs immediate on-scene DNA profiling of suspects detained in the field. He has a Ph.D. in microbiology and DNA analysis. He has been assigned to the Technical Evidence Team since its formation last year. Before that, DNA technology was not widely used by law enforcement. However, when the federal government began funding all costs associated with DNA testing, many law enforcement agencies formed specialized technical evidence teams specifically for the

purpose of DNA analysis and DNA profiling.

Today, Officer Dooley has been busy. A violent rape of a young girl occurred earlier in his shift. The six year old victim was asleep in her room when her attacker entered through an open window. Officer Dooley responded to the location to assist the detectives with processing the scene for biological evidence. He located blood, semen, and hairs; all he believed to be from the suspect. This was far more biological evidence then was necessary for DNA analysis. Officer Dooley was accustomed to performing analysis on samples as small as a flake of skin. This scene was a bonanza of DNA evidence for him. He used a small handheld device to quickly process the biological evidence into a readable DNA profile. Then he transmitted the DNA profile electronically to the statewide DNA databank for comparison to profiles of known sex offenders. Within minutes, Dooley obtained a match to a suspect who was on parole for rape. Records maintained both locally and at the state level on sex registrants revealed that the suspect lived only several blocks from the victim's residence. Officers responded to the suspect's location and placed him in custody. At the time of the arrest, the suspect claimed not to know of the victim and that he had not left his residence for the entire day. His mother said that she had been home all day with her son. Officer Dooley was skeptical and performed DNA analysis on a tiny speck of blood on the suspect's thumb. The DNA profile matched that of the victim, thus discrediting the suspect's alibi.

By the end of day, Officer Dooley had processed three rape scenes and been able to identify the rapist in each incident. He assisted at a homicide scene and identified a probable suspect. And, he identified a suspect who was lying to officers about his name to avoid arrest. As he recounts his day, he thinks of the rape of the young girl earlier in the morning and is

pleased that the DNA analysis will produce a case so strong, that the victim will likely never need to testify. Officer Dooley wonders how detectives ever solved crimes without DNA technology.

Scenario Two - Pessimistic

Newspaper Article, December 10, 2007

MURDER SUSPECT LINKED TO TEN SERIAL RAPES

Yesterday, a forty-five year old man was arrested for the rape and murder of an eighty year old woman who was performing volunteer work at her church. The suspect attacked the victim while she was in the basement of the church sorting through boxes of Christmas decorations. The suspect was trapped in the basement of the church when a janitor locked the door to the basement while securing the building. Police were called to the scene later that night when nearby residents heard noises coming from the basement of the church. When checking the location, officers located the suspect and the victim, in the basement. The suspect was arrested at the scene for charges of rape and murder. The victim died hours later at a local area hospital from massive head trauma.

Police detectives revealed that the suspect had been considered a prime suspect in ten rape cases dating back to June 2003. However, police had been unable to make an arrest. All of the victims were seventy to eighty years of age and had been severely beaten about the head. None of the victims had been able to identify their attacker.

An official with the Department of Corrections confirmed that the suspect was on parole for a rape conviction. The official also confirmed that prior to the suspect's release from

custody, biological samples were taken for DNA profiling and this DNA profile information had been entered into the state's Known Offender DNA Data Bank. The official commented that this DNA profile information should have resulted in a quick identification of the suspect in these cases. The Police Chief said that samples from the scene had not been submitted for DNA analysis because of the associated cost involved. He said it is department policy to submit only samples for analysis after charges have been filed with the District Attorney's Office. A detective who spoke under the condition of anonymity commented, "This policy cost us a life this time."

The pastor of the victim's church questioned why the suspect hadn't been arrested earlier. The victims in the previous rapes have all retained legal counsel and are considering action against the police department.

Scenario Three - Surprise Free

Newspaper Article, December 10, 2007

DNA DATA BANK LINKS SUSPECT TO RAPE

The Fresno Police Department announced that a suspect has been arrested in the rape of a college student occurring in 2001. The arrest came after evidence in the case was recently submitted to the Department of Justice for DNA analysis. This analysis was part of the continuing Cold Hit Program, which matches DNA profiles from crimes scenes to those in the Known Offender Data Bank. The Fresno Police Chief commented that he expects additional cases to be solved as detectives continue to sort through old cases and send biological evidence to DOJ for analysis. Many cases that are approaching the six year statute of limitations have not

yet been processed for DNA profiling. The chief cites the backlog of cases and lack of man power as primary reasons these old cases are not being reviewed quicker. He said they will continue to review these cases, but the priority is to investigate the current cases. The Department currently has in excess of six hundred unsolved rape cases dating back six years. Only fifty percent of those have been forwarded to DOJ for analysis. "DNA technology has evolved to the point of automation, providing quick accurate results. The problem we face today, is that agencies are not getting the evidence to us quickly enough to avoid statute of limitation problems," said a spokesperson for DOJ. The technology for quick DNA profile and analysis is available, however, law enforcement agencies across the nation continue to struggle with making the most of the technology.

Law enforcement leadership must take an aggressive role in planning for a future that makes the best use of advancements in DNA technology to impact sex crime investigations. Planning for the future will result in more effective use of advancing technology, which will ultimately lead to safer communities.

