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Cold Case Investigations:

A University Initiative

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Amber Fortney

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Cold Case Investigations:

A University Initiative

By: Amber L. Fortney

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A THESIS

APPROVED FOR THE W. ROGER WEBB FORENSIC SCIENCE INSTITUTE

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"Whatever you do, work at it with all your heart, as working for the Lord, not for human masters." – Colossians 3:23 NIV

THESIS ABSTRACT

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ABSTRACT: Despite technological advancements and improved methodologies in forensic science and investigative practices, cold cases are a growing problem in the United States. Although there has been a surge in interest in solving cold cases due to advancements in technology, there has been very little research conducted on cold case investigation methodology. Many agencies lack the personnel and resources to devote adequate attention to cold cases. Federal dollars spent on cold case resolution in recent years focused only on those cases that could benefit due to improvements in DNA analysis techniques. The literature demonstrates that advances in other forensic disciplines can provide answers in unsolved crimes. Additionally, it has been shown that investigations often benefit simply from a case file review by a fresh set of eyes. This research was conducted to develop best practices guidelines for a cold case program in a collegiate setting in partnership with a law enforcement agency. Information from a variety of sources was reviewed to develop guidelines that would address the needs of all parties to such a collaboration. A manual entitled “Best Practices & Guidelines for the Implementation and Management of a Cold Case Program in a Collegiate Setting” was produced as a result of this research. This manual is intended for use by institutions of

higher learning with a focus on educating students for careers in the field of forensic science and will assist instructors in implementing an upper level course for students to engage in the review and analysis of case files pertaining to unsolved crimes designated as cold cases by the collaborating law enforcement agency. Such a course is ideally suited to graduate students and as an in-house practicum for seniors.

KEYWORDS*: cold case, investigation, unsolved, homicide, forensic, university, college, task force, methodology, experiential learning*

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CHAPTER I

Introduction

Background

While the definition of a cold case may vary from agency to agency, the National Institute of Justice defines a cold case as "any case whose probative investigative leads have been exhausted" (Heurich, 2008). Crimes go unsolved for a variety reasons. For example, technology at the time of the event may be inadequate to analyze the evidence. Witnesses with knowledge about the offense may be hostile or afraid and unwilling to cooperate with the investigation. Investigators may have inadequate time to devote to the investigation and properly work the case. Evidence may have been improperly handled (Spraggs, 2003). In addition, there are often issues within law enforcement agencies that contribute to the likelihood of cases going cold. For example, rising crime rates within a jurisdiction increase caseloads on individual investigators. Budget shortfalls lead to understaffed departments, overworked investigators, and a lack of investigative resources. Backlogs develop and the outcome is often a sub-par work product. Delays in the processing of evidence can cause other pieces of the puzzle to be overlooked or opportunities to gather additional evidence or apprehend a suspect to be missed. Also, in today's atmosphere, high profile and mass incidents can expend resources disproportionately, causing other things to fall through the cracks (Turner & Kosa, 2003). Finally, addressing the issue of wrongful convictions has the potential to increase the number of cold cases. When a conviction is overturned, the crime for which the

exonerated individual was convicted will become an unsolved case. In approximately half of DNA-exoneration cases (149 of 307), the actual perpetrator was identified, and it was found that they had gone on to commit more than 120 violent crimes including rape and murder subsequent to the arrest of the wrong individual (Acker, 2012). If reexamination of the evidence does not lead to a legitimate suspect, the case is likely to become a cold case, effectively remaining unsolved since the crime was committed and throughout the entire period of time that the exoneree was incarcerated.

The resolution of cold cases has the potential to benefit our justice system in a number of ways. The cold case status of an investigation may allow for additional crimes to be committed due to a couple of reasons. Allowing the killer to remain free extends to him or her the opportunity to commit additional crimes. Additionally, the perceived inability of an investigative agency to solve crime and apprehend the suspect may lead others to believe they too can escape punishment if they were to engage in criminal activity. The solving of a cold case brings with it the potential resolution of other cases. The perpetrator of the crime may have been involved in other unsolved crimes, often in other jurisdictions, that were previously believed to be unrelated. Alternatively, apprehension of the guilty party may lead to information about acquaintances of the suspect and their involvement in other criminal activity. Finally, the community may become less likely to cooperate with police due to a loss of confidence when cases they care about remain unsolved, thereby compounding the difficulty in solving other cases (Turner & Kosa, 2003). Succinctly put, the failure to resolve cases where the possibility exists is a failure to serve justice.

Problem Statement

Over the last fifty years, homicide clearance rates have fallen steadily from more than ninety percent in 1960 to a current rate of approximately 60%. Meanwhile, after a 20-year period of declining homicide rates in the U.S., the FBI's Uniform Crime Report has revealed a rise in homicides of approximately 8% during the reporting years 2015-2016 (Asher, 2017). These trends, should they continue, will contribute to a rising number of cold case homicides, further burdening our criminal justice system and failing society as a whole.

Funding awarded to law enforcement agencies under the "Solving Cold Cases with DNA" grant program peaked in 2008 at $18,050,897 and had declined to $2,758,721 by 2015. Most law enforcement agencies do not have personnel dedicated to cold case investigation units. Instead, detectives review cold cases when their caseload of active investigations allows. Some agencies avail themselves of retired investigators willing to work cold cases on a volunteer basis. Law enforcement agencies within the state of Oklahoma have numerous cold case files waiting to be reviewed. As time passes and technology advances, cases that have been previously reviewed may benefit from another look.

Significance of the Study

Although there has been a surge in interest in solving cold cases due to advancements in technology, there has been very little research conducted on cold case investigation methodology. Several universities have implemented cold case programs, but it is not clear if a standard methodology is being applied in these programs. It appears that the structure of the programs varies from college to college. It is important to

ascertain if cold case investigations may benefit from unconventional investigative means and personnel not typical of traditional criminal investigative backgrounds. It is conventionally believed that cold-case investigators should be veteran detectives. However, some university programs have demonstrated success due to the up-to-date educations of their students and the enthusiastic interest that they possess.

A cold-case investigation program in a university offers students the opportunity to gain real-world experience unparalleled by curriculum-based academic endeavors. Additionally, such a program could provide a valuable service to our community in assisting law enforcement agencies state-wide. Supervised and mentored by the inimitable and highly-accomplished faculty of the Forensic Science Institute, our students possess the ability to aid law enforcement agencies in conducting administrative reviews of case files pertaining to cold case investigations.

CHAPTER II

Review of the Literature

History

The homicide clearance rate, as defined by the FBI's Uniform Crime Report, is the ratio of the number of cases solved in a year compared to the number of new cases arising in that same year (FBI, 2018). Homicide clearance rates have been declining over the last fifty years, from more than 90% in 1960 to a current national average of approximately 60% (see Figure 1).

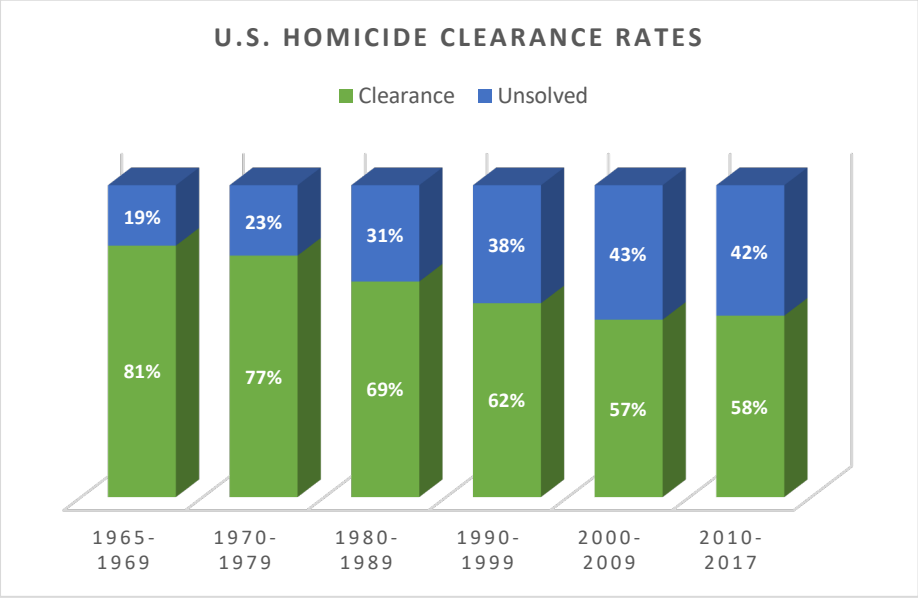

Figure 1: Homicide clearance rates (FBI, 2018; MAP, 2019)

The decline during the 1970s and most of the 1980s may be generally understood and expected, but most people would probably have assumed that the advent of DNA technology in the late 1980s would have made it easier to solve homicide cases and resulted in improved clearance rates since that time. However, experts say that while new

tools such as DNA analysis have helped, their advantage has been offset by other factors, such as higher standards for charging someone, worsening relations between police and the public, and the changing nature of crime (Kaste, 2015). Prior to the 1970s, most homicides involved a victim and perpetrator who knew each other, requiring investigators to look no farther than the sphere of family, friends, and acquaintances of the victim to find their suspect. Contrastingly, by 1992 more than half of homicides were either stranger-on-stranger or committed by an unknown assailant (Davis, Jensen, Burgette, & Burnett, 2014). Declines in clearance rates translate to an increase in the number of cold cases every year. It is estimated that more than 300,000 murders have gone unsolved since 1965 (see *Figure 2*).

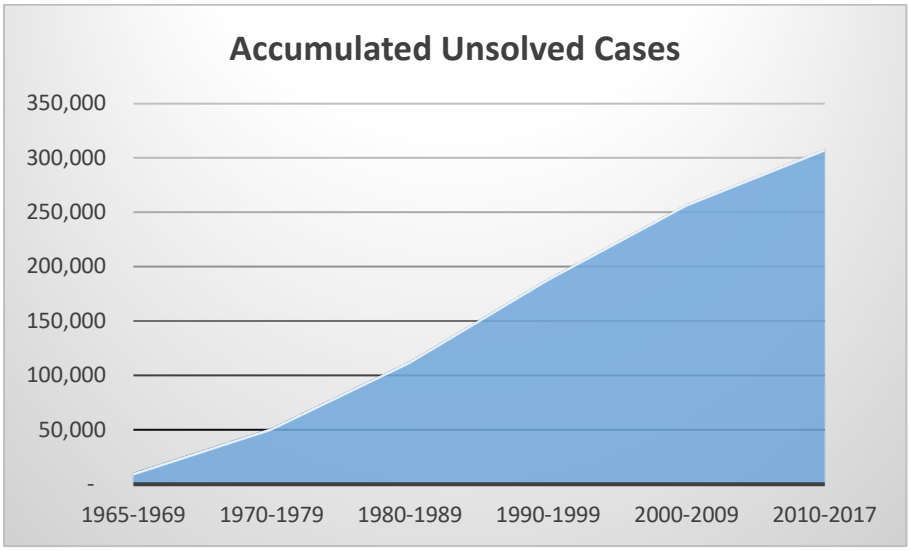

Figure 2: Cumulative number of unsolved cases (MAP, 2019)

Rationales

Due to the development of DNA technology in the late 1980s, law enforcement agencies commenced the review of cold cases with the purpose of determining which case files contain evidence that could thereby be analyzed. In so doing, investigators have realized that, even in the absence of biological evidence, cold cases can often benefit

from a second look. Advancements in DNA extraction and analysis over the last three decades have been accompanied by additional developments in other forensic areas as well as in the investigative arena. Simply taking another look with a fresh set of eyes can shed new light on an investigation (Davis, Jensen, & Kitchens, 2011; Spraggs, 2003; Turner & Kosa, 2003). As stated by Sir Arthur Conan Doyle's (1894) inimitable detective, Sherlock Holmes, "Nothing clears up a case so much as stating it to another person" (p. 3). Often, revisiting the case leads to the realization that changes due simply to the passage of time can affect what information can be gathered from witnesses who were previously uncooperative. Investigators have found that an intensive focus of resources on unsolved cases may bring about resolution previously thought unattainable (Davis, Jensen, & Kitchens, 2011; Spraggs, 2003; Turner & Kosa, 2003).

There are certain factors that are on the investigator's side in reopening a cold case. Critical pieces of evidence that may have been overlooked in initial investigation can be rediscovered and recognized for their significance and then processed utilizing current technology. Advances in areas such as DNA analysis, fingerprint development, and other visualization techniques can reveal evidence not previously obtainable. The development and evolution of forensic databases and new search techniques can provide critical leads for the investigator to follow. Latent prints have been developed on evidence collected in the 1940s. DNA profiles can be obtained from evidence in decades-old cases provided the item has been properly stored (Davis Jensen, & Kitchens, 2011; Spraggs, 2003).

Hindrances. There are practical matters that may hinder an agency's ability to review and reinvestigate cold cases as well. There may not be sufficient staffing or

funding to devote to cold case investigation; active investigations, rightfully so, are the priority. Unfortunately, witnesses may still be uncooperative. Those parties essential to the investigation, such as suspects, witnesses, or even surviving co-victims may have since died or become difficult or impossible to locate. Finally, there is often discouragement on the part of individual investigators or at the departmental level due to individual case failures (Turner & Kosa, 2003).

Unfortunately, the evidence needed to resolve an investigation may have been irretrievably lost over the years. Biological evidence may degrade, and fingerprints may be obliterated. Photographs and negatives may fade, and digital storage media may be corrupted. Pieces of evidence may have been lost or destroyed. Cold case investigation can be confounded by the fact that they receive low priority in the forensic laboratory due to backlogs in current investigations. Additionally, you may run into difficulties inherent in cold cases: subjects and witnesses die or cannot be located. The ugly truth is that some cold cases will remain unsolved despite the best efforts of investigators (Spraggs, 2003; Turner & Kosa, 2003; Walton, 2006).

Factors for Success. In a study published in the Journal of Forensic Sciences, researchers found that certain factors were instrumental in cold case clearance. New information from witnesses was a factor in sixty-three percent of the cases sampled, and new information from informants was a factor in fourteen percent. Physical evidence was a factor in thirteen percent of sampled cases. Links to other crimes was a factor in eleven percent. DNA identification was a factor in only three percent of sampled cases, and confessions were a factor in only two percent of sampled cases (Davis, Jensen, Burgette, & Burnett, 2014). Although the statistics regarding forensics seem relatively low, there is

little difference when compared to the statistics for prosecutions of homicides. In a study of five jurisdictions, researchers found that twenty-eight percent of 400 prosecuted homicide cases from 2003 had latent prints and less than five percent had DNA tying the defendant to crime (Peterson, Sommers, Baskin, & Johnson, 2010). Similarly, a study of homicide cases from 1996 to 2003 showed that while DNA evidence had been collected in approximately thirty-nine percent of cases, DNA profiles were available to investigators in only 6.7 percent of cases at the time the suspect was charged (Schroeder & White, 2009).

Efforts and Cost

Efforts have been undertaken at multiple levels to resolve cold cases. In 2006, the FBI established the Cold Case Initiative to reinvestigate unsolved Civil Rights homicides predating 1970. Stating that they recognize that the legal and factual challenges are enormous, still they pursue all avenues toward resolution because of their moral conviction – that even where cases are not prosecutable, it is still important to provide answers to family members of victims. Therefore, they instructed their fifty-six field offices to review their files to determine which cases merited review under those parameters (U.S. Department of Justice, 2015).

In 2004, the National Institute of Justice began its "Solving Cold Cases with DNA" grant program to provide agencies with the resources to identify, investigate, and analyze cases that have potential to be solved through DNA analysis. Funds can be used for personnel, equipment, supplies, training, outsourcing, or travel. Some agencies use these funds to establish a cold case unit; others use internal resources or a combination of federal funds and internal resources (Heurich, 2008). Some agencies, as well as other

non-government organizations, have established public websites to try to gather and disseminate information on cold cases.

According to a 2004 report, medical examiners and coroners take in more than 4,000 unidentified decedents per year. Approximately 1,000 of those remain unidentified a year later and become cold cases. In 2005, an effort began to implement a central reporting system to address this problem. As of 2007, medical examiners throughout the country reported more than 40,000 sets of unidentified human remains held in their evidence rooms (Ritter, 2007). The National Missing and Unidentified Persons System (NamUs) became fully searchable in 2009 and provides the ability to search the missing persons database against the unidentified decedent database. It is searchable and accessible by everyone including members of the general public. NamUs also provides forensic resources to assist agencies in the fields of odontology, fingerprinting, DNA and forensic anthropology free of charge for comparisons of missing persons to unidentified remains (University of North Texas, n.d.).

From 2005 to 2015, the National Institute of Justice issued 221 awards to state and local agencies totaling more than 85 million dollars. The Oklahoma State Bureau of Investigation received close to one million of those dollars over a two year period (National Institute of Justice, n.d.). A study on cold case units conducted by RAND Corporation found that cold case reviews led to the conclusive identification of a suspect in one in five cases with one in twenty resulting in an arrest and a conviction secured in one in one hundred. Approximately fifty-six percent of cold case units are grant funded; the remaining forty-four percent are internally funded by the agency or jointly with a group of agencies. The study found that the median cold case allocation is about $35,000

(Davis, Jensen, & Kitchens, 2011). A study of cold case investigation units in Texas found that thirty-six percent of investigators' time was consumed by reviewing case files while twenty-five percent was spent locating and interviewing witnesses, twenty-one percent reviewing physical evidence, and twelve percent conferring with former investigators (Reyes, 2009).

Advances in Forensic Science

As previously discussed, DNA analysis has been instrumental in the process of cold case review. In the absence of this technology prior to the late 1980s, investigators could not identify a suspect solely on the basis of biological material left behind at the crime scene. With the advancement from Restriction Fragment Length Polymorphism (RFLP) to Polymerase Chain Reaction (PCR) amplification and Short Tandem Repeat (STR) analysis, samples previously unsuitable for analysis can now yield DNA profiles. We can get a DNA profile from a much smaller sample. Therefore, samples that previously yielded inconclusive results can now be reanalyzed using newer methods. A DNA profile can be derived from a few skin cells (NIJ, 2002).

Fingerprint development has advanced as well. Cyanoacrylate fuming was introduced as a way to develop latent prints in 1982. Unlike other development mediums like ninhydrin which has been used for fingerprint development since the early twentieth century, cyanoacrylate fuming is useful on a variety of surfaces which are unsuitable for other development methods. The amino acids and proteins in latent fingerprints can subsist for decades allowing for recovery of prints on properly stored evidence to now be developed with modern techniques. Recent research has shown that aged fingerprints can be enhanced with ionizing radiation to increase visualization of minutiae through

cyanoacrylate fuming (Ristova, Radiceska, Bozinov, & Barandovski, 2016). British scientists have developed a method for developing fingerprints on smooth, shiny fabrics using cyanoacrylate fuming followed by infrared spectral mapping (Sonnex, Almond, & Bond, 2016).

The use of chemicals and the invisible light spectrum for the enhancement of bloodstains are additional advancements in the field of forensic science. Luminol began to commonly be used to visualize otherwise invisible bloodstains in the 1970s. More recently other chemical enhancements such as Amido Black, Leuco Crystal Violet, Hungarian Red, and BlueStar are being used (Walton, 2006). The use of lasers to reveal latent evidence began in the 1970s with the Royal Canadian Mounted Police. However, the original units were large and unwieldy. Since the 1990s, the adaptation of high intensity incandescent lamps allowed for lightweight alternate light source (ALS) machines capable of providing an intense beam of varying wavelengths, enhancing the ability to visualize an abundance of latent evidence. (Penven, n.d.).

DNA phenotyping which uses DNA from biological materials found at crime scenes to predict appearance traits and ancestry of the source became commercially available in late 2014. Parabon NanoLab's Snapshot can create a rendering of a suspect by plugging an individual genetic profile into a predictive tool. It yields an image in a matter of minutes, which can make it invaluable in active cases. Its ability to put a face on an unknown suspect can also aid cold case investigations by allowing people who recognize someone they know in that rendering to provide a name or other identifying information to police. Faces jog memories in ways that verbal descriptions cannot. The first investigative use of DNA phenotyping was the 2011 double homicide of a mother

and daughter in Columbia, South Carolina. However, that case was solved in March of 2017 through advancements in palm print analysis and comparison techniques. Meanwhile, DNA phenotyping is being used to solve cases in several other jurisdictions including Colorado, Idaho, Louisiana, Maryland, North Carolina, and Texas. To date, approximately one hundred picture profiles have been developed by Parabon with about a dozen leading to suspects, one of which resulted in court conviction (King, 2017). Of course, critics are still debating the accuracy and usefulness of this technology. The Snapshot tool has been validated by several law enforcement agencies at federal, state, and local levels. In 2015, Parabon announced a blind validation study conducted in collaboration with Dr. Bruce Budowle of The Institute of Applied Genetics at the University of North Texas. Results of that study are still pending (Parabon NanoLabs, 2015).