CHAPTER THREE

STRATEGIC PLANNING

Introduction

Strategic planning is extremely vital in developing the future state as portrayed in scenario one, the optimistic future. This chapter will focus on process components that are necessary to the development of a strategic plan with the goal of achieving the favorable environment described in scenario one. This includes a description of the vision and desired goals relative to the issue of technological advancements in DNA and their impact on sex crimes investigations. It will also provide an understanding of the present state, an organizational analysis, a stakeholder analysis, and strategy development including three alternative broad strategies. Suggested recommendations along with a discussion of needed resources will be provided. This chapter will also contain information relevant to moving the issue of using DNA technology in sex crimes investigation from the present state to a future desired state. Through the use of the strategic plan, emphasis will be placed on preparing the organization for change and mitigating adverse impact. For this part of the project, the Fresno Police Department, will be used as the example of an organization.

Vision and Goals

Technological advancements in DNA analysis and profiling promise to be the most

significant breakthroughs in forensic science in the twentieth century. DNA technology clearly has a prominent place in the investigation of sex crimes. DNA technology can help to solve cases that otherwise would not be solved. It can identify the guilty and free the innocent. A strategic plan that moves the department toward a vision of full utilization of DNA technology to investigate sex crimes needs to be developed, with the goals of this plan being rapid identification and apprehension of suspected offenders. The development of such a strategic plan will result in enhanced public safety.

Organizational Description

An understanding of the present state of the organization is a necessary component to the development of a strategic plan. So far, the issue of sex crimes investigations and DNA technology has been reviewed and examined through a process of scanning, literature review, NGT process, and the development of three futures scenarios. However, before the Fresno Police Department can move toward the future desired state of fully utilizing DNA technology in sex crimes investigations, there must be a thorough understanding of the present state of the department as it relates to the issue. And secondly, there must be an assessment of this present state.

Patrol officers are responsible for conducting the initial investigation of a sex crime. The officers conduct interviews with victims, witnesses, and suspects if identified. They are also responsible for ensuring proper identification and processing of evidence at the scene. Unless the officers have previously been assigned to the Sexual Assault Unit, the only training they have in sex crime investigations is the training they received in the police academy. Currently, the Commission on Peace Officer Standards and Training requires eight hours of training in sex

crimes investigations. It has been considerably less in previous years. Patrol officers currently receive no training in any aspects of DNA evidence. The officers are required to notify a detective in the Sexual Assault Unit in cases involving serious injury or a recognized pattern of criminal activity. The detective then determines if an investigator should respond to the scene to assist the officer with the investigation.

The Sexual Assault Unit is comprised of ten detectives and a sergeant. Two of these detectives are assigned to monitoring the P.C. 290 registrants and working to conduct Megan's Law notifications. The remaining eight detectives have follow-up investigative responsibility for all sexual assault, child abuse, and child neglect cases occurring in the City of Fresno. They also have responsibility for follow-up investigations for indecent exposure cases. Detectives are required to be on call to respond to crimes scenes when their assistance is requested by patrol officers. Collectively, detectives are called out to approximately one to two scenes a week to assist patrol officers. Detectives occasionally comment that vital physical evidence is lost because they are not called to scenes to assist in the location and processing of evidence.

Detectives receive training in sex crimes investigation, interviews and interrogations, basic investigation and attend conferences presented by the California Sexual Assault Investigators Association. Only one of the detectives has received training on DNA evidence, and that was not a class specifically focusing on aspects of DNA, but a class on investigations that made some references to DNA issues. The other detectives have not received training in DNA evidence. Cases are assigned to detectives by the unit sergeant. In calendar year 2000, there were approximately 1,746 sex offenses, as described in PC 290, reported to the department. There were approximately 954 child neglect and abuse cases reported. Due to the tremendous

number of cases written, only those cases with the best chance of being solved are actively pursued. The sergeant logs the cases assigned to detectives. However, because of the high caseload, there is no review of the case to ensure proper investigation before it is closed, cleared, or suspended.

Crimes scenes are processed by civilian evidence technicians. They collect evidence identified by either the officer or detective at the scene. They all attend a basic field evidence technician course that provides a brief discussion of DNA. They do not attend training specifically pertaining to DNA evidence collection and retention.

The City of Fresno has a population of registered sex offenders that is higher than other cities of comparable size. Fresno is one of seven geographical areas where sex offenders are paroled. There are approximately 1,600 registered sex offenders currently living within the city. The department makes full use of Megan's Law to notify the public of the serious at risk offenders. The department was one of the first agencies in the state to conduct regular notification operations and present mapping of offenders' residences to the public.

The department is a participant in the Cold Hit program being administered by Department of Justice. A detective assigned to the sexual assault unit has recently completed review of all sexual assault cases dating back to 1996, to determine the presence of biological evidence. The evidence in 153 cases has been sent to the local Department of Justice Regional laboratory in Fresno for DNA testing. When DNA is located in the evidence, it will be checked against the data bank of known offenders.