Databases. There are a number of forensic databases that are useful in active investigations and are similarly useful to varying extent in cold case investigations as well. Often, cold cases preceded the advent of computerized databases; even in those cases that have arisen since forensic databases came into existence, it is likely the search capabilities and capacities of the databases have become more powerful and sophisticated over time.

CODIS is the Combined DNA Index System maintained by the Federal Bureau of Investigation. It contains the DNA profiles of convicted offenders and missing persons, as well as profiles from biological evidence recovered at crime scenes, and DNA profiles of arrestees in certain states. The database contains more than 12 million offender profiles, 2.6 million arrestee profiles and over 750,000 forensic profiles as of February 2017.

Suitable for submission are DNA data generated through PCR Short Tandem Repeat (STR) technology, Y chromosome STR (Y-STR) technology, and Mitochondrial DNA (mtDNA). CODIS is credited in the resolution of thirty cold cases during the first year of grant funding by the National Institute of Justice (Heurich, 2008). The weakness of CODIS is that there can be no match if the subject is not already in the system. However, newer technology and methodology can be of assistance where a traditional CODIS search has failed to identify a suspect. Commonly known as familial DNA searching, a deliberate trolling technique can be used to search for close biological relatives. This search method compares short tandem repeats (STR) at specific loci. Persons who are biologically related to each other will have more of the same repeat patterns than persons who are not biologically related. Through this search technique, CODIS is capable of providing a list of possible relatives of the unknown donor, given that their profiles are in the system (Wade, 2015; Walton, 2006).

Familial DNA has been used successfully in cold case investigations like the Grim Sleeper, a serial killer who operated in California for more than twenty years. DNA from the crime scene had provided no identifications through CODIS. A familial DNA search was requested in 2010, leading investigators to Lonnie Franklin through a similar DNA profile from Franklin's son who was in the system due to a federal weapons violation. Several states have enacted laws permitting and governing the use of familial DNA searching, including California, New York, Colorado, and Florida (Maguire, McCallum, Storey, & Whitaker, 2014). Despite the New York statute, the NYPD has declined to allow familial DNA searching on any of its cases due to concerns about confidentiality and indemnification. However, in September 2018 the NYPD reached an agreement with

state officials effectively allowing its use in unsolved homicide and rape cases (DeStefano, 2018). Some states allow the use of familial DNA searching without enacting laws specific to the practice. However, the technique was categorically banned by the state of Maryland in 2003 (Maguire, McCallum, Storey, & Whitaker, 2014).

In 2018, cold case investigators turned to genetic genealogy in an effort to bring resolution to decades-old crimes that had previously proven unsolvable using traditional forensic methods. Genealogical DNA testing differs from traditional DNA testing in that it uses single-nucleotide polymorphisms (SNPs) rather than short tandem repeats in the genome for comparison. Uploading a genealogical DNA profile of an unknown subject to an open-source database such as GEDMatch allows for comparison of the submitted profile to other genetic profiles within a database. The degree of relatedness is quantified and the list of individuals who share DNA with the unknown subject are returned to the user in a matrix. From that matrix, experienced genealogists triangulate from at least two individuals to find a common ancestor and then construct a family tree of all descendants using traditional genealogy methods. Aided by genealogist Barbara Rae-Venter, Paul Holes, an investigator with the Contra Costa County District Attorney's office, used genetic genealogy to search for the identity of the Golden State Killer. Although GEDMatch provided a list of results within 24 hours, it took approximately two-and-a-half months for the team to find a common ancestor and an additional two months to construct a family tree. From that point, it was a matter of traditional police work to determine which individuals could be their suspect (Ferguson & Morford, 2018a). Ultimately, their work led to the arrest of Joseph James DeAngelo by the Sacramento County Sheriff's Department on April 24, charging him with eight counts of murder.

DeAngelo is believed to have committed numerous burglaries, more than fifty rapes, and at least thirteen murders from 1974 to 1986 (Murphy, 2018b). The reported resolution of cold cases in other jurisdictions across the nation quickly followed, and the technique is now being used in active investigations as well as cold cases (Murphy, 2018a). Parabon NanoLabs recently announced the addition of genetic genealogy to the services offered to law enforcement agencies. Their genetic genealogy unit, led by genealogist CeCe Moore, has screened DNA samples from nearly 100 agencies. "Of the cases we have screened, 20% look to be directly solvable with GG methods alone and another 30% are likely solvable in partnership with law enforcement," states CEO Steven Armentrout (Parabon NanoLabs, 2018). According to Armentrout, the genetic genealogy unit at Parabon is working on more than fifty cases at the time of this writing (Ferguson & Morford, 2018b).

IAFIS, the Integrated Automated Fingerprint Identification System, is a national computerized system that allows fingerprints found at a crime scene or of a person of interest to be compared to a database of known fingerprints and unidentified crime scene prints maintained by the FBI. Although the FBI has been collecting fingerprint records since 1924, efforts to automate began in 1960s. During that time several companies and agencies came up with their own systems. This resulted in Automated Fingerprint Identification Systems (AFIS) on multiple platforms in different jurisdictions that were incompatible with each other. To address the compatibility issue, the FBI implemented IAFIS in July 1999, allowing for the search of fingerprint records and crime scene prints across jurisdictions nationwide. As with all databases, the system is useful in identifying a suspect only when the unknown subject’s prints are already in the database (CJIS, 2014;

Walton, 2006). Historically, the IAFIS system has contained only fingerprints. However, in 2007, the FBI began the implementation of Next Generation Identification (NGI) to replace IAFIS in a series of phases. The system became fully operational in 2014 with a more powerful fingerprint-matching algorithm that improved accuracy from 92 percent under IAFIS to 99.6 percent using NGI. Increment 3 of the rollout introduced the ability to search palm prints within the database and expanded searches to include the Civil Repository and the Unsolved Latent File (CJIS, 2014; CJIS, n.d.).

Efforts to automate searches of firearm components for the purpose of identifying the firearm used in a particular crime began in 1992 but were not fully implemented until 2000. NIBIN is the National Integrated Ballistic Information Network, maintained by the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). It allows for searches of spent cartridge cases and bullets from crime scenes against the database to try to identify the firearm used in a crime by comparing marks left on the ammunition components such as firing pin and breech face impressions on spent cartridge cases and striations in land impressions on bullets. Additionally, the search results can indicate links to other crimes already in the system. A limitation to NIBIN's effectiveness is that it is restricted to guns used in crimes due to a reluctance to database firearms as they are produced (Budden, 2001).

The Forensic Anthropology Data Bank began in 1986 and is maintained by Forensic Anthropology Center at the University of Tennessee aided by a grant from the National Institute of Justice. The database aids forensic anthropologists in determining the age, sex, stature, and ancestry of a person from their skeletal remains. Its usefulness

in cold cases should be apparent in its capability of assisting in the investigation of unidentified human remains (Forensic Anthropology Center, n.d.).

The FBI's footwear reference collection started out as a file cabinet of photographs in 1935. At that time, there was not a lot of variation of outsoles, being generally comprised of leather outsole with leather or wooden heel, sometimes including a hard rubber portion and nondescript pattern. The 1950s saw the introduction of specialty athletic shoes and since then there has been an exponential increase in outsole design variations. The FBI's database was computerized in the 1980s and now contains more than 14,000 designs (Bodziak, 2000). There are a few commercially available footwear and tire databases, such as TreadMark, SoleMate, and TreadMate (Bowen & Schneider, 2007). Unfortunately, these databases are only able to provide information on the basis of class characteristics. In an active investigation, this might be helpful in directing the investigation. However, it is probably not as helpful in a cold case because the opportunity for further investigation led by such a match has long since passed. Without a known exemplar for comparison taken in a timely manner, no efforts approaching an identification can be made. Likewise, linking the impression to a particular suspect may be impossible (Bodziak, 2000).

Advances in Investigative Tools and Techniques

In addition to advances in forensic science, there have been significant advances in investigative tools and techniques from which cold case investigations can benefit, such as services provided by federal law enforcement agencies, data analysis software, mass communications, and other innovative methods.

The Federal Bureau of Investigation provides assistance to state and local law enforcement agencies through the Violent Criminal Apprehension Program (ViCAP) and Criminal Investigative Analysis. ViCAP was implemented in 1985, with its purpose being to identify cases exhibiting similar characteristics. Data is collected on solved and unsolved homicides or attempted homicides, particularly those that involve abduction, appear random or motiveless, are sexually motivated, or are believed to be part of a series, and on missing person cases believed to involve foul play and unidentified victims of homicide. By the mid-1990s, the FBI realized that only three to seven percent of homicides were being reported to ViCAP. State and local agencies were neglecting to submit case information because the lengthy forms necessary to submit a case were too cumbersome and time consuming. This led the FBI to revamp the system to make it more user-friendly and affordable (Witzig, 2003). A great advantage of ViCAP is that once a case has been submitted, it is continuously compared to other cases in the system. When it identifies a similarity or pattern, the submitting agencies are notified so that they can follow up on new leads. ViCAP assists investigations in a variety of ways: specifying types of evidence that should be searched for; recommending and providing unique laboratory tests to be conducted; and storing images related to cases (Walton, 2006). It is important to keep in mind that the types of cases ViCAP targets bear characteristics that make them susceptible to going cold – stranger-on-stranger or random homicides, those with absent or unclear motives, and cases involving unidentified bodies and missing persons.

The FBI began providing criminal investigative analysis services to law enforcement agencies in the 1970s. Profiling methods, crime scene analysis, geographic

profiling, and victimology assessment are used to provide leads for investigators. The profile generated can provide information pertaining to lifestyle, race, gender, emotional age, marital status, level of education, occupation and work history of the offender. This requires a comprehensive review of case materials including police reports, crime scene photographs, autopsy reports and photographs, victim and witness statements, victimology and forensic reports (O'Toole, 1999). Cases predating the 1970s and even well into that decade may benefit because law enforcement agencies do not always avail themselves of such services. As with the low submission rate for ViCAP which was well below ten percent over an approximate ten-year period (Walton, 2006), the offer of assistance through criminal investigative analysis may have been similarly unheeded.

There are now computer programs for organizing and analyzing investigative data. For example, IBM provides the i2 Analyst's Notebook. It can be used to create timelines and organize complex and confusing information, allowing investigators to see how pieces of a puzzling investigation fit together to form the big picture. In some cases, patterns or trends are revealed that provide new leads and, in some instances, indicate the specific crime being investigated may be linked to other crimes (Spraggs, 2003).

There are continuing advances in communications that can aid investigations, such as 24- hour national news services, the Internet, telephone services like Crime Stoppers, and various social media platforms. Each of these have proved useful in active investigations and have the potential to provide assistance in the collection and dissemination of information pertaining to cold case investigations, as well. The prevalence of television programs, books, and movies focusing on cold case investigations indicates that there is significant public interest in cold case homicides.

Sometimes all it takes to jumpstart a stalled investigation is to spark public interest or reach just the right individual.

Finally, there have been innovative efforts undertaken by various agencies. Cold Case Playing Cards are just such an endeavor. Inspired by playing cards distributed in the hunt for members of Saddam Hussein's regime during the Iraq War, the Florida Department of Law Enforcement distributed 100,000 decks of cards in the state's prisons featuring 104 cold cases. This simplistic yet clever approach led to the resolution of three murders in just three months. The same concept helped solve several crimes in Connecticut, and since 2005, Cold case playing cards have been introduced in seventeen more states (Neyfakh, 2016).

Cold Case Investigation Methodology

The methodology of cold case investigation involves a review of the case file, consultation with previous investigators, identifying and locating persons to interview and/or research, developing leads to follow, assessing evidence for additional analysis, and composing a thorough summary of the case for further investigation (Spraggs, 2003; Turner & Kosa, 2003). Case material is likely to include patrol reports, detectives' notes, laboratory reports, photographs, crime scene diagrams, witness lists, lead sheets, and suspect information. After reinvestigation, a cold case is considered closed if there is an arrest, with or without prosecution. If it is determined that the suspect is found to be dead or otherwise unavailable for prosecution, then the case will be closed administratively (Lord, 2005; Spraggs, 2003).

Ideally, case files would be organized into three-ring binders. It would be a cold case investigator's dream to find case files so well-organized. The reality is that often a

case file is a collection of documents thrown haphazardly into a cardboard box. In some instances, evidence may be improperly included in the case file rather than properly packaged and stored. The contents of the case file may pose unique problems for the cold case investigator. Handwritten reports and statements can be confounding for the new investigator who does not have the advantage of being in on the original investigation. It is not nearly as hard to read something that is almost illegible if you know what it is supposed to say. Equally as problematic as poor penmanship would be the inability of the author to spell or to construct a coherent sentence. Deciphering such writings can take an inordinate amount of time on the part of the cold case investigator. The case file will probably contain media that poses its own problems. Photographs and negatives may be faded sometimes to the point of being of no value. Documents and audio/video files may be stored on obsolete media such as floppy disks or cassette tapes (Spraggs, 2003).

Cold Case Task Force. Jurisdictions may form cold case task forces when they have a large volume of unsolved case or when budgets allow or when a decline in their regular caseload affords them the time to devote to cold cases. A cold case task force may consist of dedicated investigators or investigators with other duties (Turner & Kosa, 2003). Volunteers and retirees are sometimes used. Some task forces are interdepartmental or interjurisdictional depending on the volume of cold cases. Unfortunately, police agencies often lack the manpower, equipment, and funding necessary to support a dedicated cold case unit. Often they are backlogged with active cases leaving cold cases to rarely get the attention they deserve (Heurich, 2008).

University Programs

Because of the overwhelming number of cold cases in some jurisdictions, quite a few have enlisted the help of criminal justice and forensics programs at universities and colleges around the country. Faculty and students work together, in collaboration with law enforcement representatives, reviewing cold cases to identify leads to be followed and forensic testing to be conducted. Students in these programs undergo a rigorous selection process involving applications, background and criminal history checks, and interviews with faculty and detectives. Applicants are made to sign a confidentiality agreement, at risk of prosecution for obstruction of justice if broken. Tasks for the students include pouring over volumes of police reports and organizing, tabbing and indexing them; crafting evidence lists; writing case summaries; and scheduling witness interviews (Bagley, 2016; Christenson, 2016; Dietz, 2012; Evans, 2011; Faust, 2017; Morrisville State College, 2017; Pollastrini, n.d.). According to Michigan detective Tim Kozal, "A fresh, enthusiastic set of eyes looking at a well-worn police report can be a real advantage." He recalls "several years ago in Kalamazoo, a college intern assisting in the review of police reports in a long-unsolved case who caught something police had missed that actually solved the case." Kozal says student involvement in that case was worth its weight in gold (Bagley, 2016).

Conclusion

Justice demands truth. The foremost principle of forensic science is that its purpose is to seek the truth. As forensic scientists we strive to be objective and unbiased. We must not concern ourselves with whether or not a particular suspect will be convicted of the crime in question. Our aim is to reveal the truth of a matter and to be ready and

able to communicate that truth to the trier of fact should the case come before the court. The rash of overturned wrongful convictions in recent years is a stark reminder that our justice system has failed in some cases to uphold one of its prime tenets – that it is better that ten guilty persons go free than one innocent person be imprisoned. By the same token, the anticipated likelihood of prosecution should not be a determining factor in whether or not truth should be pursued. Providing answers to those affected by a crime has an inherent value that should not be ignored by our justice system. Leaving cold cases unsolved until all those directly affected have passed beyond our reach is a failure to serve justice as well.

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CHAPTER III

Research Purpose

Purpose Statement

According to cold case experts, the essential traits of a cold case investigator include the following: seniority, strong communication and interpersonal skills, strong research skills, patience, creativity, persistence, a high level of motivation, enthusiasm for the job, and additional training about modern criminalistics technology (Turner & Kosa, 2003). The faculty and student body of the W. Roger Webb Forensic Science Institute at the University of Central Oklahoma consist of esteemed retired investigators and first-rate forensic science and criminal justice students at both the undergraduate and graduate level, providing the human resources necessary to help make a difference in obtaining justice for victims of cold cases. The purpose of this research is to explore the structure and protocols of existing cold case units within the state of Oklahoma and cold case investigation programs at universities around the U.S. with the goal of designing an effective protocol for case review and a discerning selection process for the admittance of students into a cold case review program. This program should provide a needed service to law enforcement agencies within the state of Oklahoma while enhancing the educational experience of students in the Forensic Science Institute.

"Any truth is better than indefinite doubt" (Doyle, 1894, p. 45).

~Sherlock Holmes

Methods

Participants & Data Collection

The research will include consultations with cold case units in law enforcement agencies within the state of Oklahoma. A collaboration between the Forensic Science Institute and the Tulsa County Sheriff's Office Cold Case Task Force will provide the opportunity for observation and participation in case file review. Law enforcement agencies within the state of Oklahoma will be queried regarding their procedures and protocols for case file review and to ascertain the specific needs of the agencies that could benefit from the proposed university cold case program. Existing university cold case investigation programs will be surveyed to ascertain their protocol for case review and the type of program through which students collaborate with law enforcement agencies.

Limitations

This study will be limited by the fact that it is not feasible to include all law enforcement agencies within the population from which to sample. Additionally, many agencies have no dedicated cold case unit or standard protocol for reviewing cold cases making it difficult to compare and assess best practices in reviewing case files. Little research had been done on cold case investigation methodology. Furthermore, the source of information pertaining to university cold case investigation programs is limited to media reports. Therefore, it is unknown how many such programs are in operation in the United States.

CHAPTER IV

Cold case investigations: Developing best practices and guidelines for cold case review & analysis in a university course*

**Prepared and formatted for submission to the Journal of Criminal Justice Education*

Cold case investigations: Developing best practices and guidelines for cold case review & analysis in a university course

Despite technological advancements and improved methodologies in forensic science and investigative practices, cold cases are a growing problem in the United States. Although there has been a surge in interest in solving cold cases due to advancements in technology, there has been very little research conducted on cold case investigation methodology. Many agencies lack the personnel and resources to devote adequate attention to cold cases. Federal dollars spent on cold case resolution in recent years focused only on those cases that could benefit due to improvements in DNA analysis techniques. The literature demonstrates that advances in other forensic disciplines can provide answers in unsolved crimes. Additionally, it has been shown that investigations often benefit simply from a case file review by a fresh set of eyes. This paper discusses the development of best practices guidelines for a cold case program in a collegiate setting.

Keywords: *cold case, investigation, unsolved, homicide, forensic, university, college, task force, methodology, experiential learning*

Introduction

Due to the autonomous nature of law enforcement agencies across the United States, and even throughout the world, there is no standard definition for the term “cold case”. Each agency sets its own parameters for designating a case cold. For the purposes of this article, the term “cold case” will be defined as “any case whose probative investigative leads have been exhausted” as set forth by the National Institute of Justice (Heurich, 2008).

Despite technological advancements and improved methodologies in forensic science and investigative practices, cold cases are a growing problem in the United States. According to data from the FBI’s Uniform Crime Reports, homicide clearance rates have declined from more than 90% in 1960 to a current rate of approximately 60%

(see *Figure 1*). It is estimated that more than 300,000 homicides have gone unsolved in the United States since 1965 (MAP, 2019). From 2005 to 2015, the National Institute of Justice awarded nearly $80 million in funding to agencies under the "Solving Cold Cases with DNA" grant program. Many law enforcement agencies formed cold case task forces during that time (NIJ, 2019). Since then a lack of funding and the demands of active caseloads have resulted in a reduction of the resources and attention devoted to cold cases. Meanwhile the number of unsolved cases continues to grow. This is unlikely to change unless new approaches to dealing with the cold case problem are implemented.

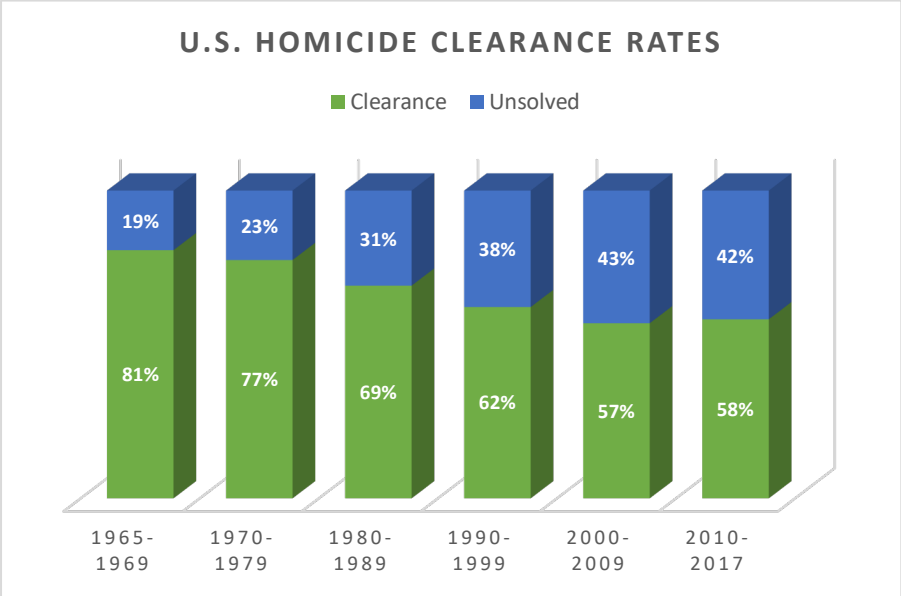

Figure 1: Homicide clearance rates (FBI, 2018; MAP, 2019)

The methodology employed by cold case investigators begins with a comprehensive review of case file documents, followed by consultation with investigators who previously worked the case, identifying and locating persons germane to the investigation, developing leads to follow, assessing evidence for additional analysis, and composing a thorough yet concise summary of the case for further investigation (Spraggs, 2003; Turner & Kosa, 2003). The cold case investigator's work

does not stop there but proceeds with standard police work. However, a study of cold case units in Texas found that more than half of a cold case investigator's time is usually spent reviewing case files and assessing evidence for further analysis (Reyes, 2009). These are tasks for which many law enforcement agencies use volunteers, often retired homicide detectives. Forensic science students may be especially suited to these tasks because of their education. In fact, forensic science students possess many of the traits considered essential for cold case investigators: strong communication and interpersonal skills, strong research skills, patience, creativity, persistence, a high level of motivation, enthusiasm for the job, and current training about modern criminalistics technology (Turner & Kosa, 2003). A university cold case program offers students the opportunity to apply the cumulative knowledge and skills gained throughout their years of study to real world criminal investigations while providing a beneficial service to the community by assisting law enforcement agencies in their investigation of long unsolved crimes.

University Cold Case Programs

A number of jurisdictions across the United States have enlisted the help of college students in reviewing cold case homicides, noting the advantages offered by a fresh set of eyes paired with enthusiasm for the work. The author reached out to ten university cold case programs to inquire as to written protocol and procedure utilized by students in conducting case file review and analysis. The majority of respondents advised that they have no written protocol, relying instead on principles of journalism or direction from the partnering investigative agency for guidance (see Table 1). Dr. Bryan Byers, professor of Criminal Justice and Criminology at Ball State University, graciously provided the written protocol used by his students to review case files, conduct research, interview subjects, and create reports and public service announcements for partnering agencies.

Table 1. Protocol for university cold case programs

Protocol for Case File Review	*n*	*Course for College Credit*	*College Project*	*Student Club*
Formal written protocol	1	1		
Apply principles of journalism	2	2		
Rely on investigative agency	2	1		1
No response to inquiry	5	2	3	

Resources for the Development of Best Practices Guidelines

As demonstrated by the efforts to collect written protocol and procedures from other university cold case programs, these programs take a variety of forms, and there appears to be a lack of formal protocol and procedures for case file review. This research sought to understand the needs of law enforcement agencies investigating cold case crimes in order to develop best practices guidelines for a cold case program in collegiate setting. It was determined that the creation of written protocol and procedures would require an amalgamation and synthesis of information from a variety of sources. In addition to the materials provided by Dr. Byers, the author consulted experts in cold case investigations at regional, state, and local agencies, sought advisement from the faculty of the University of Central Oklahoma (UCO) Forensic Science Institute, and tested a variety of methods with students in a *Cold Case Review & Analysis* course over the span of a year.

Cold Case Review & Analysis Course

In 2018, the Forensic Science Institute entered into a partnership with the Tulsa County Sheriff's Office Cold Case Task Force to work the agency's 31 unsolved homicide

investigations. The groundwork for the partnership was laid through careful consideration of the benefits, requirements, and restrictions for each party by a committee of faculty members acting as advisors. Through the partnership, the *Cold Case Review & Analysis* course began as a seminar for graduate students in the fall semester of 2018 and was opened up to include senior capstone students the following semester. The author was both a student and a teaching assistant in the class, using the time spent reviewing case files and working with other students to test and revise a systematic process for the review of case files as well as a standardized set of reports for conveying findings to the investigative agency.

Through this experience, it has become clear that a thorough review of case files can best be accomplished through a systematic approach. In reviewing a case file, the reviewer is essentially looking at bits of information and attempting to recreate a big picture of what occurred and who was involved. Similar to the tasks associated with processing a crime scene, a systematic process for case file review and analysis is needed to ensure thoroughness and minimize the potential for any meaningful bits of information being overlooked. It is also essential to properly document where each piece of information was found in the case file to allow the investigative agency to efficiently locate and verify the information in the event that it is later needed for legal matters. A variety of tools are needed to assist the reviewer in deriving meaning from the bits of information gleaned from the case file. Lastly, the information and its probative value should be succinctly and effectively reported to the investigative agency.

While each person may approach a case from a different perspective and have preferred means of organizing material, the spreadsheets and templates devised through

this research provide the foundation for ensuring that a diligent and comprehensive review and analysis are achieved. With the objective of providing a time-saving service to the investigative agency, it is believed that a standardized set of reports are the best way to convey information about the case file and make recommendations for further analysis and investigation.

A Summary of Best Practices and Guidelines

Administrative considerations

In proposing a partnership with a law enforcement agency, issues of confidentiality and security will need to be addressed between school administrators and all stakeholders on the criminal justice side of the table, to include the sheriff or chief of police, the cold case task force leader, and the prosecutor. The cases on which the students will be working are criminal investigations, subject to all of the same legal requirements of active investigations. To avoid compromising the case, sensitive information related to the investigation must be kept out of the public domain, and the chain of custody for all items of evidence must be maintained.

At the same time, faculty should be attentive to the fact that students are not professional investigators or seasoned experts. Despite the time and effort invested in learning and evaluation, they do not yet have the training and experience necessary to fully prepare them to testify. To ensure that students are shielded from the possibility of being called to testify if, and when, the case is brought to trial, agreements between the university and the collaborating law enforcement agency should be explicit in communicating that students are to be considered case file reviewers, researchers, and analysts. They are not permitted to handle or examine items of physical evidence,

interview witnesses, or engage in any other activities that would make their work-product discoverable.

It is emphatically recommended that a memorandum of understanding (MOU) be devised, explicitly laying out the requirements, responsibilities, and concerns of both parties to the agreement. The MOU should define the parties, purpose, and mission of the collaboration and outline the organizational structure and the process by which its goals will be achieved. It should also address the means by which the requirements of confidentiality and protections will be imposed.

During the selection process, prospective students should be informed of the sensitive nature of the materials they will be reviewing and the absolute requirement that they maintain confidentiality of the case files. Each student in the course is required to sign a confidentiality agreement, pledging to adhere to its requirements and acknowledging that they understand the legal ramifications they would face for any failure to comply. Signed copies of each student's confidentiality agreement should be kept by the university and provided to the collaborating law enforcement agency.

To ensure physical security, case files should be stored in a locked room to which there is limited access, and a log should be kept, indicating when case files are removed from, and returned to, storage and by whom. It is also necessary to take into consideration the need for confidentiality when selecting a classroom for the course. Students should be able to discuss aspects of the investigation and collaborate with classmates on reports without risk of being overheard by persons in adjoining areas. They should be able to utilize visual aids such as whiteboards and projectors without putting sensitive

information on display to others in the building. Of even greater importance is a secure network of computers and printers on which students can conduct their work.

Course Structure

In addition to his/her duties as a mentor and student performance evaluator, the instructor for the course will act as a facilitator and liaison between the students and the law enforcement agency. The instructor should be able to guide and instruct the students and answer questions they may have about the ins and outs of homicide investigations. It would also be advantageous for the instructor to have a network of professional colleagues in the investigative and cold case fields, allowing for the procurement of guest speakers. An individual with a background in homicide investigations, as well as experience in the classroom, would be an ideal selection.

Selecting students from multiple forensic science disciplines would be advantageous in assembling a well-rounded group for the course each semester. No less important is that students selected for the course are those who have demonstrated a strong work ethic, a sense of responsibility, an adeptness for critical thinking, a firm understanding of the curriculum in prior coursework, and an enthusiastic interest in criminal investigations.

The desired outcome for this course is that students will provide informative reports to the investigating agency to assist them in furthering the investigation. At the same time, students should benefit from the process by experiencing the opportunity to apply the knowledge and skills gained through previous coursework. For these reasons, students should be evaluated on their performance in several areas: participation and teamwork, proficiency in performing the tasks associated with case file review and

analysis, effective report writing, and the presentation of findings to the investigating agency.

Case Management

Although the full potential for solvability of a case cannot be assessed until the case file review has been completed, an initial triage can be conducted through a review of the initial incident report, the crime scene report with sketches and diagrams, and the medical examiner's report. Priority should be given to those cases in which physical evidence was recovered at the scene that has the potential to lead to the identification of the perpetrator, and chain of custody was established at the scene through proper documentation. Weight should also be given to cases in which a suspect was identified in the incident report or witnesses were present who may be able to identify the suspect.

It should be understood that this initial triage is only for the selection and assignment of case files for the students to review. Solvability factors should be reassessed after the case file review is complete and provided to the investigative agency in a set of final reports. This will allow the investigative agency to triage the cases for further investigation.

Systematic Process for Review

Before the students take custody of the case file, it should be inspected by the law enforcement agency to ensure that there are no items of physical evidence are included. The documents should then be arranged in chronological order and separated into sections by document type (e.g. incident report, crime scene report, supplementary investigative report, property receipt, autopsy report, etc.). This is done to facilitate the locating of the document again when it is referenced in a cold case review report. An

evaluation of completeness should be conducted to determine if anything appears to be missing from the case file. If the original case file was provided to students, a working copy should be made and the original expediently returned to the agency.

The primary objective in reviewing the case file is to identify evidence that can be analyzed using modern forensic techniques to aid investigators in furthering the investigation. In order to determine what analysis should be conducted on an item of evidence, the origin of the item must be known, and the context of its origin must be understood. This will allow the reviewer to evaluate what forensic probative value may be offered by the results of further analysis. In order to understand the potential forensic value of the evidence, a comprehensive reading of the case file is required. In conducting the review, it is expedient to also gather information regarding persons, places, and events. The organization and comparison of these bits of information may reveal leads for investigators to follow and conflicts between two or more accounts that require investigative follow-up. Furthermore, an objective and robust understanding of the crime cannot be achieved without the integration and interpretation of such meaningful bits of information gleaned from the case file.

A systematic approach is recommended to facilitate and standardize the process of reading each case file document and recording significant data regarding evidence, forensic analysis, timeline events, and persons of significance to the investigation. Students in the *Cold Case Review & Analysis Course* are provided with a set of spreadsheets designed by the author to aid in the organization of this material. Data compiled through this process can then be used to compose reports for submission to the

investigative agency. The flowchart in Figure 2 depicts the process students are to use for case file review and analysis.

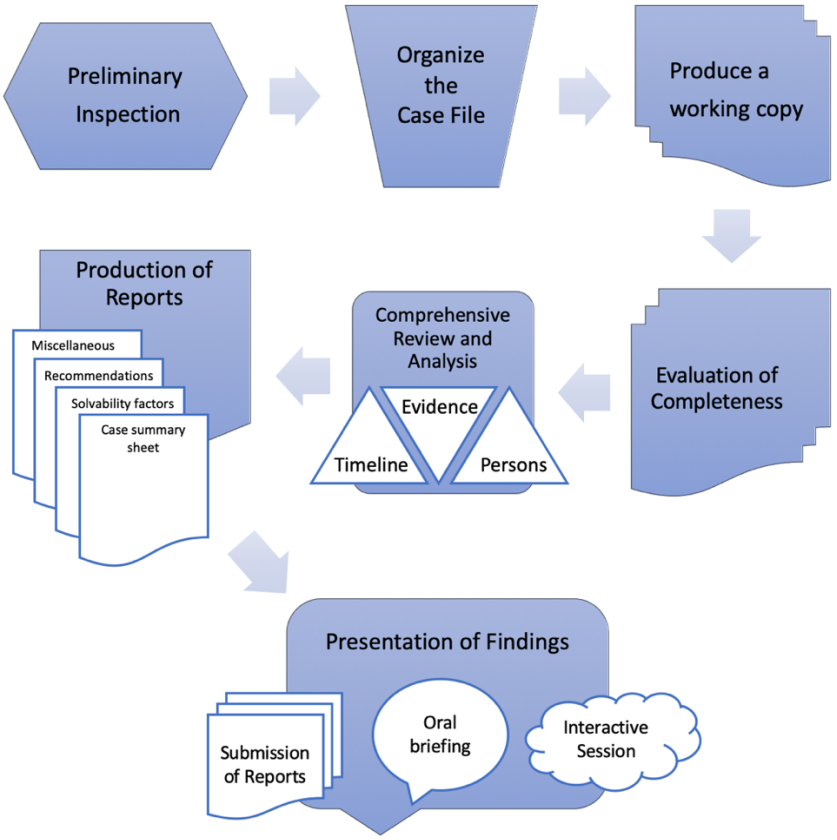

Figure 2: Cold case review & analysis flowchart

Standardized Reports for the Investigative Agency

Presenting the review team's findings to the investigating agency should begin with documenting those findings in written reports. One purpose of the *Cold Case Review & Analysis* course is to reduce the demands of time and energy on investigators so that their time can be devoted to investigative activities. A series of standardized reports, allowing for slight variation to accommodate unique aspects of the case, is the best way to accomplish this objective. Once the investigators become familiar with the format of the reports, they will be able to effectively and efficiently grasp the content of the reports,

quickly find desired information, and reference the reports to locate the specific case file source documents.

Students in the course are provided a series of written report templates, devised by the author through consultation with the partnering agency, as well as through individual trial and error. Reports should include a reference citation for each item of significant information by citing the case file document in which the information is found. This may be done through in-text citation for narrative summaries or as a reference column in tables or spreadsheets.

Forensic and Investigative Advances

Forensic science students receive education and training in modern forensic methods and technologies. Cold cases have been shown to benefit from advances in both forensic science and investigative techniques. Although seasoned investigators bring a wealth of experience to the table as members of cold case units, they are often less aware than are students of innovations that could develop new leads in dormant investigations. A chapter of the best practices and guidelines manual, as summarized here, is dedicated to advancements in forensic and investigative technologies and methods and their applicability to cold case investigations.

DNA Technologies

Since its introduction in the 1980s, DNA has become the gold standard of identification evidence. During the decades since it was first introduced, there have been significant advancements in both collection and analysis methods that have the potential to impact cold case investigations. Where analysts once needed a sample the size of a half-dollar, they are now able to develop a full DNA profile from only a few cells using polymerase

chain reaction (PCR) analysis of short tandem repeats (STR). The CODIS database has become more robust, increasing the likelihood of a cold hit (NIJ, 2002). Additionally, science continues to find new ways to utilize the information provided by DNA analysis, such as DNA phenotyping and genetic genealogy (Kayser, 2015; Greytak, Moore, & Armentrout, 2019).

Fingerprint technologies

Historically, the Integrated Automated Fingerprint Identification System (IAFIS) has contained only fingerprints. However, in 2007, the FBI began the implementation of Next Generation Identification (NGI) to replace IAFIS in a series of phases. The system became fully operational in 2014 with a more powerful fingerprint-matching algorithm that improved accuracy from 92 percent under IAFIS to 99.6 percent using NGI. Increment 3 of the rollout introduced the ability to search palm prints within the database and expanded searches to include the Civil Repository and the Unsolved Latent File (CJIS, 2014; CJIS, n.d.). Although solving cold cases using DNA gets more attention from the press, NGI has become a powerful tool in the resolution of cold cases through resubmission of prints recovered decades ago, including those previously searched through IAFIS (Stokes, 2019).

Forensic scientists have successfully developed latent prints on decades old evidence, using both old and new techniques. Using cyanoacrylate (CA) fuming in combination with fluorescent dye and a laser for visualization, analysts at a Canadian laboratory developed and photographed latent prints on a plastic bag from the scene of a 1980s homicide (Tapps, McMullen, Gagne, & Beaudoin, 2019). Vacuum metal deposition is reported to have been used successfully to develop latent prints on evidence

that is more than twenty years old (Pennsylvania Commission on Crime & Delinquency, 2017). In a 21-year-old case, analysts at a Canadian forensic laboratory developed prints on newspaper using Oil Red O (ORO) staining where the previous use of DFO had failed (Beaudoin, 2011).

Behavioral sciences

Behavioral sciences are applicable to multiple facets of criminal investigations, including behavioral aspects of crime scenes, criminal profiling, victimology, and forensic interviewing and interrogation. The Violent Criminal Apprehension Program (ViCAP) uses data collected on solved and unsolved homicides or attempted homicides, particularly those that involve abduction, appear random or motiveless, are sexually motivated, or are believed to be part of a series, and on missing person cases believed to involve foul play and unidentified victims of homicide to identify cases exhibiting similar characteristics (Witzig, 2003). Although ViCAP was implemented by the Federal Bureau of Investigation (FBI) in 1985 and revamped in the mid-1990s, it has been largely neglected by law enforcement agencies across the United States (Miller, 2015). It is important to keep in mind that the types of cases ViCAP targets bear characteristics that make them susceptible to going cold – stranger-on-stranger or random homicides, those with absent or unclear motives, and cases involving unidentified bodies and missing persons.

The FBI also offers criminal investigative analysis services to state and local law enforcement agencies, using crime scene analysis, geographic profiling, and victimology assessment to provide offender profiles, leads, and interview strategies through a comprehensive review of the case file (O'Toole, 1999).

NamUs

The National Missing and Unidentified Persons System (NamUs) became fully searchable in 2009 and provides the ability to search the missing persons database against the unidentified decedent database. It is searchable and accessible by everyone, including members of the general public. In addition to the database search tools, NamUs provides forensic resources to assist agencies in the fields of odontology, fingerprinting, nuclear and mitochondrial DNA and forensic anthropology free of charge for comparisons of missing persons to unidentified remains (UNT Forensic Services Unit, n.d.).

Data analysis

Cold cases, particularly those that are complex or contain voluminous reports, may benefit from the use of computer programs for organizing and analyzing investigative data, such as the i2 Analyst's Notebook from IBM. It can be used to create timelines and organize complex and confusing information, allowing investigators to see how pieces of a puzzling investigation fit together to form the big picture. In some cases, patterns or trends are revealed that provide new leads and, in some instances, indicate the specific crime being investigated may be linked to other crimes (Spraggs, 2003).

Innovative approaches

The 21st century has brought about innovative approaches to resolving cold cases. Cold case playing cards were introduced by the Florida Department of Law Enforcement in 2005, solving three of the featured homicide cases in just three months. Each card in a 52-card deck features a cold case, seeking tips from inmates in penal institutions. The same concept helped solve several crimes in Connecticut, and since 2005, cold case playing cards have been introduced in seventeen more states (Neyfakh, 2016).

There are continuing advances in communications that can aid investigations, such as 24- hour national news services, the Internet, telephone services like Crime Stoppers, and various social media platforms. Each of these have proved useful in active investigations and have the potential to provide assistance in the collection and dissemination of information pertaining to cold case investigations, as well. The prevalence of television programs, books, and movies focusing on cold case investigations indicates that there is significant public interest in cold case homicides. Sometimes all it takes to jumpstart a stalled investigation is to spark public interest or reach just the right individual.