The department uses the Department of Justice crime laboratory for almost all DNA analysis. Even though the technology used at the lab requires only several days to perform an

analysis, the department often does not receive a report for several months. The regional lab is plagued with the problem of backlogged cases and high employee turnover. Supervising Agent in Charge John Balbach from the Department of Justice, Bureau of Investigations, cites concerns with the use of the regional DOJ labs and the statewide database. Although legislation identifies which state agency is responsible for obtaining DNA samples, performing lab analysis, and maintaining the data bank, there is no coordination or oversight to ensure that all components are meeting their responsibilities. For instance, sheriff's departments are responsible for obtaining samples from PC 290 registrants who have not provided samples, yet some counties have never submitted any samples. Another example is inefficiency in use of the data bank. Samples of known offenders are being continuously added to the data base, however, when an agency requests a DNA profile be run against the known offender data bank, it is checked only once, and not checked again even though known offender samples are being added continuously. Another concern cited by Balbach is that the regional DOJ lab will conduct the analysis to profile the DNA, however, they will not forward the DNA profile to the database without a specific request from the agency who submitted the sample. Most agencies are unaware of the practices and procedures for the Department of Justice regional laboratories. Without a working understanding of DOJ's procedures and practices, the services they offer cannot be fully utilized. Currently, there is no dedicated liaison between the Fresno Police Department and the regional DOJ laboratory.

Organizational Analysis

An analysis of the present state is essential before a strategic plan can be developed. To accomplish the analysis in this study, the WOTS-UP model (an organizational assessment of

weaknesses, opportunities, threats, and strengths of the organization) was utilized to determine the department's ability to respond to the issue. Using the WOTS-UP framework, an objective inventory of the organization's weaknesses, strengths, threats, and opportunities, as they apply to the issue, was completed. Opportunities and threats are considered external to the organization and may include trends and events. Strengths and weaknesses are considered internal to the organization and denote positive conditions and possible obstacles to the organization's goal relative to the issue.

Internal Weaknesses

- Sexual Assault Unit within the department investigates not only sexual assault cases, but also conducts investigations on child abuse cases, creating an unmanageable case load.
- Department is experiencing difficulty maintaining full staffing levels, resulting in vacancies within the investigation division and specifically the sexual assault unit.
- Case load responsibilities do not allow investigators sufficient time for adequate review of crimes scenes and physical evidence.
- Department policy does not mandate a call-out for detectives in cases of sexual assaults with physical evidence.
- Patrol personnel responsible for the initial investigation and evidence collection in sex crimes cases are untrained relative to aspects of DNA evidence.
- Evidence technicians responsible for evidence collection at major crimes scenes are untrained in DNA evidence collection techniques.
- Detectives assigned to the sexual assault unit are not trained in forensic DNA aspects as they relate to profiling and the Department of Justice data bank.

- Completed investigations are not reviewed by a detective sergeant to ensure adequate investigation or consideration for DNA evidence.
- There is no department policy regarding the submission of biological evidence for DNA profiling.
- The department has not budgeted for costs associated with increased DNA analysis.
- No uniform practice or procedure exists for following up on evidence submitted to DOJ for analysis.

External Opportunities

- Public perception and acceptance of DNA technology is favorable which may enhance the department's efforts to reach the desired state.
- Courts have upheld the use of DNA technology as reliable scientific evidence, giving agencies the go ahead to utilize the technology in prosecution of criminal cases.
- Advanced DNA technology currently on the market and may be available for use by the department on a trial basis.
- Training regarding DNA technology is readily available both for cost and at no cost from a variety of sources.
- Department of Justice Lab currently conducts DNA analysis without cost to local agencies.
- The known offender DNA data bank is currently operated by Department of Justice without cost to local agencies.
- The department's relationship with allied law enforcement agencies is positive, creating a favorable environment to consider the creation of a regional DNA crime lab.

- Local state legislators are sensitive to crimes issues and support law enforcement agencies in crime fighting efforts.
- Successes working with Office of Criminal Justice Planning on previous grants may provide an opportunity to obtain a grant relative to DNA profiling in sex crimes investigations.

External threats

- The police department is experiencing a budget shortfall.
- The federal and state budgets are facing serious restrictions due to a shift in priorities created by acts of terrorism and an energy crisis resulting in an elimination of grants.
- Leadership within organizations, necessary for collaboration, do not share the same vision or goals.
- The DNA data base is vulnerable to attack which could result in a complete loss of both known and unknown offender profiles.

Internal Strengths

- Top police management share the same vision regarding the use of technology to solve crimes.
- The department has an established reputation for innovation in the arena of sex crime investigations.
- Skilled, experienced detectives are currently staffing the sexual assault unit.
- The department has strong partnerships with allied agencies, such as local probation and parole.
- The training unit is well equipped to facilitate necessary training in DNA technology on a

department wide basis.

- The department has experience in implementing the use of high technology in crime fighting efforts.

Stakeholder Identification and Analysis

The identification and analysis of stakeholders and their expectations relative to the issue, is an integral part of the strategic planning process. Stakeholders are individuals or groups that are impacted by what the organization does. Additionally, they are individuals and groups who have impact on what organizations do. Stakeholders, and their position relative to the issue or organizational vision, can impact change within the organization. This impact can be either positive or negative. A stakeholder who is overlooked may have a disastrous impact on developing the strategic plan. Such a stakeholder is known as a snail darter. Therefore, it is important to clearly identify all stakeholders and determine what role they will play in the strategic planning process.