Glossaries

Additional chapters in the best practices and guidelines manual provides a series of glossaries for students in a cold case review and analysis course. In addition to a chapter on forensic and investigative advances, there is a chapter providing resources and tools for researching persons, places, and objects related to the investigation. Other chapters included are a glossary of disciplines of forensic science and an overview of evidence in criminal investigations.

Conclusion and Discussion

The best practices guidelines manual developed through this research effort is intended for use by institutions of higher learning with a focus on educating students for careers in the field of forensic science. Application of the provided guidelines will assist instructors in implementing an upper level course for students to engage in the review and analysis of case files pertaining to unsolved crimes designated as cold cases by the collaborating law enforcement agency. Such a course is ideally suited to graduate students and as an in-

house practicum for seniors, as these students have completed the coursework necessary to prepare them for such an endeavor and should have greater levels of maturity and responsibility than students at an earlier level in their education.

Educators considering establishing a cold case program should keep in mind that its purpose should be twofold – providing a meaningful experiential learning opportunity for students of their institution while performing a needed service for law enforcement agencies within the community. Remember that our purpose, as forensic scientists, is to seek the truth and serve justice.

Acknowledgments

The author expresses gratitude to the Tulsa County Sheriff's Office, the Tulsa County District Attorney, the Oklahoma State Bureau of Investigation, Oklahoma County Cold Case Detective Mike Burke, the University of Central Oklahoma, and the UCO Forensic Science Institute for their support, participation, and contributions to this research. Special thanks are also offered to Dr. Bryan Byers of Ball State University and Dr. James Adcock of the Mid-South Cold Case Initiative for their contributions.

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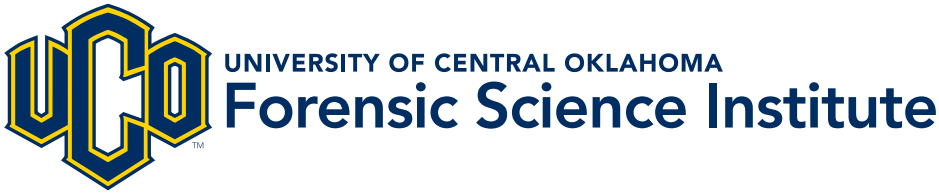
CHAPTER V

Cold Case Investigations: Best Practices and Guidelines for the Implementation and Management of a Cold Case Program in a Collegiate Setting

COLD CASE REVIEW & ANALYSIS

BEST PRACTICES & GUIDELINES

FOR THE IMPLEMENTATION AND MANAGEMENT OF A COLD CASE PROGRAM IN A COLLEGIATE SETTING



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Preface

This *Cold Case Review & Analysis* manual is intended for use by institutions of higher learning with a focus on educating students for careers in the field of forensic science. Application of the guidelines provided herein will assist instructors in implementing an upper level course for students to engage in the review and analysis of case files pertaining to unsolved crimes designated as cold cases by the collaborating law enforcement agency. Such a course is ideally suited to graduate students and as an in-house practicum for seniors, as these students have completed the coursework necessary to prepare them for such an endeavor and should have greater levels of maturity and responsibility than students at an earlier level in their education. This manual will address the importance of those and other important characteristics of the cold case analyst. Additionally, administrative and course structure issues will be addressed, and guidelines for the process of reviewing cold cases and producing meaningful reports for the investigative agency will be laid out. Educators considering establishing such a course should keep in mind that its purpose should be twofold – providing a meaningful experiential learning opportunity for students of their institution while performing a needed service for law enforcement agencies within the community. Remember that our purpose as forensic scientists is to seek the truth and serve justice. The survivors of unsolved crimes await answers. If anything can be done by us to contribute to the resolution of cold cases, let their wait not be indefinite.

Acknowledgments

The authors express gratitude to the Tulsa County Sheriff's Office, the Tulsa County District Attorney, the Oklahoma State Bureau of Investigation, Oklahoma County Cold Case Detective Mike Burke, NamUs Regional Program Specialist Michael Nance, the University of Central Oklahoma, and the UCO Forensic Science Institute for their support, participation, and contributions to the research that led to the development of *Cold Case Review & Analysis: Best Practices & Guidelines for the Implementation and Management of a Cold Case Program in a Collegiate Setting*. Special thanks are also offered to Dr. Bryan Byers of Ball State University and Dr. James Adcock of the Mid-South Cold Case Initiative for their contributions.

Chapter 1

Introduction to Cold Cases

What is a Cold Case?

Due to the autonomous nature of law enforcement agencies across the United States, and even throughout the world, there is no standard definition for the term "cold case". Each agency sets their own parameters for designation, and even the term "cold case" is not universally favored. According to Dr. Richard Walton (2006), editor of *Cold Case Homicides: Practical Investigative Techniques*, the term was coined by the Florida news media in the 1980s and stuck, since then becoming widely accepted despite any perceived negative connotations. Many investigators feel that the term stigmatizes cases as hopelessly unsolvable, a notion which is particularly disheartening for the families and friends of homicide victims. In the minds of some, "unsolved" is the preferred term for such cases. The fact remains, however, that all cases that are being investigated are unsolved. Therefore, the term "unsolved" is inadequate in setting apart cases wherein the previous investigation failed to resolve the case. For the purposes of this manual, the term "cold case" will be used and defined as "any case whose probative investigative leads have been exhausted" as set forth by the National Institute of Justice (Heurich, 2008).

Nevertheless, in implementing a university cold case initiative, it is important for you, as educators and students alike, to be aware of the designation and parameters of cold cases as utilized by the law enforcement agency with which you are collaborating. This is necessary, not only in order to understand the nature of the case files on which you will be working, but also to maintain a good working relationship with the collaborating agency. You should familiarize yourself with their standards and preferred

terminology and keep them in mind when interacting and communicating with the agency. A working relationship built on mutual respect and appreciation will yield the best results.

The Problem with Cold Cases

Despite technological advancements and improved methodologies in forensic science and investigative practices, cold cases are a growing problem in the United States. According to data from the FBI's Uniform Crime Reports, homicide clearance rates have declined from approximately 90% in 1960 to a current rate of approximately 60% (see *Figure 1*).

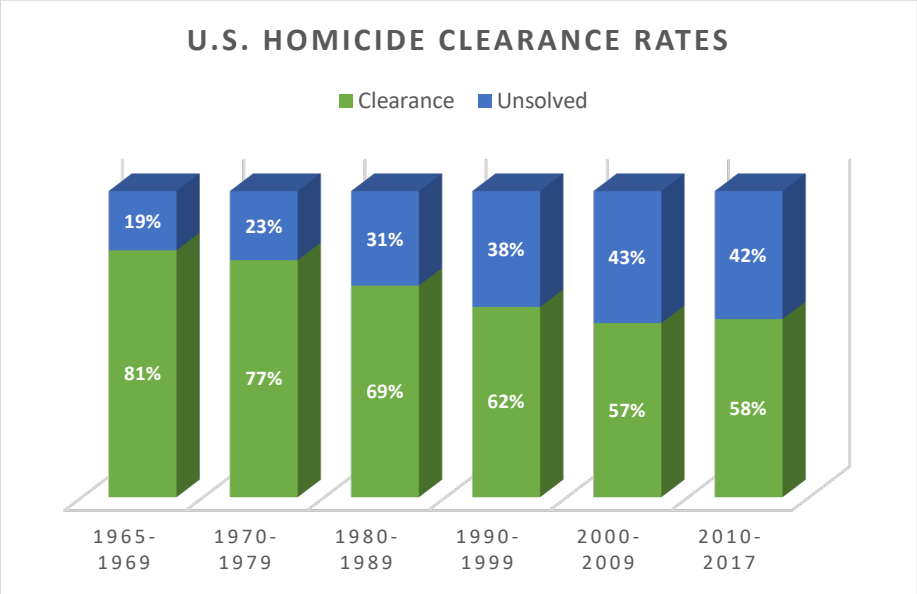

Figure 1: Homicide clearance rates (FBI, 2018; MAP, 2019)

It is estimated that more than 300,000 homicides have gone unsolved in the United States since 1965 (MAP, 2019). From 2005 to 2015, the National Institute of Justice awarded nearly $80 million in grant funding to agencies under the "Solving Cold Cases with DNA" program. Many law enforcement agencies formed cold case task forces

during that time (NIJ, 2019). Since then a lack of funding and the demands of active caseloads have resulted in a reduction of the resources and attention devoted to cold cases. Meanwhile the number of unsolved cases continues to grow. This is unlikely to change unless new approaches to dealing with the cold case problem are implemented.

Cold Case Investigation Methodology

As stated in the literature, the methodology employed by cold case investigators begins with a comprehensive review of case file documents, followed by consultation with investigators who previously worked the case, identifying and locating persons germane to the investigation, developing leads to follow, assessing evidence for additional analysis, and composing a thorough yet concise summary of the case for further investigation (Spraggs, 2003; Turner & Kosa, 2003). While the cold case investigator's work does not stop there but proceeds with standard police work, more than half of a cold case investigator's time is usually spent reviewing case files and assessing evidence for further analysis (Reyes, 2009). Therefore, students in a *Cold Case Review & Analysis* course can be of great benefit in lightening the workload of investigators and contributing to the resolution of unsolved cases. This will be discussed at greater length in the following chapters. However, it should be noted that upper level and graduate students of forensic science programs collectively possess many of the traits deemed essential for a cold case investigator – strong communication and interpersonal skills, strong research skills, patience, creativity, persistence, a high level of motivation, enthusiasm for the job, and additional training about modern criminalistics technology (Turner & Kosa, 2003).

The author's research has shown that there is no standard written protocol for the review and analysis of cold cases. In fact, the law enforcement agency with which your cold case university program collaborates may or may not have written protocol. Often because cold case units are manned by retired detectives, they simply apply the principles and methods that have served them throughout their careers to the task of reviewing case files. In contacting other universities and colleges that offered cold case programs, the author found that none of them had written protocol for the review of case files. Some of the professors with whom the author communicated stated that, coming from a journalism background, they required their cold case students to apply the tenets and principles of journalism in conducting case file review and analysis. While it is true that every case file is different and those nuances require flexibility in conducting a review and compiling reports, a standard written protocol can be indispensable in guiding the review and ensuring that it is thorough and complete, particularly for students who lack the experience possessed by seasoned investigators.

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Chapter 2

Motivation & Purpose

Experiential Learning

For hundreds of years, institutions of higher learning have recognized the unparalleled value of experiential learning and have sought ways to incorporate such opportunities for students into their degree programs. The purpose of a capstone program is to provide seniors the opportunity to integrate and apply their cumulative knowledge and skills in an authentic practical context (Hauhart & Grahe, 2015). This can be accomplished through a practicum or internship at a forensic laboratory or an investigative agency or through a capstone course within the academic institution. Students in a *Cold Case Review & Analysis* course use critical thinking skills and apply scientific principles in the review and analysis of unsolved homicide and missing persons cases. The realization that the outcome of the work they put into these cases goes beyond a grade on their transcript has an observable impact in the classroom. Students are inspired by knowledge that they can assist in bringing resolution to unsolved cases.

The collaboration between the university and a law enforcement agency gives students the opportunity to work with professionals in the field – an experience very similar to that of an off-site practicum. They benefit from being able to receive guidance and feedback from investigators. Such interaction has the potential to build confidence and reduce apprehension on the part of the students as they are preparing to embark upon the professional stage of their careers. The entire cold case review process allows students to gain a better understanding of and appreciation for the complexity of working an investigation. As with other capstone programs, the value of a *Cold Case Review &*

Analysis course rests on two principles: (1) that experience is a great teacher, and (2) that the integrated application of the student's comprehensive knowledge can have an illuminating effect on his or her understanding of the field as a whole (Hauhart & Grahe, 2015). For the reasons stated, a *Cold Case Review & Analysis* course is ideal for graduate students either as an elective or as required curriculum, as well as for seniors as a capstone experience.

Community Service

Surviving victims, their family and friends, investigators, and the community are often haunted by the gnawing questions of what happened, who did it, why, and why have they not been held accountable (Heurich, 2008). The work of students in a cold case program has the potential to provide answers to these sometimes decades-old questions. Although law enforcement agencies would very much like to resolve every case in their jurisdiction, they are often stymied in their ability to focus resources on cold case investigations due to limited funding and active caseloads. Most agencies do not have personnel dedicated to cold case review for this reason. In many agencies, detectives will pick up a cold case file for review when there is a lull in active casework, only to put it down again when active investigations demand their attention. This lack of continuity is detrimental to the resolution of unsolved crimes. Investigators have found that cases are more likely to be resolved when there is an intense focus of resources and the uninterrupted attention of personnel in dedicated cold case units. Some agencies, in recognition of this principle, have formed task forces made up of retired investigators often working as volunteers (Turner & Kosa, 2003).

As stated in the previous chapter, a great deal of the cold case investigator's time is consumed by the review of the case file and the evaluation of evidence (Reyes, 2009). These are tasks that forensic science students are capable of performing. In so doing, they effectively free up investigators to dedicate their time and efforts to those phases of the investigation that demand the authority and experience of a sworn officer.

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Chapter 3

Administrative Issues

Partnering with a Law Enforcement Agency

The first thing to consider in launching a university cold case program is the need for a partnership with a law enforcement agency. Success in this area will depend on whether the agency is bound by any laws or statutes that prohibit or limit such partnerships as well as the policies of the agency. The author has found that cold case experts are generally of a progressive mindset in this area and are open to using unconventional means to bring resolution to cold cases. Not long after the author presented the idea of starting a cold case program at the University of Central Oklahoma Forensic Science Institute, we were very fortunate to be contacted by members of the Tulsa County Sheriff's Office Cold Case Task Force requesting a meeting to explore the possibility of forming a partnership to work on their inventory of cold case homicide files. If not for that serendipitous event, it would have been necessary to approach state and local law enforcement agencies to propose such a partnership. As time advances and students in the Cold Case Review & Analysis class complete work on their inventory of case files, it will become necessary to pursue partnerships with other agencies. It is recommended that a committee of instructors be formed to discuss all administrative issues to be considered and advise the graduate student assigned to the project of formalizing a proposal to take to candidate agencies. Once the program is established and students have demonstrated the ability to assist law enforcement agencies with cold cases, positive publicity and word-of-mouth should facilitate this endeavor. In proposing the partnership, issues of confidentiality and security will need to be addressed between

school administrators and all stakeholders on the criminal justice side of the table, to include the sheriff or chief of police, the cold case task force leader, and the state prosecutor. The remainder of this chapter will address these concerns.

The single most important thing to consider when implementing a cold case program is that the cases on which your students will be working are criminal investigations, subject to all of the same legal requirements of active investigations. The ultimate goal of any investigation is to find the responsible party and provide evidence that can be used in a court of law to prove beyond a reasonable doubt that the defendant committed the crime for which he or she stands accused. For this reason, it is imperative that the integrity of the investigation be protected. To avoid compromising the case, sensitive information related to the investigation must be kept out of the public domain, and the chain of custody for all items of evidence must be maintained. It would be a disastrous turn of events if efforts to aid in furthering an investigation ended up damaging the case to such an extent that it could never be successfully prosecuted.

At the same time, faculty should be attentive to the fact that students are not professional investigators; nor are they experts in their respective field of forensic science. Despite the time and effort invested in learning and evaluation, they do not yet have the training and experience necessary to fully prepare them to testify. Administrators should take all steps necessary to ensure that students are shielded from the possibility of being called to testify if and when the case is brought to trial. Agreements between the university and the collaborating law enforcement agency should be explicit in communicating this constraint. Students should be considered case file reviewers, researchers, and analysts. They should not be handling or examining items of

evidence, interviewing witnesses, or engaging in any other activities that would make their work-product discoverable evidence in the case.

Memorandum of Understanding

It is strenuously recommended that a memorandum of understanding (MOU) be entered into at the administrative levels of both the university and the collaborating law enforcement agency. Such a document should explicitly lay out the requirements, responsibilities, and concerns of both parties and be duly signed by all stakeholders including, but not limited to, the president or provost and the department chair or director at the university, as well as the sheriff or police chief of the collaborating agency, the task force leader, and the district attorney of the jurisdiction being served. The MOU should define the parties, purpose, and mission of the collaboration and outline the organizational structure and the process by which its goals will be achieved. It should address the means by which the aforementioned requirements of confidentiality and protections will be imposed. As an example, the MOU for the collaboration between the University of Central Oklahoma Forensic Science Institute and the Tulsa County Sheriff's Office Cold Case Task Force is included in *Appendix A* of this manual.

Confidentiality & Nondisclosure Agreement

Although students participating in the cold case program should have been carefully selected, it should not be left to assumption that they will have a thorough understanding of the importance of confidentiality and the seriousness of the ramifications for any failure to comply. It is of such vital importance that it should be impressed upon students at multiple stages. During the selection process, prospective students should be informed of the sensitive nature of the materials they will be

reviewing and the absolute requirement that they maintain confidentiality of the case files. They should be reminded of their responsibility in this regard upon selection. On the first day that the class meets, each student should sign a *Confidentiality & Nondisclosure Agreement*, pledging to adhere to its requirements and acknowledging that they understand the legal ramifications they would face for any failure to comply. Signed copies of each student's confidentiality agreement should be kept by the university and provided to the collaborating law enforcement agency. Many law enforcement agencies have a standard confidentiality agreement that they use for volunteer personnel within their agency. Such an agreement is sufficient for use with students as they are essentially working as volunteers for the agency under the collaboration with the university. If the law enforcement agency does not have a suitable document, the example provided in *Appendix B* of this manual can be adapted for use in your program.

Case File Security

In addressing concerns of protecting the integrity of the investigation, the physical security of case files should not be overlooked. Files should be stored in a locked room to which there is limited access, and a log should be kept to indicate when case files are removed from and returned to storage and by whom. An example of a *Case File Access Log* is included in *Appendix E* of this manual. Case files should never be left unattended while outside of the secure storage area. At the UCO Forensic Science Institute, case files are stored in a lock-equipped file cabinet or a lock-equipped mobile file chest in a locked room to which there is one key, and that key is maintained by a single member of the Forensic Science Institute staff. Students wishing to check out a case file must request the key to enter the storage room and check out a case file. The key is then returned to the

staff member and later requested again in order to return the case file to storage. The *Case File Access Log* is reviewed periodically by the *Cold Case Review & Analysis* instructor.

It is also necessary to take into consideration the need for confidentiality when selecting a classroom for the course. Students should be able to discuss aspects of the investigation and collaborate with classmates on reports without risk of being overheard by passers-by or persons in adjoining areas. They should be able to utilize visual aids such as whiteboards and projectors without putting sensitive information on display to others in the building. Of even greater importance is the need for computers and printers on a secure network. The Technical Coordinator at the UCO Forensic Science Institute set up a native boot virtual machine that allows access to the Cold Case server only by those persons given authorization. The server can only be accessed in the designated computer lab and contains a Cold Case Shared Drive which is a nested permissions file share accessible only by the approved list of faculty and students. This list is updated each semester to allow access to new class members and discontinue access to students who are no longer associated with the class. Request assistance from the information technology coordinator or specialist at your university in implementing a secure system for your cold case class.

Chapter 4

Course Structure & Curriculum

Instruction and Supervision

In addition to his/her duties as a mentor and student performance evaluator, the instructor for the Cold Case Review & Analysis course will act as a facilitator and liaison between the students and the law enforcement agency and as a coordinator for guest speakers. The instructor should be able to guide and instruct the students and answer questions they may have about the ins and outs of homicide investigations. It would also be advantageous for the instructor to have a network of professional colleagues in the investigative and cold case fields, allowing for the procurement of guest speakers each semester. An individual with a lengthy background in homicide investigations as well as experience in the classroom would be an ideal selection.

The leader of the partnering cold case unit or law enforcement agency (or a designated representative) also acts as a liaison and mentor for the students. This individual can also perform as a guest speaker, availing students of his/her extensive knowledge and experience in homicide investigations and giving insight into his/her individual approach to cold case investigations. The law enforcement representative generally selects the cases for the students to review and sometimes presents a brief introduction to the case. Once analysis is complete, students will present their findings to one or more representatives from the partnering agency, which has the authority to act on those findings. This may include the leader of the cold case unit or a designated representative as well as any detectives or task force members specifically assigned to the case.