Table 3-1 identifies the potential stakeholders as it relates to the department's use of DNA technology to investigate sex crimes. Additionally, the table illustrates what positional role the stakeholder needs to maintain during the strategic planning process. The Fresno Police Officers' Association is identified as a possible snail darter because of their potential to thwart any strategic plan with labor issues. They must be included early in the strategic planning process to avoid last minute unforseen obstacles in the strategic planning process.

Table 3-1

Stakeholders and their Expected Role In the Strategic Planning Process

STAKEHOLDER	INCLUSION	RECOGNITION	INFORMATION	LEADERSHIP
City Council		X	X	
City Manager		X	X	
Chief of Police	X	X	X	X
Police Management	X	X	X	X
Police Detectives	X	X	X	X
Patrol Officers	X	X	X	X
Department of Justice Regional Lab	X	X	X	X
Probation Department	X	X	X	X
Parole	X	X	X	X
Police Department Civilian Evidence Technicians	X	X	X	X
Fresno Police Officers' Association		X	X	
Community at large			X	

Strategy Development

When developing a strategic plan, it is important to consider the expectations of the stakeholders. The plan should be developed so it addresses these expectations . Some stakeholders will have shared expectations, while some have unique expectations.

The City Council and the City Manager would expect that a strategic plan to address the issue would be cost efficient and that costs be deferred to other agencies when possible. They would also expect that the plan includes a means to measure effectiveness and results. The police chief would have the same expectations from the plan. Additionally, the chief would want the plan to take into consideration competing needs within the agency when considering personnel needs. The chief would want a plan that could be implemented with existing resources or with the assistance of allied agency resources.

Police management would want a strategic plan that is realistic and able to be sold to personnel under their command. They would also expect that the plan be well considered and not diminish resources from other units. Any strategic plan that jeopardized the functions of other units within the department would not be widely accepted by police managers.

Police detectives, police officers, and civilian evidence technicians would expect that a strategic plan would include provisions for training and for the establishment of policy regarding the issue. They would also expect that the plan provide provisions for material resources necessary to carry out the plan.

Parole and probation agencies would expect to have their roles clearly identified within the strategic plan. They would expect to be fully utilized, and they would want a liaison or regular interagency meetings to establish communication flow. Personnel from the Department

of Justice Regional Lab would also expect the plan to establish a means for communication with allied agencies. They would also expect for the plan to provide training on DNA evidence. They would expect that the plan address the backlog of cases they are working on.

The Fresno Police Officers' Association would expect that their represented personnel will be compensated for any specialized skills they may be required to develop. They would also be concerned with any change of work conditions the plan might present, such as additional callouts for detectives.

The community at large would expect the plan to provide a means to educate the public on the issue, that the plan be made public through the use of the media, and that the public receive some information regarding the effectiveness of the plan.

To gain support for a strategic plan that fully utilizes DNA technology in sex crime investigations, the expectations of all stakeholders need to be considered and their expectations must be incorporated into the plan.

Development of Alternative Strategies

Consideration of the three alternative scenarios developed after the NGT process can assist a leader in developing a strategic plan. Broad alternative strategies can be developed in accordance with the desired future state.

Strategy 1: Leadership is indifferent to the issue. Maintain the status quo.

This strategy requires no effort or participation of the leader. This option reduces the opportunity for collaboration between agencies and reduces the likelihood that DNA technology will be fully utilized to investigate sex crimes. This option could cause personnel within the police department and allied agencies to lose confidence in the agency's ability to adequately

solve sex crimes. The public loses confidence in the department, and in turn, the department loses public support.

Strategy 2: Leadership is willing to participate, but takes no leadership role.

In this strategy, the leader and the department understand the importance of the issue. They willingly participate in programs offered and administrated by other agencies, but they take no active role in impacting the issue. The agency takes no leadership role and maintains a neutral position. The department waits for some external change or action to propel the issue. There are no internal operational changes within the department to accommodate progress on the issue. This strategy requires little organizational effort. The issue moves forward, but only because of external forces. The department has no influence on the how the external forces operate, nor their impact on the issue. The department has no control over the outcome in this type of strategy.

Strategy 3: The leadership takes an active role to fully utilize DNA technology.

This strategy is the most difficult strategy for the leader and the department. Leadership must understand and appreciate the need for change within the organization. The need for change must be clearly communicated throughout the department, to allied agencies, and to the public. Leadership must create and share the vision of the desired state. The vision, maximized use of DNA technology to quickly solve sex crimes, must be integrated into the systems and processes within the organization. There must be strong collaboration with other agencies. Stakeholders must be brought together to share a common vision. Internal operational changes, policy changes, and use of resources must be assessed and manipulated until they positively impact the issue to the extent the desired state is achieved.