Student Selection

A review of cold case protocol and procedures from law enforcement agencies showed that a cold case unit is best assembled from individuals from a broad range of backgrounds and disciplines (OSBI, 2009; Turner & Kosa, 2003; M. Huff, personal communication, March 25, 2019). This standard is easily applied in a school of forensic science due to the fact that there are multiple disciplines under the umbrella of forensic science, to include, but not limited to: serology, DNA analysis, firearms and tool mark analysis, fingerprint comparison, other impression evidence, digital forensics, forensic chemistry, bloodstain pattern analysis, crime scene reconstruction, medicolegal forensics, forensic psychology, and forensic anthropology. Selecting students from multiple disciplines would be advantageous in assembling a well-rounded group for the course each semester.

No less important is that students selected for the course are those who have demonstrated a strong work ethic, a sense of responsibility, an adeptness for critical thinking, a firm understanding of the curriculum in prior coursework, and an enthusiastic interest in criminal investigations. As stated in *Chapter 1*, traits deemed essential for cold case investigators are strong communication and interpersonal skills, strong research skills, patience, creativity, tenacity, a high level of motivation, enthusiasm for the job, and additional training about modern criminalistics technology (Adcock, 2019; Turner & Kosa, 2003; Walton, 2014). The Oklahoma State Bureau of Investigation (2009) recommends that members of a cold case unit have knowledge of laws pertaining to death investigations, a patient demeanor, knowledge of crime scene dynamics, and the ability to recognize evidence. They should also be open-minded and dedicated to the task of

reviewing case files and furthering the investigations of unsolved crimes – particularly homicides and sexual assaults. These guidelines would serve well in selecting students for a cold case program at a university. The desire to be involved and the ability to be discreet, characteristics listed as important by Dr. Vivian Lord of the University of North Carolina (2005), may be two of the most important traits to look for when selecting students for the program.

Curriculum and Supplies

Students in the *Cold Case Review & Analysis* class will need equipment and supplies to aid them in organizing the case files, researching the cases, documenting their findings, and producing reports for the law enforcement agency. Access to computers with a shared drive on a secure network as discussed in *Chapter 3* is recommended as it is helpful for students assigned to the same case file to collaborate on spreadsheets and reports. Microsoft Office applications such as Word, Excel, and PowerPoint are recommended for the purposes of organizing data and preparing reports. Access to a printer will also be needed for the production of reports and the scanning of case files. File storage containers or file cabinets that can be secured in a room with restricted access are also necessary for storing the case files. Students will need basic supplies such as 3-ring binders in a variety of page capacities, tabbed dividers, report covers, and a 3-hole punch. Data analysis software such as IBM's *i2 Analyst's Notebook*, if available, can be very useful in organizing and analyzing complex data. However, one should weigh the extent to which it might be used and its applicability to the inventory of case files against the cost of obtaining a license and the training necessary to use the software to determine whether the expenditure would be justified.

Early in the semester, bringing in a guest speaker to talk to students about his/her own approach to reviewing cold case files can be enlightening and give students some direction in starting out. As stated previously, the law enforcement agency representative who acts as liaison and supervisor for the program could be invited to speak to the students on the first or second day that the class meets. A second option is for the instructor to reach out to other cold case professionals in the region to interact with the students in this manner.

Textbook. The *Cold Case Review & Analysis* manual should be the required text for a university cold case course. In addition to administrative and instructional guidelines, it includes a detailed process for the review and analysis of investigative case files (see *Chapter 6*) as well as templates and examples of spreadsheets and reports (see *Appendices*) that are useful in the organization and analysis of data and the presentation of findings to the investigative agency. *Chapter 7* instructs students as to how best to put together concise yet informative reports for the investigative agency followed by an oral briefing of their findings. *Chapter 9* provides an overview of resources and tools that will assist the students in researching elements of the case file and analyzing data. Glossaries are included for quick reference resources regarding disciplines of forensic science (see *Chapter 10*) and evidence (see *Chapter 11*).

Student Performance Evaluation

Course syllabus requirements. This course is not designed to subject students to examinations for the purpose of demonstrating their accumulated knowledge. The *Cold Case Review & Analysis* course was first offered as a seminar to students at the University of Central Oklahoma Forensic Science Institute in the fall of 2018 and the

spring of 2019. The desired outcome for this course is that students will provide informative reports to the investigating agency to assist them in furthering the investigation. At the same time, students should benefit from the process by experiencing the opportunity to apply the knowledge and skills gained through previous coursework. For these reasons, students should be evaluated on their performance in several areas: participation and teamwork, proficiency in performing tasks associated with case file review and analysis, effective report writing, and the presentation of findings to the investigating agency. Due to the fact that many of these activities will be carried out during scheduled class periods, at which time the instructor will have the opportunity to observe and evaluate student performance, participation and attendance are key.

Standards of evaluation. Students enrolled in the *Cold Case Review & Analysis* course will be evaluated using the criteria displayed in Table 1. A copy of the original course syllabus is included as an example in *Appendix C* of this manual.

Table 1: Cold Case Review & Analysis standards of student performance evaluation

Element	Percentage of Grade
Participation & attendance	40%
Demonstration of proficiency	25%
Written reports	25%
Briefings	10%
TOTAL	100%

Capstone student requirements. Students enrolled in the *Cold Case Review & Analysis* course as part of their capstone experience should be required to fulfill the same requirements as those students who obtain practicum positions in the field. At the UCO Forensic Science Institute, capstone students must have completed the required forensic

science coursework prior to applying for the capstone. In addition to attending the 3-hour class period each week, the capstone student must invest 4.5 hours outside of class time during the 16-week semester of enrollment (9 hours per week during an 8-week term). This is required in substitution for the 120-hour commitment required for field practicum assignments. The student's time may be spent reviewing case files, preparing reports, or conducting research. Because case file access is restricted, all case file reviews done outside of class time must be done during regular business hours and the files returned to storage before the end of the business day. The practicum student must maintain a daily log briefly describing the activities in which the student engaged. The student is required to submit a 5-10 page paper in APA format about the capstone experience, covering the following aspects:

- A comprehensive overview of the participating law enforcement agency,
- A description of the student's duties and activities, and
- Interesting observations and experiences pertaining to the program's value as a capstone experience.

In writing the report, the student should take care to avoid violating the confidentiality agreement and should cite any literature used as references. At the completion of the semester, the *Cold Case Review & Analysis* instructor will evaluate the student's performance in the class by the standards set forth in the course syllabus. As with other capstone opportunities, the final requirement for the student is to sit for a comprehensive examination in forensic science.

Capstone student standards of evaluation. Students enrolled in the *Cold Case Review & Analysis* course as a capstone experience will be evaluated using the criteria

displayed in *Table 2*. These elements and standards are the same as those used to evaluate all students enrolled in a capstone at the UCO Forensic Science Institute.

Table 2: Capstone student evaluation standards

Element	Percentage of Grade
Daily log	10%
Summary paper	30%
Comprehensive examination	40%
Instructor's evaluation	20%
TOTAL	100%

References

Adcock, J. M. (2019). Cold case protocol: Solving the cold case crisis in America. Publisher: Author

Lord, V. B. (2005). Implementing a cold case homicide unit: A challenging task. *FBI Law Enforcement Bulletin,* 74(2), 1-6.

OSBI (2009, January). Cold case investigation protocol for reviewing unresolved cases. Oklahoma State Bureau of Investigation.

Turner, R. & Kosa, R. (2003). Cold case squads: Leaving no stone unturned. *Bureau of Justice Assistance Bulletin*. Rockville, MD: BJA Clearinghouse.

Walton, R. H. (2014). *Practical cold case homicide investigations procedural manual.* Boca Raton, FL: CRC Press.

Chapter 5

Case Management

Triage of Cases

Case files for the *Cold Case Review & Analysis* class may have been hand-picked by the investigating agency according to their standards for prioritization. In agencies that lack a systematic triage process, cases that are selected for review are usually high profile cases, cases where the family of the victim has recently contacted the agency, or cases in which new evidence has recently come to light. If the case files have not already been triaged by the investigative agency, the students may need to conduct a cursory review for prioritization of assignment of cases to teams. This is particularly necessary when there are more case files than review teams in the class.

Cold case expert, Dr. James Adcock (2019), suggests that cases be selected for review on the basis of solvability factors and rank-ordered as Priority 1-5. Priority 1 cases are those in which there is known physical evidence to be analyzed and the victim is female, whereas Priority 2 cases include known physical evidence for analysis but the victim is male. His rationale for this difference in ranking is that female victims are more likely to have been in close contact with their assailant, thereby increasing the likelihood of an exchange of trace evidence, than are male victims. However, when prioritizing, the reviewer should also consider how the death occurred. Close contact murders such as stabbings, blunt force attacks, and strangulations, whether the victim is male or female, are more likely to produce evidence on and around the victim than murders in which the victim was shot. Priority 3 cases are those in which a suspect or suspects are named in the file. Cases determined to have some investigative potential but lack any of the

aforementioned characteristics are considered Priority 4, and Priority 5 cases are those cases which are unlikely to ever be solved.

Although the full potential for solvability of a case cannot be assessed until the case file review has been completed, an initial triage can be conducted through a review of the initial incident report, the crime scene report with sketches and diagrams, and the medical examiner's report. Priority should be given to those cases in which physical evidence was recovered at the scene that has the potential to lead to the identification of the perpetrator and chain of custody was established at the scene through proper documentation. Weight should also be given to cases in which a suspect was identified in the incident report or witnesses were present who may be able to identify the suspect. It should be understood that this initial triage is only for the selection and assignment of case files for the students to review. Solvability factors should be reassessed after the case file review is complete and provided to the investigative agency in a set of final reports. This will allow the investigative agency to triage the cases for further investigation.

Team Assignment

In assembling teams, recall that a well-rounded cold case unit is made up of personnel from multiple backgrounds in the various disciplines of forensic science. To replicate this, select students from different disciplines to work as a team on each case file. It would also be prudent to team up undergraduate practicum students with more mature and experienced graduate students. Once teams are assigned a case file to review, that assignment should be recorded in the Case Assignment Log (see *Appendix D*). The log should be updated as follows to indicate the review status of each case: "in queue" to

indicate the review has not yet commenced, “pending” to indicate the review is in progress, or “complete” to indicate that all reports on the case file have been submitted. The log should be maintained from one semester to the next without any deletions of completed case file reviews.

Students should be encouraged to consult with others outside of their team when specialized forensic knowledge is needed. This may include other students in the *Cold Case Review & Analysis* course as well as faculty members within the institution. The wealth of knowledge and experience embodied in the faculty of an institute of forensic science is a substantial part of the reason that a program such as the one described in this manual is beneficial. Consultation with fellow classmates from other disciplines may provide the answers sought by the review team; at the very least, the team can work together with others outside their respective disciplines to guide them in the right direction in seeking those answers.

Although this manual is replete in guidelines for the review and analysis of case files, it is understood that each individual will approach the task differently. In fact, lessons can be learned in observing and considering the perspectives of others who view things differently from oneself. Students should keep in mind that in the field of forensic science, they are likely to be required to work as part of a team throughout their careers. This course offers the opportunity to develop team-building skills and learn to appreciate each other’s different perspectives, approaches, and talents.

Organization of the Shared Drive

The Cold Case shared drive is key to allowing team members to collaborate on case file review and analysis and the production of reports for the fact that it allows

students to observe each other's work to avoid redundant activities. The shared drive should be organized in such a way that allows students and the instructor to efficiently locate desired files. Additionally, important files such as templates and final reports should be protected from accidental overwriting by setting them apart from student work files within the shared drive. It is recommended that the following folders be created within the shared drive: Student Work Files, Templates, and Case File Masters.

Student work files. A personal work file folder should be set up within the Student Work Files folder for each student enrolled in the course. All work products produced by the students should be stored in their individual work file folders. They may organize the materials within their work folder according to personal preference. Students should be instructed to copy the necessary template from the Templates folder to their individual student work file folder to begin the review process. The file name should then be edited to include the case name for which the file is being used. For example, a Timeline spreadsheet template being used by student, Jane Smith, for the review of the "John Doe" case should be copied from the Templates folder to Jane Smith's work folder and renamed "Timeline_Doe".

Templates folder. Each of the spreadsheet and report templates used for case file review and the compilation of reports should be stored in the Templates folder. Recommended templates include the following:

- Case file access log
- Case assignment log
- Case file cover sheet
- Evaluation of completeness checklist

- Case file summary sheet
- Report template with table of contents
- Spreadsheets
- Action log
- Forensic & Investigative recommendations template

Each of these templates is discussed at length in other chapters of this manual, with examples included in the appendices. It would be advisable to store backups of each of the templates in another location, such as a backup folder in the shared drive and/or a portable USB drive to avoid the need to delete content of any of the templates if a student inadvertently saves over a template.

Case file master. A separate folder should be created for each case within the Case File Master folder for storage of all completed reports. It is advisable that one or more managers be designated to be responsible for ensuring that all completed reports are placed in the master file and printed for submission to the investigative agency. Depending on the size and makeup of the class, the manager(s) may be one person from each review team or one or more individuals selected from the class as a whole. When the semester is complete, the instructor or a teaching assistant should administrate the student work files to ensure that nothing was overlooked by case file managers. All completed works can then be archived in preparation for the next academic term.

References

Adcock, J. M. (2019). Cold case protocol: Solving the cold case crisis in America.

Publisher: Author

Chapter 6

The Case File Review Process

Initial Briefing

An initial briefing by the investigative agency representative may be conducted but is not required. One aspect of the cold case review process as conducted by a fresh set of eyes is that the reviewer analyze the case without any preconceived notions, untainted by the opinions of those who are already familiar with the investigation. If the reviewer is looking at the case from the same perspective as previous investigators, he/she may overlook or misinterpret the same critical detail that had previously contributed to the case going unsolved due to cognitive bias. The initial briefing, if it is conducted, should be limited in nature for this reason. However, the investigative agency may have some specific requests pertaining to actions that they want the students to take or reports they want students to produce. For example, on one case that the students worked in the pilot *Cold Case Review & Analysis* course, the agency requested that ViCAP submission forms be completed for the suspect and each of the known victims. ViCAP forms are discussed in greater detail in *Chapter 7* of this manual. Additionally, the investigative agency may have knowledge of specific reports or items of evidence that have not been located. There is no harm in providing students with such information. It can save them time and energy that might otherwise be spent attempting to determine if the items are available and making a written request that they be located and provided to the students. It can also prepare the students to be mindful of any mention of missing items in the case file that might aid the investigative agency in tracking down or determining what happened to the missing items.

Preliminary Inspection

Through experience, the author has discovered that there are sometimes items of evidence stored with the case file rather than in the proper evidence storage facility. On one occasion, an original document that included the victim's handwriting and disclosed an appointment time for the victim on the date of her disappearance was discovered in the file box amongst the investigative reports. On another occasion, a sealed manila envelope containing cigarette butts from the suspect's car were discovered in the case file binder. Each of these is an item of evidence that should have been properly packaged and stored to maintain chain of custody. For this reason, the case file should be inspected by the law enforcement agency representative immediately after the initial briefing before the university students take custody of the file in order to maintain chain of custody and to prevent students from taking any discoverable actions.

Organizing the Case File

Before the review of the case file begins, the documents should be arranged in chronological order and separated into sections by document type (e.g. Crime Scene Report, Supplementary Investigative Report, Property Receipt, etc.). This is done to facilitate the locating of the document again when it is referenced in a *Cold Case Review Report*. Reports are discussed at length in *Chapter 7* of this manual. It is recommended that the following list be used as a guide to organize the case file by section:

- Crime scene report, photos, sketches, and diagrams
- Supplementary investigative reports
- Medical Examiner report & photos
- Property receipts

- Evidence photos
- Forensic reports
- Other
    - People
    - Places
    - Lead sheets
    - Handwritten statements & notes
    - Transcripts

Clearly, this list is only a guide and may be amended as necessitated by particularities of the case file. A case file organization template is provided in *Appendix F* of this manual as well as a template for the organization of large case file provided by Jim Hardin of the TCSO Cold Case Task Force (see *Appendix G)*. If the case file received by the students is the original case file, a working copy should be produced by photocopying or scanning the original documents for the review process. It is recommended that this step be undertaken with caution. Due to fragility of the aged documents and variations in page thickness and dimensions, it would be unwise to feed the original case file through the automatic feed mechanism of a printer or scanner. The process of laying each document on the glass is tedious and time-consuming but necessary to prevent irreparable damage to the documents. The working copy of the case file should then be hole-punched and arranged in a 3-ring binder with tabbed dividers for each section. Note: This step should only be taken with a working copy of the case file. Do not alter any original case file documents. It is recommended that the original case file be returned to the investigative agency as soon as possible. Once the case file

working copy is arranged in a tab-divided binder, a table of contents listing each consecutive section of the binder should be created to facilitate locating specific documents within the case file.

If a cover sheet does not already exist, one should be created and placed on the cover of the binder or as the first page of its contents before the table of contents. It is recommended that the cover sheet include the case number, a photograph of the victim (in life), the victim's name, age, date of birth, incident date, cause of death, and a brief mention of additional information significant to the case. The purpose of this cover sheet is to provide at-a-glance information about the victim and the nature of the crime to the reader. An example is included in *Appendix H* of this manual.

The investigative agency may have already created an action log for the case file. This is usually included at the front of the case file. Although this action log should be maintained in its state and position, the reviewer of the case file may create his/her own action log during the case file review process. The case file review action log will be discussed later in this chapter.

Evaluation of Completeness

An initial evaluation of completeness can be conducted on the case file once all of the documents have been properly organized. The following list will serve as a basic guide in determining if anything is missing from the case file.

- Are all investigating agency reports present?
- Are all reports complete?
- Are crime scene photographs present?
- Are crime scene diagrams present?

- Are investigative notes present?
- Is the medical examiner's report present?
- Are autopsy photographs present?
- Are evidence logs present?
- Are property receipts present?
- Are forensic reports present?
- Are reports from other agencies present?

For the sake of convenience, a checklist, adapted from a checklist formerly used by the Kansas Bureau of Investigation and provided to the author by Michael Nance, NamUs Regional Program Specialist, is included in *Appendix I* of this manual. Due to the fact that investigations are complex, this checklist should not be considered exhaustive.

Digitization of the Case File

Digitization of the case file is an optional step and should only be undertaken with the express approval of the investigative agency, as digitization can create new case file security and confidentiality concerns. If the original case file is provided by the investigative agency, this step would take the place of photocopying of all documents in the case file. To preserve the case file in digital format, all documents in the case file may be scanned into pdf files.

As time allows, the following tasks should be completed by the review team:

- Transcribe all handwritten documents into WORD documents
- Transcribe all audio files into WORD documents
- Create pdf files from the transcribed WORD documents
- Catalog all digital files into a spreadsheet or other available database

Finally, print a working copy of the case file for the review and analysis process. Number the pages of the working copy for reference in all case file review forms and reports. This can be done using consecutive numbers or a letter-number format. Each page in the binder should have its own number. If a document is found later that should have been included between two consecutively numbered pages, the newly found document can then be labeled in a number-letter format. For example, if a 3-page document should be placed between pages already marked as *36* and *37*, the pages of the newly found document should be marked as page *36b, 36c,* and *36d*.

Comprehensive Review & Analysis

A thorough reading of the case file is required in order to gain a comprehensive understanding of the crime – what occurred, where, when, who may have been involved, what evidence exists and what it means. In conducting the review, the reviewer should be guided by the end goal of providing for the investigative agency a concise detailed list of forensic and investigative leads to follow as well as a brief summary of the case.

Crime scene. A crime scene should be properly documented with a detailed written narrative, a crime scene sketch or diagram, a series of crime scene photos, and possibly videography depending on the technology available at the time of the incident. The case file review should begin with the initial incident report to gain an overview of the crime, making note of photographs, diagrams, and evidence logs that should be present in the case file. A crime scene entry log, if present, is useful in directing investigators to individuals who responded to the crime scene and may be available to interview to fill in missing blanks about the crime scene. Crime scene photograph logs can assist the reviewer in determining if all photographs taken at the crime scene are still

in existence and present in the case file. Similarly an evidence log can assist in determining if all items of evidence collected at the crime were properly preserved and secured in the agency's property facility. If the case file does not contain proper documentation of the crime scene, the reviewer should attempt to ascertain whether or not the crime scene can be revisited and if doing so would offer anything of value to investigators.

In cases where more than one geographic location was involved, it can be helpful and informative to map the locations in an application such as Google Maps or Bing Maps or download historic maps and satellite images from internet archives. These applications and resources are discussed in greater detail in *Chapter 9*. Even if development of the locations has changed over time it can be helpful to examine the locations in relation to each other and in relation to other geographic elements that may have been germane to the incident.