Strategy 3 is plainly the preferred strategy in achieving the desired state portrayed in scenario one. This strategy requires the department leadership to move from a passive and accepting role to an aggressive role when it comes to utilizing DNA technology in sex crime investigations. It calls for the department leadership to establish collaborative relationships within and outside the agency to focus resources on providing training, processes, policies and personnel committed to transforming the common vision to the desired state.

Before law enforcement can begin to fully utilize advancements in DNA technology to impact sex crimes investigations, leadership must identify a clear vision and goal, conduct a comprehensive organizational analysis, and carefully consider stakeholders. Then they must develop alternative strategies, and pursue the strategy that will ensure that advancements in DNA technology are fully utilized to impact sex crimes investigations.

CHAPTER FOUR

TRANSITION MANAGEMENT

Introduction

In this chapter, transition management and dynamics of organizational change will be explored. Successful significant change does not just happen within an organization. Transition management is necessary to move an organization from its present state to a desired future state successfully. For the Fresno Police Department to move from its current state to the desire future state, in which DNA technology in fully utilized in sex crime investigation, transition management is necessary. Transition management includes the components of commitment planning, implementation of change, and transition evaluation.

Commitment Planning

Commitment planning is a strategy with specific steps designed to secure the support of those individuals or groups whose commitment is essential for the organizational change to occur. These groups and individuals are collectively known as the critical mass. The primary steps in developing a commitment plan are:

1. Identify individuals or groups whose commitment is advantageous to the change.

2. Define the critical mass necessary to ensure the effectiveness of the change.

3. Define a plan for getting the commitment of the critical mass.

4. Create a monitoring process to assess the progress.[35]

To identify the critical mass for this issue, it was necessary to review the stakeholders and assess the importance of their of support. Those stakeholders whose support was necessary to move the issue forward were identified as the critical mass. The following individuals and groups were identified as those whose support and commitment are necessary to successfully implement the change strategy for the issue:

- City Council
- City Manager
- Chief of Police
- All Police Personnel
- Probation Department
- Department of Corrections
- Department of Justice Regional Lab
- Fresno Police Officer's Association

Commitment Charting

Commitment charting is one technique that can be used to evaluate the commitment of groups and individuals, and assist in identifying where intervention strategies should be utilized to increase commitment. Commitment charting assumes that some level of commitment for each individual or group in the critical mass is necessary for the change to occur. However, the level

of commitment is not the same for everyone. Commitment can be simply rated as one of four categories:

1. Block the change
2. Let change happen
3. Help change happen
4. Make change happen

Commitment charting considers the minimum degree of commitment necessary by the stakeholder for the change to occur, and also considers what that stakeholder's current level of commitment for the change actually is. Table 4-1 illustrates the current level commitment of those groups and individuals in the critical mass, as well as, the necessary level of commitment required to move the issue forward.

Table 4-1

Critical Mass Commitment Chart

X = Current position

0 = Desired position

Critical Mass Members	Block the Change	Let Change Happen	Help Change Happen	Make Change Happen
City Council		X O		
City Manager		X ➜	O	
Chief of Police			X ➜	O
All Police Personnel			X ➜	O
Department of Corrections (Parole)			X ➜	O
Probation Department		X ➜	➜	O
Department of Justice Regional Lab		X ➜	➜	O

Fresno Police Officers' Association	X ➜	O		

Table 4-1 indicates that the majority of the stakeholders in the critical mass must have a higher level of commitment than their current level.

Intervention Strategies

Intervention strategies such as, problem finding, education, resistance management, role modeling and changing the rewards system are useful tactics in getting commitment.[36]

Education on the available DNA technology and its use in sex crime investigations, may be all that is necessary to increase the commitment of the City Manager, Chief of Police, police personnel, probation and parole. Changing the rewards system by considering extra pay for specialized duties would serve to increase the support of the Fresno Police Officers' Association. Role modeling may be a successful tactic to gain the support of allied agencies who want to be involved but are not sure how to do so. Sometimes a combination of strategies needs to be used to increase commitment of stakeholders. Leadership must explore the different strategies while remaining vigilant in gaining the necessary commitment of the critical mass.

Implementation of Change

A set of guidelines for implementing change has been developed by Professor Todd D. Jick. In his book, *Managing Change; Cases and Concepts*, Jick identifies a set of 10 commandments for implementing change. These guidelines are helpful in developing an implementation plan. They are listed as:

1. Analyze the organization and its need for change. Leaders must understand the strengths and weaknesses of the organization and how the organization will be affected in order to

develop a successful implementation plan. This can be accomplished by use of the Wots UP model of organizational analysis.

2. Create a shared vison and common direction. This will assist the organization in achieving its goals.
3. Separate from the past. Discuss where the organization is today and where it will be in the future.
4. Create a sense of urgency. Understanding the need for change is critical to uniting an organization behind the change.
5. Support a strong leader role. A leader must be identified who will guide, drive and inspire the change.
6. Line up political sponsorship. This involves the identification of those who are the critical mass, and use of strategies to develop their commitment.
7. Craft an implementation plan.
8. Develop enabling structures.
9. Communicate and involve people, and be honest.
10. Reinforce and institutionalize the change.

Implementation Techniques

Utilizing these ten steps, an implementation plan can be formed. A transition leader must be identified. The transitional leader must create a state of urgency regarding the issue. This can be accomplished by reviewing the capabilities of DNA technology in its application to the investigation of sex crime cases, and by illustrating how it can be utilized to solve crimes that would otherwise not be solved. The transition leader will be responsible for persuading the

critical mass to move to a required level of commitment. This can be accomplished by bringing all members of the critical mass together for meetings to learn how each agency or unit can move the issue forward to a desired future. This process is important so all those in the critical mass understand each other's present role. These meetings also put members on record as to their support for crafting a plan that allows for full utilization of DNA technology in the investigation of sex crimes. After this process is completed, the transition manager can begin to map out the effort by setting goals with time lines, assigning specific responsibilities to involved personnel, and by publicly announcing and celebrating the achievement of goals. The transition manager must facilitate the development of enabling structures. This could include the formation of a task force to manage the change over a period of time and by providing necessary training in DNA technology to affected personnel. New reward systems could be developed, such as acknowledging officers for their proper use of DNA technology, much the same as they are commended for lifting fingerprints or locating stolen autos. The transition manager must also institutionalize the changes by incorporating it into policy. The change of operational procedures will affirm the importance of utilizing DNA technology and hasten its acceptance.

Evaluation

Evaluative methods must be established to measure both the transition progress and the results or outcome of the plan.

To ensure that the change is occurring, a review of progress needs to be ongoing. This review needs to done against previously agreed upon time lines. Progress reports should be generated and distributed to agency heads and others involved in the transitional process. When progress is not within time lines, problem solving techniques must be utilized to determine the

reason for the delay and determine a course of action to get the project moving so time lines are met and other components of the plan are not delayed.

Once the transition is completed, the merit of the change needs to be evaluated. This can be achieved by monitoring sex crimes cases and tracking the clearance rates of cases where DNA technology is utilized in suspect identification. Cases that do not utilize DNA technology should also be monitored to determine why DNA technology was not utilized and how the investigation could incorporate the use of DNA technology. Evaluation should be monitored on a monthly basis, with a report generated and distributed to affected agencies and personnel. The evaluative process should be institutionalized in department policy.

A circumspect transition management plan that considers and includes elements of commitment planning, implementation techniques, and an evaluative process will enable law enforcement agencies to fully utilize advancements in DNA technology to impact sex crime investigations.

CHAPTER FIVE

FINDINGS/IMPLICATIONS/RECOMMENDATIONS/CONCLUSIONS

Findings

Through this project, it has been determined that DNA technology is an extremely useful tool when investigating sex offenses. Effective use of DNA technology can result in the solving of cases that would otherwise go unsolved. Advancements in DNA technology now allow for quick, accurate results in DNA analysis and profiling. A data bank of known offender DNA profiles is administered by the Department of Justice and is available for local law enforcement use. Recidivism rates for sex offenders are high, making it more important that their offenses be thoroughly investigated with the latest in DNA technology. Quick identification and apprehension of sex offenders will enhance public safety and lessen further chance of additional violent attacks on members of our community. Local law enforcement agencies have been slow to embrace and fully utilize DNA technology. Personnel throughout the criminal justice system lack training and understanding of DNA and its relevance in sex crime investigation. There has been a lack of coordination amongst allied agencies in using available DNA technology. To impact this issue, leadership is necessary to formulate a strategic response and action plan to

move the organization to a desired future state where DNA technology is fully utilized to investigate sex crimes.

Implications on Leadership

The issue of effectively using DNA technology to impact sex crimes investigations has significant implications on leadership. Law enforcement is responsible for the investigation of crimes and providing for the public's safety. It is the leadership within the law enforcement agency that determines how crimes will be investigated and what degree of public safety will be pursued. The advancements in DNA technology create a tremendous potential for use in sex crime investigation. Law enforcement is continuously being challenged to incorporate new advancing technologies to enhance its delivery of service and crime fighting efforts. In jurisdictions where advanced DNA technology has been used, there has been a positive impact on the identification and apprehension of suspects involved in sex crimes. Agencies that are able to successfully integrate the use of new technologies will take a leadership role in establishing a futuristic approach regarding use of advanced DNA technology in sex crime investigations. Those agencies that fail to take a leadership role in the use of DNA technology risk facing the conditions portrayed in scenario three.

The agency leader has the opportunity to make a significant impact on what impact DNA technology has on the investigation of sex crimes. By virtue of their position, they can facilitate change, not only within their agency, but often in concert with changes in allied agencies. The management staff within the department has a leadership responsibility to assist the chief in the development of a strategic plan and transitional plan. The success of the agency in establishing what impact DNA technology will have on sex crime investigations will be dependent on the

vision and planning of the leadership.

Budgetary Implications

The desired state of providing full use of DNA technology to impact sex crime investigations is not without associated costs. The NGT process indicated there was a fair level of concern regarding costs associated with training of personnel, performing the DNA analysis, and purchasing of necessary materials and equipment to facilitate DNA testing. To helpoff set costs, research should be conducted on the availability of technology grants through both state and federal governments. Alternative training methods, such as use of video tapes and CD ROM, should be considered. Research should be conducted with private serological laboratories to determine the lowest costs for analysis in the event DOJ is not utilized. Private laboratories may be agreeable to contracting for lesser than customary fees to develop credibility in court.