If the case file lacks a crime scene diagram or has only a rough sketch, a measured drawing can be created if adequate information and accurate measurements are contained within the reports. Diagrams may be hand-drawn or created using CAD software, SmartDraw, or even Microsoft WORD or Paint (CAD Pro, 2019; SmartDraw, 2019; Lamarche, 2007; Byrd, n.d.). Forensic analyses such as crime scene reconstruction, shooting reconstruction, bloodstain pattern analysis, and behavioral analysis may be applicable, depending on the characteristics of the crime scene and how well-documented the scene is. Each of these disciplines is discussed further in Chapter 10 of this manual.

Systematic review. As forensic science students educated in the latest methods and technologies available for the analysis and evaluation of evidence, the primary

objective in reviewing the case file is to identify which items of evidence can be analyzed using modern forensic techniques to aid investigators in furthering the investigation. In order to determine what analysis should be conducted on an item of evidence, the origin of the item must be known, and the context of its origin must be understood. This will allow the reviewer to evaluate what forensic probative value may be offered by the results of further analysis. In order to understand the potential forensic value of the evidence, a comprehensive reading of the case file is required. In conducting the review, it is expedient to also gather information regarding persons, places, and events. The organization and comparison of these bits of information may reveal leads for investigators to follow and conflicts between two or more accounts that require investigative follow-up. The appendices of this manual provide examples of tools that are designed to aid in the process of review and analysis through a systematic approach. To facilitate and standardize the process, the reviewer should read each case file document, recording significant data into the following forms:

- Case Timeline Spreadsheet (see *Appendix N*)
- Evidence Spreadsheet (see *Appendix O*)
- Persons Spreadsheet (see *Appendix P*)
- Action Log (see *Appendix Q*)

Timeline. A timeline may have already been developed by the investigative agency. This should not dissuade the reviewer from inputting timeline events into a spreadsheet as there remains the possibility that something may have been inadvertently omitted. The value of assembling a timeline is that more often than not information uncovered in an investigation is rarely, if ever, discovered in chronological order.

Gleaning these bits of information from the documents within the case file and assembling them in chronological order can reveal contradictions and lines of inquiry that need to be followed up on.

The reviewer will record the case file name and number in the appropriate cells of the timeline spreadsheet (see example in *Figure 2*). The name of the investigating agency should be entered into the cell labeled Agency, and the reviewer's name should be entered into the cell labeled Analyst. The columns of the spreadsheet are fairly self-explanatory with the date and time (if applicable) of the event to be recorded in the appropriate columns followed by a brief description of the event, the location where the event occurred, the document in which the information was found, and any notes or remarks the reviewer believes to be significant in subsequent columns. It is best to use the binder page number when recording the source document to avoid any confusion. When all events have been entered into the spreadsheet, it can be sorted chronologically using the dropdown menu in the date column heading.

TIMELINE EVENTS					
CASE #		86-H-5	AGENCY:	TCSO	
CASE FILE NAME:		John Smith	ANALYST:	Amber Fortney	
Date	**Time**	**Description**	**Location**	**Source Documen**	**Notes**
8/14/86	21:40	John Smith arrived at club	123 State Street	1-24	per Jane Smith's statement

Figure 2: Timeline spreadsheet example

Once all data from the case file has been entered into the timeline spreadsheet and sorted chronologically, the reviewer should make note of any meaningful gaps in the

timeline that should be addressed by investigators. Of equal and often greater importance is to document any conflicts between timeline events as these can hold evidentiary value for the investigation. This was experienced by the author in a case review conducted in 2013. In an Oklahoma cold case homicide that occurred in the 1970s, the primary suspect claimed an alibi that included driving around for an extended period of time in a particular car accompanied by a friend in a community approximately 30 miles away from the crime scene during the time in which the victim disappeared. The friend was interviewed and gave a statement supporting the suspect's alibi, making it impossible for him to have been in the vicinity when the victim disappeared. However, two additional witnesses who, separate from each other, passed by the victim's residence during the time in question reported seeing that very vehicle parked outside the victim's residence during the time in which the suspect claimed to have been elsewhere. This example illustrates the efficacy of a detailed timeline in revealing significant inconsistencies that may have gone unnoticed by previous investigators. Details may be overlooked or obscured in the copious assortment of reports, particularly when the investigation is complex, when there is a lack of continuity in the investigation, or when communicative dysfunction exists between investigators. What might have been disregarded or entirely overlooked is revealed to have probative value through a conflict in the timeline.

Evidence. In order to make constructive recommendations for further forensic analysis, it is of paramount importance that the reviewer understand the origin, significance, and circumstances pertaining to each item of evidence referenced in the case file. Does the item of evidence possess the potential to reveal information that is both relevant and probative to the investigation? Is the chain of custody intact, and has the

item been properly preserved? If the current location of an item of evidence is unknown, is there anything within the case file that would assist investigators in locating it or reveal what became of it? Items of evidence may have been sent to a laboratory for analysis and not returned. It is possible that the evidence being sought was previously consumed in testing, destroyed, or irretrievably misplaced. A review of all supplementary investigative reports, forensic analysis reports, and correspondence within the case file may guide the reviewer in determining the status and location of such items of evidence.

In evaluating the evidence, the ultimate goal for the reviewer is to provide for investigators a list of evidence along with recommendations for further analysis. This can best be accomplished by entering each item of evidence into a spreadsheet and documenting all forensic examinations that have already been conducted on the evidence. In cold case investigations, the history of an item of evidence is equally as important as its source. Previous forensic analysis may have been conducted on a particular item of evidence with negative or inconclusive results. However, because of advances in technology, it is possible that positive results of greater probative value may be obtained by resubmitting the evidence for additional analysis. As the literature has shown, forensic techniques such as DNA analysis have improved dramatically over the years, forensic databases have become more robust, and computer algorithms have become more powerful. These and other advances offer the potential to glean answers from the evidence in long unsolved crimes. In reviewing the case file, it is crucial that prior analysis and the results of that analysis be recorded as well as the date of the analysis. This information will be used by the reviewer to compose a final report to the investigative agency.

When reading reports, if prior forensic analysis has been conducted, the reviewer should locate the laboratory report that delineates the results of the analysis. In the case of positive probative results, the forensic report will be required to present the results in court. Alternatively, it would be imprudent to rely only on a mention of negative or inconclusive results in an investigative report or other document, as a miscommunication could lead to a crucial piece of information being overlooked. The following account illustrates the fact that the only reliable source of forensic results is the laboratory report.

In 2015, a team of detectives and technical investigators at the Midwest City Police Department conducted a case file review of the cold case disappearance of Kirsten Hatfield some eighteen years earlier. In May 1997, Kirsten's mother awoke to find her eight-year-old daughter missing and the window adjacent to Kirsten's bed slightly ajar. A review of the case file indicated that Kirsten's underwear, ripped on one side and stained with what appeared to be blood, were found by the backyard fence at the rear of the property. During the initial investigation, the garment had been submitted to the FBI Laboratory for DNA analysis of the bloodstains as well as DNA analysis of epithelial cells from the crotch to confirm that it was indeed Kirsten's underwear. Continuing with the review, the team found a supplementary investigative report in which a detective stated that the results of the analysis indicated that the blood on the underwear was Kirsten's. However, the team was unable to find the forensic report that provided the results. Upon retrieving the underwear from the property room, the team found that portions of the fabric had been cut away for analysis, confirming that the analysis had been conducted. The team then requested the forensic report from the FBI Laboratory and learned that the stains on the underwear were indeed human blood but the DNA profile

developed from the stains did not match Kirsten nor any other exemplars submitted to the laboratory for comparison. After requesting reanalysis of the bloodstains by the OSBI Forensic Science Center, the team learned that the blood deposited on Kirsten's underwear came from an unknown male. This was a major turning point in the investigation. Further investigation would lead the team to a list of suspects, all but one of whom would be ruled out by the DNA profile. Ultimately, the DNA was matched to Anthony Palma, a man with a criminal history who lived two doors down from Kirsten's home at the time of her disappearance (K. Jones, personal communication, June 7, 2019). Palma was convicted of Kirsten's abduction and murder in 2017 thanks to the diligence and dedication of the team of investigators who refused to let her case remain unsolved.

The heading cells in the Evidence spreadsheet (see example in *Figure 3*) are to be filled out in the same manner as those in the Timeline spreadsheet, with case number, case file name, agency name, and analyst name. The columns, as well, are fairly self-explanatory. Enter the evidence number assigned to the item in the case file in the left-most (#) column. Give a brief description of the item, consistent with its description in the source document, and describe in the Item Origin column where the evidence item originated. Take care to document any analyses already conducted on the item, the date of the analyses, and the results in the appropriate columns. If more than one analysis has been conducted on the item of evidence, the reviewer may record each on a separate line of the spreadsheet or expand the spreadsheet to include additional columns. Status and location may not be known by the reviewer; however, the property receipt number can be recorded in this column to assist investigators in locating the item of evidence to carry out any recommendations for further analysis, as noted in the right-most column.

EVIDENCE									
CASE #		77-H-1			AGENCY:		TCSO		
CASE FILE NAME:		Rose Redd			ANALYST:		Amber Fortney		
#	Item Description	Item Origin	Notes	Source Documen	Analysis Conducte	Date of Analysis	Results	Status & Location	Recommended Further Analysi
3	Silk scarf, multicolored	Crime scene	found in close proximity to victim	1-5	none	n/a	n/a	PR# 5491	DNA

Figure 3: Evidence spreadsheet example

Persons. The reviewer should gather information about the identities of, and relationships between, all persons significant to the investigation. Determine from the case file if all witnesses have been interviewed and if any follow-up interviews are necessary. Were any suspects identified in the investigation? If so, document any measures taken in investigating the suspects – interviews, interrogations, written statements, polygraph examinations, and/or forensic comparisons to evidence. If interviews and interrogations were adequately memorialized with audio or audiovisual recordings, it may be advantageous to subject them to behavioral analysis to determine if deception is indicated by verbal, paralinguistic, or nonverbal behaviors. Written statements may be similarly analyzed to look for conflicts, inconsistencies, and/or the use of ambiguous, equivocal, or evasive accounts.

In the Person's spreadsheet (see example in *Figure 4*), the reviewer will assign a sequential number to each individual entered into the spreadsheet in the left-most column (#). It may be preferential to record the individual's name in the last-name-first format for the purposes of sorting after the spreadsheet is complete. The third column (X) is for designation of the individual, such as a victim, suspect, witness, etc. The Relationships

column is to be used to describe the individual's relationship to any other individual in the case file. The reviewer should record any significant information about, or provided by, the individual as well as any questions that need to be asked or investigated further.

PERSONS								
CASE #		86-H-4			AGENCY:		TCSO	
CASE FILE NAME:		Eve Brown			ANALYST:		Amber Fortney	
#	Name	X	Description	Source Document	Address	Phone Number	Relationships	Questions and/or Information
1	Jones, Bob	Witness	w/m, 48 years old, 5'11", approx. 180 lbs.	2-38	321 10th Ave.	555-987-6543	neighbor; casual acquaintance of victim	observed a man in dark clothing and a ski mask outside another neighbor's residence approx. two weeks before murder

Figure 4: Persons spreadsheet example

Secondary to the case file, Internet tools and resources can be used to provide information to investigators that may assist them in locating persons relevant to the investigation and are further discussed in *Chapter 9*. Of particular interest to investigators is the possibility that relationships between persons significant to the investigation may have changed during the intervening years. Divorces, breakups or deaths may have occurred; lifestyles may have dramatically changed; values may have evolved. Any of these changes may lead to a shift in loyalties that could result in a previously uncooperative witness being willing to open up to investigators.

Action log. The reviewer should make note of investigative leads that have already been followed and investigative avenues that remain open and unexplored. The purpose of this is to assist the reviewer in providing a list of forensic and investigative recommendations to the investigating agency when reports are complete. Recommendations should take into consideration the investigative actions and forensic

analyses that have already been conducted as well as the timeline pertaining to those actions and analyses. Oklahoma County cold case investigator Mike Burke provided to the author a form referred to as the "Yellow Book" and commonly used in active investigations by the Oklahoma City Police Department as an assignment log (OCPD, n.d.). The Action Log was adapted from the "Yellow Book" by the author for use in cold case review and analysis (see *Figures 5* and *6*). It consists of three pages containing a grid page which serves as the cover page for the log, an instruction page, and a table for listing each action (see *Appendix Q*). The grid page and table page are intended to be replicated as needed to accommodate any quantity of data.

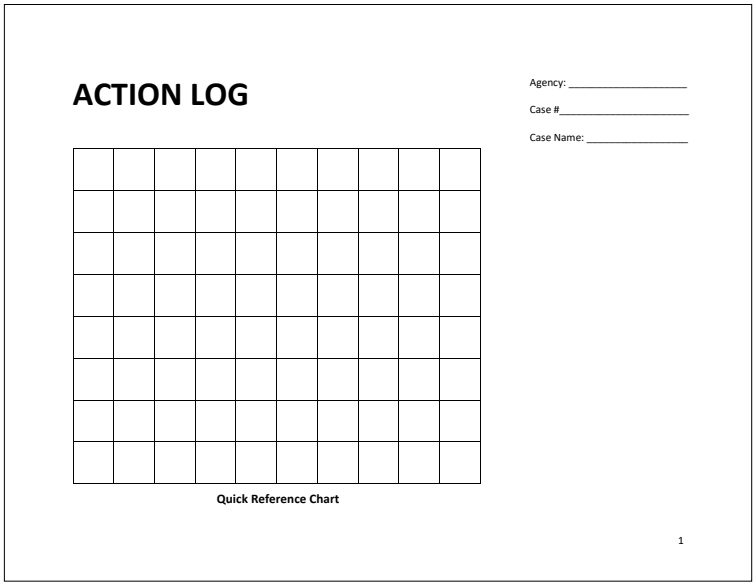
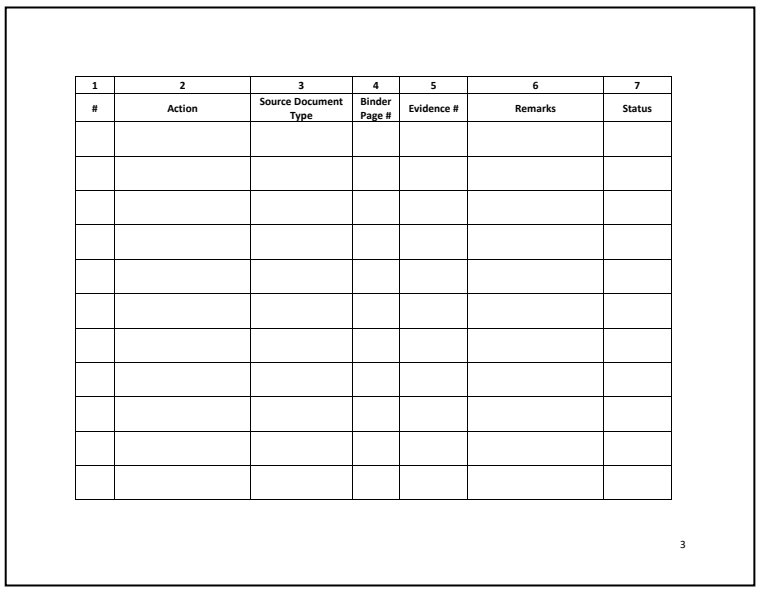


Figure 5: Action Log grid cover sheet



1	2	3	4	5	6	7
#	Action	Source Document Type	Binder Page #	Evidence #	Remarks	Status

3

Figure 6: Action Log

Conclusion. The purpose of conducting a case file review and analysis is to glean information from the case file and provide leads to investigators. It is not to supplant the responsibilities of investigators in interpreting meaning or formulating theories about the crime. However, one benefit to the agency in utilizing a university cold case program is that it provides new perspective from a fresh set of eyes. The reviewer should offer to the agency an explanation of the potential meaning of any findings and describe how those findings corroborate or oppose a theory. In so doing, it is incumbent upon the review team to thoroughly and objectively report everything of potential significance to the agency – even those findings that cannot be adequately explained. The production of reports for the investigative agency is discussed in *Chapter 8* of this manual. A flowchart is provided in *Figure 7* to assist the review team in the systematic process of cold case review and analysis.

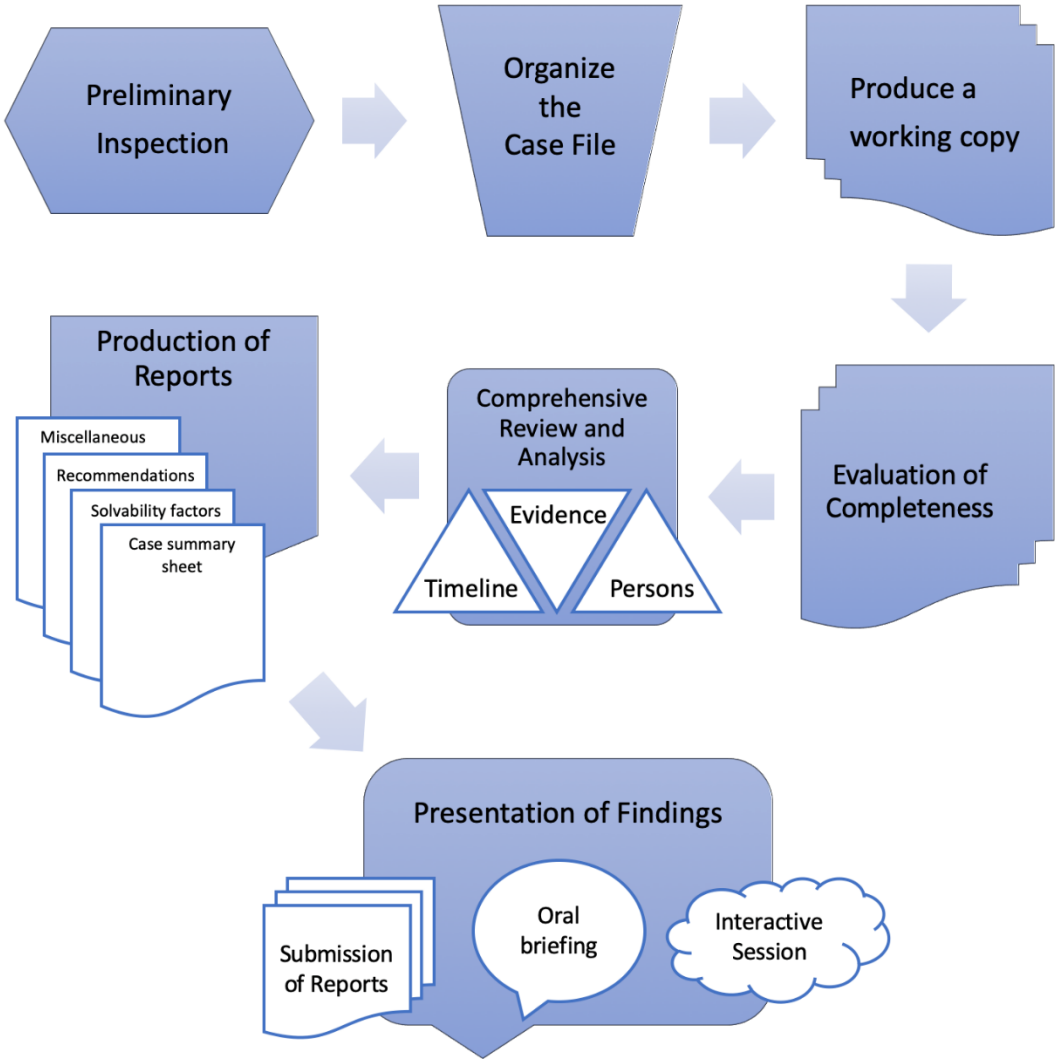


Figure 7: Cold case review & analysis flowchart

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Chapter 7

Reporting to the Investigative Agency

Written Reports

Presenting the review team's findings to the investigating agency should begin with documenting those findings in written reports. As stated in *Chapter 2*, one purpose of Cold Case Review & Analysis is to reduce the demands of time and energy on investigators so that their time can be devoted to investigative activities. A series of standardized reports, allowing for some variation to accommodate unique aspects of the case, is the best way to accomplish this. Once the investigators become familiar with the format of the reports, they will be able to effectively and efficiently grasp the content of the reports, quickly find desired information, and reference the reports to locate the specific case file source documents.