Failure to use DNA technology to impact sex crime investigations could result in an increase in the crime rate for sex offenses, additional victimization with injury and possible death, and civillaw suits against the agency for failure to identify dangerous suspects. The public has an expectation that law enforcement agencies will use all available means to solve serious crimes. Failing to do so may also cause the agency to experience a loss of public trust and confidence. Although there may be increased costs with implementing use of advanced DNA technology, the costs associated with not using the technology may be more menacing.

Recommendations for the Future

Law enforcement leaders must take a progressive role in using advancements in DNA technology to impact sex crime investigations. They should develop strategic plans that include

creating events to influence trends to have a positive impact on the issue and create a desired future. Leaders must plan and work to avoid or mitigate events and trends that would have a negative impact on the issue. The following is a list of recommendations that leaders should consider when developing a strategic plan and attempting to influence trends and events to create a future desired state.

- Law enforcement leadership must work closely with federal, state, and local elected officials to ensure that they understand the importance of the issue and take action to address issues of financial resources.
- Law enforcement leadership must work with other allied agencies to develop streamlined processes for getting biological samples from the scene to the DOJ laboratory and to the data base for comparison.
- Steps should be taken to limit the staggering caseload of detectives by re-organizing the investigative bureau so the sexual assault unit investigates sexual assault cases only, while child abuse cases are forwarded to the family violence unit.
- There should be increased and continual training for officers, detectives, management staff, civilian evidence technicians and other personnel who are either involved directly or peripherally with DNA evidence.
- Agencies should aggressively pursue funding sources that would facilitate processing of DNA evidence.
- Agencies should support each other publicly as they work to address the issue.
- Agencies should aggressively pursue funding that would provide for new available experimental technology that could prove effective in utilizing DNA profiling.

- Ongoing research should be conducted on available DNA technology to determine new and additional ways to incorporate DNA technology into sex crimes investigation.
- The population of known sex offenders should be carefully monitored to ensure compliance with registration requirements and confirm that they have provided DNA samples for the data base.
- Law enforcement leaders should work through California Police Chiefs' Association, California Peace Officers' Association and Peace Officers' Research Association of California (PORAC) to support legislation requiring a statewide committee to oversee the processes for collection of DNA samples, DNA profiling, data base entry, and database use.
- Law enforcement leaders should support legislation that provides for coordination of state agencies' efforts regarding independent responsibilities.
- Law enforcement leaders must initiate legislation that provides sanctions against jurisdictions for failing to comply with existing state regulations regarding DNA profiling.
- Local law enforcement agencies should implement policies that require a skilled detective to be called to the scene of all sex crimes when there is a possibility biological evidence exists.
- Local law enforcement agencies should assign a sexual assault detective to work as a liaison with the Department of Justice regional crime lab to facilitate DNA analysis, profiling, and effective queries of the database.

Conclusions

DNA technology has advanced with lightning speed during the past five years. This technology can enable law enforcement to solve crimes that otherwise would go unsolved. The blending of computer technology, with DNA technology, allows for quick comparisons between suspect DNA profiles with known offender DNA profiles. The use of this technology can result in the quick identification and apprehension of suspects. Such technology cannot be ignored or go unused if law enforcement leaders are serious about controlling serious crimes in their communities. The challenges in creating liaisons, establishing procedures, and securing equipment to facilitate the use of DNA technology are great, but the benefits for the community greater. Law enforcement leaders can ignore DNA technology, do nothing, and allow the use of this technology to be dictated by others in the future. Or, they can take a leadership role in creating a preferred future by strategically planning to use the tremendous advancements in DNA technology to make a significant impact on sex crimes investigations.

ENDNOTES

1. Steven E. Barkin, *Criminology, A Sociological Understanding* (New Jersey: Prentice Hall, 1997), 290.

2. Mark Moodey, DNA Analysis in Forensic Science," *Bio Science* January 1989:39:3.

3. Terry Knowles, "Meeting the Challenges of the 21st Century," *The Police Chief* June 1997:39.

4. Marcia Clark, *Without a Doubt* (New York: Penguin Books, 1998), 473.

5. Ibid., 473.

6. Ibid., 483.

7. Frank Schmalleger, *Criminology Today,* (New Jersey: Prentice Hall 1999), 498.

8. Ibid., 499.

9. Beverly Merz, "DNA fingerprints come to court," *The Journal of the American Medical Association*. (1988) v259:2139.

10. Frank Schmalleger, *Criminal Justice Today* (New Jersey: Prentice Hall 1999), 696.

11. Ibid.

12. Frank Schmalleger, *Criminology Today*, 500.

13. Frank Schmalleger, *Criminal Justice Today,* 698.

14. Ibid.

15. Ibid.

16. Ibid.

17. Jim Yardley, "DNA Test Clears Man Jailed 15 Years on Charge of Rape," *New York Times* 8 May 2001: A:8.

18. Nation Briefs, "DNA links 2 to murders," *Fresno Bee* 24 March 2001:A:8.

19. Ibid.

20. National Institute of Justice Research Review, (1997) 20 October 2001. <http://www.ncjrs.org/pdffiles/13102-9.pdf>

21. Ibid.

22. Ibid.

23. Ibid.

24. Lee Goldberg, *Nanotechnology at Work: A Complete DNA Analysis Lab Packed Into a Microchip,* 11 January 1999. <http://www.findarticles.com.cf_0/m3161/1-47/53678480/print.jhtml>

25. Ibid.

26. Robin Lloyd, "Lab on a Chip May Turn Police Into DNA Detectives," *Washington Post* 1 March 1999:A:9.

27. United States Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, *Sex Offenses and Offenders*, February 1997, 25.

28. California Penal Code, West Group,1999.

29. Ibid.

30. California Department of Justice, About Cold Hit , 7 November 2001. <http://hosting.squaretree.com/coldhit/about.htm>

31. Ibid.

32. Audrey Cooper, "DNA Datalink Five felons to Rapes," Fresno Bee 7 February 2001:A:11.

33. California Penal Code, West Group, 1999.

34. Randall B. Dunham, *Nominal Group Technique: A User's Guide*, University of Wisconsin, 11 July 2001. <http://instruction.bus.wisc.edu/obdemo/reading/gnt.html>

35. Ruben T. Harris and Richard Beckhard, *Organizational Transitions: Managing complex Change* (New York: Addison-Wesley Publishing Company, 1987) 93.

36. Ibid., 95.

BIBLIOGRAPHY

Arthur, Charles. "Suspect's DNA goes on file," *New Scientist* March 25, 1995: 7.

Barkin, Steven E. *Criminology, A Sociological Understanding*. New Jersey: Prentice Hall, 1997.

California Department of Justice. Cold Hit Program Website. <http://hosting.squaretree.com/coldhit/about.htm>

California Penal Code, West Group, 1999:135-136.

Cooper, Audrey. "DNA Datalink Five Felons To Rapes." *Fresno Bee* 7 February 2001: A: 11.

Clark, Marcia. *Without a Doubt.* New York: Penguin Books, 1998.

Dunham, Randall B. *Nominal group Technique: A User's Guide*. University of Wisconsin. <http://instruction.bus.wisc.edu/obdemo/reading/gnt.html>

Fackelman, K. A. "Beyond the Genome: The Ethics of DNA Testing." *Chemical Engineering News* November 1994: 298-299.

Goldberg, Lee. *Nanotechnology at Work: A Complete DNA Analysis Lab Packed Into a Microchip,* 11 January 1999 <http://www.findarticles.com.cf_0/m3161/1_47/53678480/print.jhtml>

Harris, Ruben and Richard Beckhard, *Organizational Transitions: Managing Complex Change.* New York: Addison-Wesley Publishing Company, 1987.

Horgan, John. "High profile: Simpson case raises the issue of DNA reliability." *Scientifica American* October 1994:78-84.

Jick, Todd. "Implementing Change." Managing Change: Cases and Concepts. Irwin/McGraw Hill, 1993.

Knowles, Terry. "Meeting the Challenges of the 21st Century." *The Police Chief* June, 1997:24.

Los Angeles County Sheriff's Department Scientific Services Bureau. "DNA Testing Update." Crime Lab Bulletin. May 2001.

Lloyd, Robin. "Lab on a Chip May Turn Police Into DNA Detectives." *Washington Post* 1 March 1999:A:9.

Merz, Beverly. "DNA fingerprints come to court." *The Journal of the American Medical Association*. 1988:259:2139.

Moody, Mark. "DNA Analysis in Forensic Science," *Bio Science* January, 1989:39:3.

Nation Briefs. "DNA links 2 to murders." *Fresno Bee* 24 March 2001:A:8.

National Institute of Justice Research Review, 1997, 20 October 2001 <http://www.ncjrs.org/pdffiles/13102-9.pdf>

Schmalleger, Frank. *Criminology Today*. New Jersey: Prentice Hall, 1999: 498.

Schmalleger, Frank. *Criminal Justice Today*. New Jersey: Prentice Hall, 1999: 696.

Sensabough, George F. DNA Analysis In Biological Evidence: Applications of the Polymerase Chain Reaction,

Travis, Jeremy. "Automated DNA Typing: Method of the future." NIJ Research Preview. February 1997 U.S. Department of Justice Office of Justice Programs. Internet. October 31, 2001. <http://www.ncjrs.org/pdffiles/13102-9.pdf>

United States Department of Justice, Office of Justice Programs. Research Report. "Sex Offenses and Offenders." Bureau of Justice Statistics February 1997.

United States Department of Justice, Office of Justice Programs, National Institute of Justice. "The Future of Forensic DNA Testing." November 2000:13-51.

Weisburd, Stefi. "Fingerprinting DNA from a single hair." *Science News* April 23, 1988:133:17:9262.

Yardley, Jim. "DNA Test Clears Man Jailed 15 Years on Charge of Rape," *New York Times* 8 May 2001: A:8.

Zurer, P. "DNA profiling fast becoming accepted tool for identification." *Chemical and Engineering News* October, 10 1994:15-18.