Reports should include a reference citation for each item of significant information by citing the binder page number on which the information is found. This may be done through in-text citation for narrative summaries or as a reference column in tables or spreadsheets. Recall that *Chapter 6* of this manual includes instruction on how to create and organize a working copy case file binder with enumerated pages for case file review and analysis. The purpose in enumerating the pages is to allow the reviewer to cite the binder page number rather than describing the document in which the information was found, thereby allowing the reader to quickly locate the referenced document. It is advisable to be consistent in this process of citing case file documents as investigating agencies support warrant affidavits and prosecuting documents with the sources of information contained therein.

A series of written report templates have been devised by the author through consultation with the law enforcement agency partner as well as through individual trial and error. A report template that includes the report cover sheet and table of contents is included in *Appendix J* of this manual. The table of contents can be amended to accommodate variations in the included reports. The report should include a Case Summary Sheet (see *Appendix K*), a Solvability Factors template (see *Appendix L*), and a categorized list of Forensic and Investigative Recommendations (see *Appendix M*) as well as the case Timeline, Evidence table and Persons table that were assembled during the case file review process. The report may be supplemented with additional information that the review team may have discovered relevant to the case outside of the case file. It may also be necessary to add miscellaneous reports tailored to any unique aspects of the case.

Anna Jones
Tulsa County Sheriff's Office
79-H-6
Property Receipt # 6543

Victim(s)	Sex	DOB	ID	Date of Incident	Method *[Ex: GSW, SFI, BFI, Asphyxiation, etc.]*
Jones, Anna	F	10/11/59	OK9876543	7/5/79	ligature asphyxiation

Crime Scene	Location	Investigating Agency(s)	Notes
body recovery site	½ mile south of E 131st St. S on S. Mingo Rd	TCSO, Bixby PD	Body found partially clothed in bar ditch on east side of road on 7/8/79
Victim's residence	2112 W. Elm St Bixby, OK	Bixby PD, OSBI	Victim reported missing from residence on 7/5/79

Persons	Designation	DOB	ID	Contact Info
Brown, Barbara	Witness	4/23/35	OK8765432	(918) 555-6789
Dalton, Robert	Suspect	8/4/50	OK2345678	OK DOC 192837

Figure 8: Case summary sheet example

The purpose of the case summary sheet is to provide a concise overview of the crime and of persons and places significant to the investigation. *Figure 8* provides an

example of how the upper sections of the case summary sheet are to be filled out. The lower half of the document provides space for a narrative. The narrative should include a concise yet thorough summary of the crime and significant information uncovered by the investigation. It may include a victimology assessment as well as a comprehensive summary of information and evidence implicating a suspect or suspects. It should also include a list of important witnesses and an account of the testimony each witness is expected to provide.

After the team has completed the review and analysis of the case file, a Solvability Factors sheet should be completed (see *Appendix L*). The criteria included in this form are an amalgamation of criteria used by the agencies consulted in the author's research and factors recommended by cold case experts and researchers whose literature the author reviewed. The purpose of this document is to provide a concise overview of the evidence and information contained in the case file that will assist the investigative agency in evaluating the solvability of the crime. As discussed in previous chapters, the solvability of a case should factor heavily into its prioritization for further investigation.

The timeline, evidence, and persons spreadsheets should be printed out and included in the final report to the investigative agency. The use of these spreadsheets is discussed at length in *Chapter 6* of this manual. In addition to the timeline spreadsheet, it may be helpful to record significant dates on a calendar template or create a graphic representation of the timeline. A calendar format can be helpful in providing context as to the day of the week on which an event occurred or any holidays contemporaneous to the event. A timeline graphic provides an overall picture of the timeline that may reveal correlations or inconsistencies that might otherwise go unnoticed in a list format.

Although the evidence spreadsheet should contain the review team's recommendations for further analysis, it is advisable that those recommendations be supported with an explanation of the relevance of the evidence and the basis for the recommendation. If possible, the review team should prioritize recommendations for further analysis of evidence, taking into consideration potential for positive results from further analysis as well as the probative strength of the potential results. If the status and location of an item of evidence is unknown, include in the report any references to the evidence from the case file which may be of assistance in locating the item of evidence or determining what became of it.

Any recommendations for further investigation of persons should be supported by explaining the basis for the recommendations and their relevance to the investigation. A report template for Forensic & Investigative Recommendations is included in *Appendix M* of this manual. In addition to forensic and investigative recommendations, this report is to be used to inform the investigative agency of any items or documents believed to be missing from the case file.

The report should also contain any additional information the review team discovered outside of the case file that is relevant to the investigation, as well as any documents or miscellaneous reports produced by the review team. This may include maps, diagrams, relevant information found through internet search results, legal documents, information pertaining to social media accounts, or ViCAP submission forms. Resources and tools for conducting research outside of the case file are discussed in *Chapter 9* of this manual.

Presentation of Findings

The final duty of the case file review team is to present their findings to the investigative agency. Once all written reports are completed, they should be presented to the investigative agency, and a final oral briefing should be conducted. Although it is not required, it may be advantageous to submit written reports to the agency prior to the briefing. This will allow investigators time to review the reports and be better prepared to interact with students on the day of the briefing. Time is short and valuable for all involved. At the very least, it is advised that the team schedule the briefing date in writing and provide a brief summary as to the specific case for which information that will be presented to ensure that members of the investigative agency who are assigned to the case are in attendance.

Finally, an oral presentation of the team's findings should be conducted. Although this can be done in a formal or an informal setting and manner, it is recommended that the team prepare a structured presentation in order to convey their findings in a logically flowing manner. It may or may not be necessary to include a PowerPoint presentation in your report dependent on whether or not visual aids such as charts, images, maps, or diagrams will enhance your narrative. To save valuable time and provide for a more comprehensible report, request that all questions be reserved for an interactive session at the end of the presentation.

This interactive session should not be overlooked, as invaluable ideas can result from the collaborative discussion among the group. It is an opportunity in which the review team and investigative representatives can ask and answer questions for each other and collectively brainstorm new ideas for pursuing the investigation. Students

should not be shy about asking questions or offering ideas for fear that they may seem ridiculous. Detective Ed Jackson (retired) of the Tulsa County Sheriff's Office Cold Case Task Force stated that he loves "hare-brained ideas. Sometimes hare-brained ideas work." Consider that even if your suggestion is not feasible, it may get others to look at an aspect of the case from a new perspective and lead investigators down a previously untraveled avenue to success. Be bold and remember the purpose of the *Cold Case Review & Analysis* course. Your contribution can make a difference. Seize upon the opportunity.

Chapter 8

Forensic & Investigative Avenues

The information provided in this chapter is intended to be used as reference material for the case file review team in understanding the advantages offered by advances in technology pertaining to forensic science and criminal investigations and their applicability to a particular cold case. Additionally, it can be used to inform and guide the review team in making recommendations for further forensic analysis and providing investigative avenues to the investigative agency. The technologies and methods discussed in this chapter are merely a sample. Because of the breadth of the field, continued scientific advancements, and the ongoing development of databases, review teams are encouraged to search outside the confines of this manual for additional avenues of forensic science and investigative avenues.

DNA Technologies

Since its introduction in the 1980s, DNA has become the gold standard of identification evidence. During the decades since it was first introduced, there have been significant advancements in both collection and analysis methods that have the potential to impact cold case investigations. Where analysts once needed a sample the size of a half-dollar, they are now able to develop a full DNA profile from only a few cells using polymerase chain reaction (PCR) analysis of short tandem repeats (STR). The CODIS database has become more robust, increasing the likelihood of a cold hit. Additionally, science continues to find new ways to utilize the information provided by DNA analysis, such as DNA phenotyping and genetic genealogy (Greytak, Moore, & Armentrout, 2019; Kayser, 2015).

M-Vac DNA collection system. The M-Vac System is a DNA collection apparatus that uses a handheld vacuum while applying a sterile buffer to collect skin cells or other biological material from evidence items. The manufacturer claims the system outperforms swabbing, cutting, or taping methods in the collection of DNA because it goes deeper than the surface of the substrate and can be used on larger areas. As the DNA material is drawn out of the substrate, it is collected in a sterile bottle. The sample is then concentrated by drawing it through a filter under vacuum pressure. The material trapped in the filter can then be analyzed using standard DNA extraction methods. The M-Vac can be used on multiple substrates but is especially helpful when attempting to collect DNA material from textured, rough, or porous surfaces and has even been successfully used on clothing that was wet or submerged in water prior to recovery. It has been used effectively in active and cold case investigations to produce full profiles where previous collection methods had failed (M-Vac, n.d.). The M-Vac System was used nearly forty years after the 1977 murder of a young woman found blindfolded, gagged and strangled in her bathtub, to collect DNA from the halter top used to gag the young woman. A full DNA profile was obtained and resulted in a CODIS hit that led police to her killer – the former building manager at her apartment complex (Augenstein, 2017). The system was equally successful in drawing enough material out of a river rock used to bludgeon a young woman in 1995, resulting in a full profile used to identify her killer; previous attempts to collect touch DNA from the rock had failed (McFall, 2013).

CODIS. The Combined DNA Index System (CODIS), maintained by the Federal Bureau of Investigation, is a system of databases and software that provides services to criminal justice agencies for the storage, comparison, and identification of DNA profiles.

The national database, known as the National DNA Index System (NDIS), contains the DNA profiles of convicted offenders and missing persons, as well as profiles from biological evidence recovered at crime scenes, and DNA profiles of arrestees in certain states. CODIS was established by the DNA Identification Act of 1994. As of April 2019, the database contains more than 13.7 million offender profiles, approximately 3.5 million arrestee profiles and over 930,000 forensic profiles and continues to grow dramatically (FBI, 2019). Suitable for submission to NDIS are DNA data generated through PCR Short Tandem Repeat (STR) technology, Y chromosome STR (Y-STR) technology, and Mitochondrial DNA (mtDNA). A CODIS profile originally consisted of genetic data at 13 core loci. In January 2017, the number of core loci in a DNA profile was increased to 20; however, a forensic profile can be uploaded and searched against the database with "a minimum of 8 of the original CODIS Core Loci combined with a match rarity of at least one in ten million." This change is expected to result in increased matches in the CODIS system (FBI, n.d.). The weakness of CODIS is that there can be no match if the DNA of the subject is not already in the system. As a result of the "Solving Cold Cases with DNA" grant program, nearly 4,000 DNA profiles were added to CODIS resulting in more than 1,400 hits (Bulman, 2014). As DNA databases become more robust through active case submissions, cold case reviews, and the resolution of DNA analysis backlogs, their power to identify offenders will increase.

Familial searching. When a traditional CODIS search has failed to identify a suspect, a deliberate trolling technique commonly known as familial DNA searching can be used to search the database for close biological relatives. Persons who are biologically related to each other will have more of the same short tandem repeat (STR) patterns at

core loci than persons who are not biologically related. Through this search technique, CODIS is capable of providing a list of possible relatives of the unknown donor, given that their profiles are in the system (Wade, 2015; Walton, 2006).

DNA samples. In cases that include sexual assault, medical examiners routinely collect oral, anal, and vaginal swabs, creating smears for microscopic examination while submitting the swabs to the investigating agency for forensic analysis. If the swabs were consumed in testing or later destroyed, investigators should check with the Office of the Chief Medical Examiner (OCME) for archived slides as a source of DNA. A recent search of the OCME archives in Connecticut led to the development of DNA profiles that aided the investigation of four cold case homicides (Clark, Gill, Sasinouski, & McGuire, 2019). In a case reviewed by the author, the autopsy report indicated that the medical examiner had observed spermatozoa in a smear from an oral swab. However, later analysis of the swab indicated no sperm were present. The author sought advice from Michelle Clark of the cited article and was advised that investigators should still attempt to locate the slide and submit it for DNA analysis.

Using the PCR method to amplify DNA, scientists can now develop a DNA profile from a few skin cells deposited by the suspect when he/she came in contact with a surface. In fact, investigators should keep in mind that latent prints lifted from the crime scene that have been determined to have no value for comparison are a potential source for “touch DNA”. It is important to note, however, that touch DNA is more susceptible to contamination due to transfer. It is also more likely to result in the development of a complex mixture of DNA.

When searching for DNA reference samples germane to an investigation, particularly in cases where the victim is missing or unidentified, PKU cards may be a viable source for a blood sample. PKU cards contain dried blood samples taken from infants born in U.S. hospitals via heel prick. Oklahoma stores PKU cards only for 30-42 days after birth; however, some states store the cards indefinitely. For example, California has been collecting PKU cards since 1980 and stores them indefinitely (UNT Forensic Science Unit, n.d.).

DNA phenotyping. DNA phenotyping which uses DNA from biological materials found at crime scenes to predict appearance traits and ancestry of the source became commercially available in late 2014. Parabon NanoLab's Snapshot can create a rendering of a suspect by plugging an individual genetic profile into a predictive tool. It yields an image in a matter of minutes, which can make it invaluable in active cases. Its ability to put a face on an unknown suspect can also aid cold case investigations by allowing people who recognize someone they know in that rendering to provide a name or other identifying information to police. Faces jog memories in ways that verbal descriptions cannot. The first investigative use of DNA phenotyping was the 2011 double homicide of a mother and daughter in Columbia, South Carolina. However, that case was solved in March of 2017 through advancements in palm print analysis and comparison techniques. Meanwhile, DNA phenotyping is being used to solve cases in several other jurisdictions including Colorado, Idaho, Louisiana, Maryland, North Carolina, and Texas. To date, approximately one hundred picture profiles have been developed by Parabon with about a dozen leading to suspects, one of which resulted in court conviction (King, 2017).

Forensic genealogy. Forensic genealogy, also referred to as genetic genealogy, is useful in investigations where DNA evidence is available but searches of CODIS have been unfruitful in providing a match. Genealogical DNA testing differs from traditional DNA testing in that it uses single-nucleotide polymorphisms (SNPs) rather than short tandem repeats in the genome for comparison. Uploading a genealogical DNA profile of an unknown subject to an open-source database such as GEDMatch allows for comparison of the submitted profile to other genetic profiles within a database. The degree of relatedness is quantified and the list of individuals who share DNA with the unknown subject are returned to the user in a matrix. From that matrix, experienced genealogists triangulate from at least two individuals to find a common ancestor and then construct a family tree of all descendants using traditional genealogy methods. Then it is a matter of traditional investigative techniques and a process of elimination to narrow down the list of potential suspects from whom to procure a DNA sample (Ferguson & Morford, 2018; Fitzpatrick & Yeiser, 2013).

GEDMatch does not provide the analysis to develop the genealogical DNA profile. They provide only the search tools that compare the uploaded profile to other profiles in their database (GEDMatch, n.d.). In May 2019, GEDMatch began restricting the use of its database by law enforcement agencies by setting the default for all DNA kits in their database to opt out of use by law enforcement agencies. Only those kits specifically designated by the owners will be available for comparison by law enforcement (Russell, 2019). In 2018, Family Tree DNA began working with the FBI to create genealogical profiles from samples submitted by the FBI and allowing access to its database for genealogical searches (Haag, 2019). Parabon NanoLabs and Bode

Technology also provide genetic genealogy services to law enforcement agencies (Parabon NanoLabs, 2019; Bode Technology, n.d.).

Genetic genealogy is most effective when the perpetrator is of Caucasian ethnicity. According to a recent study, 60 percent of Americans of Northern European descent can be identified through DNA databases. This estimate is expected to reach 90 percent in two to three years and will eventually gain effectiveness in other demographics. A database need contain only 2 percent of the target population to provide a third cousin match to an individual of that demographic (Erlich, Shor, Pe'er, & Carmi, 2018).

Fingerprint Technologies

Next Generation Identification. Historically, the Integrated Automated Fingerprint Identification System (IAFIS) has contained only fingerprints. However, in 2007, the FBI began the implementation of Next Generation Identification (NGI) to replace IAFIS in a series of phases. The system became fully operational in 2014 with a more powerful fingerprint-matching algorithm that improved accuracy from 92 percent under IAFIS to 99.6 percent using NGI. Increment 3 of the rollout introduced the ability to search palm prints within the database and expanded searches to include the Civil Repository and the Unsolved Latent File (CJIS, 2014; CJIS, n.d.). Although solving cold cases using DNA gets more attention from the press, NGI has led to the resolution of many cold case through resubmission of prints recovered decades ago. In July 2018, San Diego County prosecutors charged a North Carolina man with the 1987 murder of waitress, linking him to the crime with a fingerprint recovered from the victim's residence (Winkley, 2018). NGI allowed Chattanooga police to link an Alabama man to a

thirty-year-old homicide with a fingerprint lifted from a beer can recovered at the crime scene (Peterson, 2017). Through their Latent Print (NGI) Cold Case Project, the Oklahoma State Bureau of Investigation reviewed 333 cases for suitable latent prints, leading to the submission of 224 prints from 99 cases, and resulting in 25 new identifications. Many of these prints had been previously searched without success through IAFIS (Stokes, 2019).

Latent print development. Forensic scientists have successfully developed latent prints on decades old evidence, including both porous and nonporous items. In a 21-year-old case, analysts at a Canadian forensic laboratory developed prints on newspaper using Oil Red O (ORO) staining where the previous use of DFO had failed. Like ninhydrin, DFO reacts with amino acids in latent prints, whereas ORO reacts with lipids in latent prints on porous surfaces like paper to produce a red mark on a pink background (Beaudoin, 2011). Other methods for latent print development, although not new to forensic science, have been used to develop prints on evidence in cold cases.

Cyanoacrylate fuming. Using cyanoacrylate (CA) fuming in combination with fluorescent dye and a laser for visualization, analysts at the same Canadian laboratory developed and photographed latent prints on a plastic bag from the scene of a 1980s homicide (Tapps, McMullen, Gagne, & Beaudoin, 2019). In a study published in 2013, forensic scientists were able to enhance development of aged latent prints by dusting with a powder containing amino acids prior to CA fuming (Nixon, Almond, Baum, & Bond). Other methods for developing aged latent prints with CA involve rehydration through increased humidity in the CA chamber prior to fuming, adjustments to the pH level of the humidity to which the prints are exposed, and the use of a reflected ultraviolet imaging

system (RUVIS) to visualize and capture the print (Yamashita & French et al, 2017; Kwong, 2017) .

Vacuum metal deposition. Evidence in cold case investigations has been successfully processed using vacuum metal deposition (VMD) for the development of latent prints. In VMD, an item of evidence is exposed to one or more vaporized metals in a vacuum chamber. This results in a reverse image of the ridge detail as the object is coated in metal while the residues found in latent prints prevent adherence of the metals to the latent print. Researchers have found that VMD produces higher quality of prints than CA fuming and is effective on substrates that are notoriously difficult to process such as fired cartridge cases and on objects that have been submerged in water or buried underground. Moreover, VMD can be used successfully to develop latent prints on fabric and is most effective on smooth fabrics such as silk and nylon (Fraser, Deacon, Bleay, & Bremner, 2014). It is reported to have been used successfully on evidence that is more than twenty years old (Pennsylvania Commission on Crime & Delinquency, 2017) .

NamUs

The National Missing and Unidentified Persons System (NamUs) became fully searchable in 2009 and provides the ability to search the missing persons database against the unidentified decedent database. It is searchable and accessible by everyone including members of the general public. In addition to the database search tools, NamUs provides forensic resources to assist agencies in the fields of odontology, fingerprinting, nuclear and mitochondrial DNA and forensic anthropology free of charge for comparisons of missing persons to unidentified remains (UNT Forensic Services Unit, n.d.). In a missing person case or a homicide case in which the victim’s remains have not been found, the

victim's information should already be in the NamUs Missing Persons database. If the victim's information has not been submitted to NamUs, the team should bring this to the attention of the investigative agency immediately so that the situation can be remedied.

Behavioral Sciences

ViCAP. The Federal Bureau of Investigation provides assistance to state and local law enforcement agencies through the Violent Criminal Apprehension Program (ViCAP) and Criminal Investigative Analysis. ViCAP was implemented in 1985 and revamped in the mid-1990s, with its purpose being to identify cases exhibiting similar characteristics. Data is collected on solved and unsolved homicides or attempted homicides, particularly those that involve abduction, appear random or motiveless, are sexually motivated, or are believed to be part of a series, and on missing person cases believed to involve foul play and unidentified victims of homicide (Witzig, 2003). ViCAP has historically been largely neglected by law enforcement agencies across the United States, reportedly because investigators lack incentive due to the time required to complete the form and the perception that it rarely results in a link. Agencies in which this attitude is predominant should be encouraged to participate by reminding them that the value of ViCAP, like other databases, is in the robustness of its contents. The more cases that are included in the ViCAP database, the greater the probability that a linkage between cases will be detected (Miller, 2015).

A great advantage of ViCAP is that once a case has been submitted, it is continuously compared to other cases in the system. When it identifies a similarity or pattern, the submitting agencies are notified so that they can follow up on new leads. ViCAP assists investigations in a variety of ways: specifying types of evidence that

should be searched for; recommending and providing unique laboratory tests to be conducted; and storing images related to cases (Walton, 2006). It is important to keep in mind that the types of cases ViCAP targets bear characteristics that make them susceptible to going cold – stranger-on-stranger or random homicides, those with absent or unclear motives, and cases involving unidentified bodies and missing persons.

Criminal investigative analysis. The FBI began providing criminal investigative analysis services to law enforcement agencies in the 1970s. Profiling methods, crime scene analysis, geographic profiling, and victimology assessment are used to provide leads and interview strategies for investigators. The profile generated can provide information pertaining to lifestyle, race, gender, emotional age, marital status, level of education, occupation and work history of the offender. This requires a comprehensive review of case materials including police reports, crime scene photographs, autopsy reports and photographs, victim and witness statements, victimology and forensic reports (O'Toole, 1999). Cases predating the 1970s and even well into that decade may benefit because law enforcement agencies do not always avail themselves of such services, as exemplified by the failure to submit cases to ViCAP.

Forensic interviewing. Experts in behavioral analysis can offer recommendations on interviewing strategies and the formulation of questions, as well as how best to set up an interview room and select an interviewer who has the ability to develop rapport with the subject and get them to open up. It is important to consider potential personality disorders and the cognitive abilities of the subject in developing an interview strategy. In conducting interviews and interrogations, investigators trained in forensic interview methods, such as the Reid Technique, will observe verbal,

paralinguistic, and nonverbal behaviors to discern possible deception in response to questions on the part of the interviewee (Hess, 2010; Inbau, Reid, Buckley, & Jayne, 2015).

Data Analysis for Complex Cases

Cold cases, particularly those that are complex or contain voluminous reports, may benefit from the use of computer programs for organizing and analyzing investigative data, such as the i2 Analyst's Notebook from IBM. It can be used to create timelines and organize complex and confusing information, allowing investigators to see how pieces of a puzzling investigation fit together to form the big picture. In some cases, patterns or trends are revealed that provide new leads and, in some instances, indicate the specific crime being investigated may be linked to other crimes (Spraggs, 2003).

Innovative Approaches to Cold Case Investigations

Cold case playing cards. Cold case playing cards were introduced by the Florida Department of Law Enforcement in 2005, solving three of the featured homicide cases in just three months. Each card in a 52-card deck features a cold case, seeking tips from inmates in penal institutions. The same concept helped solve several crimes in Connecticut, and since 2005, cold case playing cards have been introduced in seventeen more states (Neyfakh, 2016). In partnership with the Oklahoma Department of Corrections, the Oklahoma Office of the Medical Examiner, and NamUs, the Oklahoma State Bureau of Investigation began distributing cold case playing cards in prison commissaries in 2017. Agencies interested in submitting a cold case are directed to contact the OSBI at coldcasecards@osbi.ok.gov or call (405)879-2959 (Wallace, 2017; OSBI, 2019).

Multimedia and social media campaigns. There are continuing advances in communications that can aid investigations, such as 24- hour national news services, the Internet, telephone services like Crime Stoppers, and various social media platforms. Each of these have proved useful in active investigations and have the potential to provide assistance in the collection and dissemination of information pertaining to cold case investigations, as well. The prevalence of television programs, books, and movies focusing on cold case investigations indicates that there is significant public interest in cold case homicides. Sometimes all it takes to jumpstart a stalled investigation is to spark public interest or reach just the right individual. In the summer of 2018, the Newport Beach Police Department launched a Twitter campaign seeking leads in the 1973 abduction and murder of 11-year-old Linda O'Keefe. Periodically tweeting throughout the day on the 45th anniversary of her disappearance, the department chronicled the last known hours of Linda's life as though from her perspective. The campaign brought national attention to the case and generated tips from the public (Gomez, 2018). Linda's murderer was apprehended in February 2019 through the use of forensic genealogy and later linked to additional sexual assaults on other children (Durbin, 2019; Sclafani, 2019)

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Chapter 9

Resources & Tools

The case file itself is the primary source of information for the reviewer, and the students are not to engage in any investigative activities that might subject them to be called to testify or expose their work to discovery rules. Students are not to have access to any physical evidence and are not to have contact with witnesses, suspects, victims, or survivors. Powerful research tools for law enforcement agencies, such as ACCURINT, CLEAR, and TLOxp, are restricted from use without proper authorization. However, there are a number of resources for researching publicly available information that can aid the reviewer in researching persons, places, and objects related to the case. Additionally, there are tools for analyzing data, some of which are accessible free of charge on the Internet. This chapter will provide a sample of such resources and provide some information about each one. It should not be considered a comprehensive list as there are innumerable resources available that could be helpful in conducting research.

ViCAP

The Violent Criminal Apprehension Program, a unit of the FBI, uses a national database to look for linkages between crimes, such as homicides, sexual assaults, and kidnappings, based on the characteristics of the incidents (Witzig, 2003). Current ViCAP forms are classified and therefore not accessible by students; however, a recently superseded ViCAP form may be found online. While it might seem like a redundant process to complete the outdated form and then hand it off to the law enforcement agency to input the data into the current ViCAP submission form, it can actually save the agency substantial time and effort. The ViCAP form is quite lengthy and detailed, requiring a

thorough review of the case file in order to glean all of the requested data. Furthermore, the reviewer can use the ViCAP information to conduct victimology assessments and create a behavioral profile for the perpetrator. As mentioned in Chapter 6 of this manual, the ViCAP form was used in a case reviewed by students wherein the suspect was known to have multiple victims and to have traveled across the country as part of his employment. As discussed in *Chapter 8* of this manual, investigating agencies should be encouraged to submit qualifying cases, both solved and unsolved, to ViCAP.

NamUs

The National Missing and Unidentified Persons System (http://www.namus.gov/) is a national clearinghouse for the comparison between individuals in the missing persons database and the unidentified decedents database. NamUs is accessible by the public and allows for searches using a variety of demographic and individual characteristics of the subject, date ranges, and geographical locations (UNT Forensic Services Unit, n.d.). The system proved useful in the pilot *Cold Case Review & Analysis* course in working the same case for which students completed ViCAP forms. The suspect in that case was employed in a profession that required nationwide travel, and a travel itinerary was found in the case file for a specific period of time. Students cross-referenced the itinerary with female individuals who went missing in the specified geographical areas during the indicated time period to determine if any missing persons could have been victims of the suspect. Students should be aware that login is not required to search the databases; however, more tools are available to registered users who are logged into the system. One advantageous example is that one can track a missing person in the database and view a

listing of all unidentified decedents who have been compared to and excluded as potential matches.

Maps and Satellite Imagery

As mentioned in Chapter 6, the use of mapping applications and satellite imagery can aide the reviewer in gaining a better understanding of the crime scene location. Applications and websites such as Bing Maps (https://www.bing.com/maps), Google Earth (http://www.google.com/earth/), and Google Maps (http://www.google.com/maps) allow the user to view street maps and satellite images across the United States and street view images of locations in cities and towns. In using any of these, one should take care to avoid uploading any case-sensitive information into the application. Do not rely on the privacy setting of the application to secure confidential information. It is important to keep in mind that development any geographic location may have changed drastically since the time of the incident. Routes and travel times between locations may not accurately represent those contemporaneous with the incident. Historical maps and satellite photographs can be found online at websites such as Google Earth Pro (http://www.google.com/earth/) and Historic Aerials (http://www.historicaerials.com/). A subscription or per-use fee may be required to access or download images from these websites.

Public Records

Court documents. Court documents pertaining to closed cases are public documents and may be procured by request through the court clerk in the district in which the case was filed. The availability of documents may be searchable through a state or local database. In Oklahoma, court documents are searchable by party name or

case number through the Oklahoma State Courts Network (OSCN) at http://www.oscn.net/dockets/Search.aspx. Records from non-OSCN counties are searchable through On Demand Court Records at https://www1.odcr.com/. A fee may be required to procure court documents; however, fees may be waived for law enforcement agencies. It may be helpful simply for the review team to provide a list to the investigating agency of any available court documents believed useful to the investigation. Appellate court opinions and decisions may be available online at websites such Justia.com (https://law.justia.com/cases/).

Police reports. Information helpful to the investigation may sometimes be found in reports from other law enforcement agencies pertaining to individuals related to the case at hand. Documents pertaining to closed cases may be acquired, in whole or in part, through an open records request by submitting a form to the county or municipal government office governing the jurisdiction of the law enforcement agency. Often these forms are available for submission on the government website. Documents pertaining to ongoing investigations may be available to the law enforcement agency by request.

Medical examiner and coroner reports. Autopsy reports and other case reports pertaining to the deceased are public records available by request in many states. In Oklahoma, OCME reports for completed cases are available free-of-charge to law enforcement agencies, family members of the deceased, and media outlets (OCME, 2019). There is a nominal charge for all others; therefore, it is recommended that requests for medical examiner reports be made through the investigating law enforcement agency.

FBI files. The Federal Bureau of Investigation maintains an online library of archived FBI files that have been released to the public subject to the Freedom of

Information Act. Documents are digitally scanned and available free to the public and searchable at https://vault.fbi.gov. Documents contained in The Vault may be redacted to protect sensitive information and the privacy of individuals.

National Archives. Federal documents deemed to be of historical significance are preserved in the National Archives. Examples of documents that might be helpful to cold case investigation are archived maps, charts, and aerial photographs. Some documents are available online and searchable at https://www.archives.gov/research, while others may be requested through the website.

Inmate searches. Searches for persons currently or formerly incarcerated in state and federal correctional facilities may be conducted online. Inmates of federal prisons can be searched by name or number through the Federal Bureau of Prisons website at https://www.bop.gov/inmateloc/. Oklahoma inmates may be located by searching through the Oklahoma Department of Corrections website at https://okoffender.doc.ok.gov.

Archives and Collections

Libraries and historical societies. Local libraries and historical societies may have a variety of materials that could be of assistance in researching elements of cold cases, including local newspaper archives, local historical collections, and telephone and city directories. Large metropolitan and university libraries provide access to an even broader range of information, such as newspaper archives from across the state, region, or nation.

Newspaper archives. When case files are incomplete, a search of newspaper archives may produce information that can help fill in holes or provide leads for investigators to follow. Researchers may be surprised to find that in past decades, law

enforcement agencies may have been more liberal in the release of case sensitive information than their modern counterparts. However, it is important to keep in mind such reports may not be entirely accurate and should be regarded with caution as mere leads rather than fact. Some newspapers, provide online access to their archives. For example, articles historically published in *The Oklahoman* are available to search, browse, and download through *The Oklahoman Digital Archives* at http://archive.newsok.com/Olive/APA/Oklahoman. A simple internet search will lead researchers to archives of newspapers such as *The New York Times*, *The Washington Post*, *The San Francisco Chronicle* and many others. Collections of newspaper archives may be found at websites such as the *California Digital Newspaper Collection* (https://cdnc.ucr.edu/), NewspaperArchives.com, and Newspapers.com. Some of these archives are free to the public, and some require a fee or subscription.

Social Security Death Index. The Social Security Death Index (SSDI) contains records from the United States Social Security Administration's (SSA) Death Master File and is available online and searchable through several websites such as Ancestry.com, FamilySearch.org, GenealogyBank.com, and NewspaperArchive.com. A Google search will turn up more options for searching the SSDI. A fee may be required to access records through these services. Data of deceased persons include given name and surname, date of birth, date of death, social security number, state or territory where issued, and last reported place of residence. Additional information may be obtained by requesting the individual's application for Social Security card from the SSA (Hill & Rosenwaike, 2001/2002).

Obituaries. When researching persons, obituaries may provide valuable information pertaining to an individual and his/her family members. Obituaries are routinely published in local newspapers which can often be accessed through online or physical archives. Nowadays, obituaries are commonly published online at websites such as Legacy.com, newspaper websites, and the websites of licensed funeral homes. Older obituaries may be available through genealogical research websites such as Ancestry.com, FamilyTree.com, or FamilySearch.org.

Find A Grave. Find A Grave (http://www.findagrave.com/) is a website owned by Ancestry.com providing a database in which members of the public can search for gravesite information and cemetery records throughout the United States. It contains information, photographs, and, in some instances, obituaries uploaded by volunteers for each grave included into the database. One need only register as a member and agree to the terms of service to become a contributor; there are no fees to pay and no standards of qualifications to meet. Registered members can also post comments on memorial pages; occasionally there is information that may be of interest to an investigation in these memorial comments. However, one should use caution in evaluating the accuracy of such information unless corroborating information is found through a more reliable source. Registration is not required to use the database search function. Searches can be conducted by entering only the individual's surname, but the search engine is more efficient if additional information is provided. One can also locate cemeteries by geographic location. Another helpful function of the database is that each individual page lists and provides links to deceased relatives of the individual. Since these lists are the

product of genealogical research, they should not be considered an exhaustive account of all deceased family members.

Genealogy websites. Easy access to several of the resources and tools discussed in this chapter are available through genealogy websites, such as FamilySearch.org, Ancestry.com, or FamilyTree.com. Additionally, family trees and public records stored in, or accessible through, these websites may be helpful in locating persons germane to the investigation through familial relationships.

The Internet

Resources not already discussed in this chapter may just be a few clicks of the keyboard away through Internet search engines, such as Google, Bing, DuckDuckGo, Yahoo, Ask.com, and AOL.com, to name a few. Information found through such searches should be preserved with a screen capture and documented as to its URL address, as it may be altered or removed in time. Digital archives of websites on the World Wide Web may have been preserved by the *Wayback Machine* which is searchable at https://archive.org/web/.

News media websites. Current news websites may publish stories about cold case investigations around anniversary dates or when interest is raised for other reasons. Often comments by readers accompany the article. Comments may include claims of personal knowledge of some aspect of the crime. Such comments should be treated with a healthy dose of skepticism but not entirely ignored as they may provide leads to investigators.

People search. There are a number of people search companies offering their services on the Internet, including but not limited to Whitepages, Intelius, Pipl,

Zabasearch, Spokeo. The information provided by these search tools is limited, may require payment of a fee, and may be erroneous or outdated.

Social media. Investigators increasingly look to comments and posts on social media platforms, such as Facebook (http://www.facebook.com/), Twitter (http://www.twitter.com/), Instagram (http://www.instagram.com/), LinkedIn (https://www.linkedin.com), YouTube (https://www.youtube.com), and Myspace (http://www.myspace.com/) for information pertinent to an investigation (Brunty & Helenek, 2015). Users of these services may share news reports, audio/video recordings, and photographs pertinent to criminal cases and post comments claiming personal knowledge of some aspect of the investigation. Clearly, such claims should not be taken as factual information but may provide leads for investigators. As with other Internet material, anything of significance should be preserved with a screen capture.

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Chapter 10

Disciplines of Forensic Science

This chapter is a glossary of the various disciplines of forensic science, listed in alphabetical order, that may offer assistance to cold case investigators through modern forensic analysis and/or the use of forensic databases. Each entry offers a concise overview of the discipline and a brief description of available tools and databases pertaining to the discipline. The information provided is intended only as reference material for the review team to guide team members in providing recommendations to the investigative agency for further examination and analysis by appropriate experts within each discipline of forensic science. This glossary is not intended to be a comprehensive, in-depth interpretation of any of the disciplines listed nor a substitute for consultation with a qualified expert.

Anthropology

Forensic anthropology is the study of human skeletal remains using scientific standards of physical or biological anthropology to identify human remains and to assist law enforcement agencies in the detection of criminal activity. Forensic anthropologists use features and landmarks of human bones to estimate age at death and to attempt to determine the sex, ancestry, and stature of the deceased. Assessment of trauma to bones can aid in determining cause of death and postmortem changes such as dismemberment or wildlife scavenging. Taphonomic changes to skeletal remains can be used to estimate time since exposure, an assessment which can be helpful in estimating the postmortem interval. Examination of taphonomic changes can also be useful in determining whether or not the remains may have been relocated during the postmortem interval. Many

forensic anthropologists are trained in methods and techniques of archaeology for the recovery of human remains (Byers, 2017). A forensic anthropology database is maintained by the University of Tennessee to aid forensic anthropologists in assessing age, sex, stature, and ancestry of a person from their skeletal remains (Forensic Anthropology Center, n.d.).

Bloodstain Pattern Analysis

Bloodstain pattern analysis is the interpretation of bloodstain formations found at a crime scene to determine what caused the bloodshed. It is not a simple one-step examination, but a process involving the evaluation of the size, shape, distribution, and location of the bloodstains to draw conclusions about the dynamics of the event which resulted in bloodshed. Principles of biology, physics, and mathematics are essential to understanding the behavior of the medium of blood in response to the forces and mechanisms involved in a bloodshed event. The discipline of bloodstain pattern analysis is built on empirical observations through casework and research experiments. Through examination of properly documented bloodstain evidence, a qualified bloodstain pattern analyst may be able to determine characteristics of the event such as the nature of the force inflicted on the victim, the locations and positions of victim and assailant, the sequence of events and movements of the individuals within the crime scene, and postmortem repositioning of the victim. Transfer bloodstain patterns can sometimes reveal the shape of the object used as a weapon in blunt force and sharp force injuries, the type of footwear worn by the assailant, or friction ridge impressions left by the assailant (Bevel & Gardner, 2008). Footwear impressions and friction ridge impressions require analysis by the appropriate expert. Bloodstain pattern analysis must be conducted by a

qualified professional in the discipline of bloodstain pattern analysis. The International Association for Identification (2019) offers an examination for certification in the field of bloodstain pattern analysis to individuals who meet standards of training, education, and experience.

Chemistry

Forensic chemistry is applicable in the assessment of a wide variety of physical evidence, including drugs, textile fibers, paint and automotive finishes, soil and glass, and explosives and accelerants. Forensic chemists use a variety of tools and methods, such as microscopy, chromatography, spectrophotometry, and chemical tests, to aid in the identification of unknown substances through examination and analysis of their chemical and physical properties. For example, a forensic chemist may be able to determine that a synthetic carpet fiber found on the victim was used by one automotive manufacturer and available only in certain models during a specified time frame. Similarly, paint chips may be sourced to a manufacturer and narrowed down to makes and models of vehicles (Houck & Siegel, 2007). Paint Data Query (PDQ) is an international database of automotive paints and finish used to aid in the identification of paint evidence left at crime scenes (RCMP, 2016).

Crime Scene Reconstruction

The discipline of crime scene reconstruction uses deductive and inductive reasoning and applies scientific methods in the assessment of physical evidence at the crime scene in attempt to determine events that occurred in the commission of a crime as well as the sequence of those events (Association for Crime Scene Reconstruction, 2019). It relies heavily on documentation of the crime scene, including crime scene photographs

and videography, measured diagrams, and detailed narrative descriptions, as well as the results of forensic analysis of the evidence. It may also involve revisiting the crime scene, if possible, or the creation of a three dimensional or virtual representation of all or a portion of the scene. Crime scene reconstruction can be useful in assessing the accuracy and truthfulness of eyewitness statements. It can also be informative to a behavioral analysis of the perpetrator (Bevel & Gardner, 2008).

Digital Forensics

Digital forensics examiners use an array of tools and processes to detect, collect, and analyze evidence stored on, received, or transmitted by electronic devices. Evidence can be recovered from devices even when there have been attempts to erase the data or destroy the device. In modern investigations, digital evidence is present in almost every crime that occurs and can be found on the internet and networks as well as on a variety digital devices, including but not limited to computers, peripheral devices, cellular telephones, digital cameras, portable storage devices, video game systems, smart watches, printers, and even automobiles. In cold cases, digital forensics is likely to be more limited in its applicability for the simple fact that digital devices may not have been in existence or in common use at the time the crime occurred. However, even if no digital evidence was created contemporaneous to the commission of the crime, the possibility exists that those involved in, or having knowledge of, the crime may create digital evidence at later dates through communication about the crime, particularly when they become aware that there is renewed attention to the investigation. Digital devices should only be examined by qualified digital forensics examiners. Investigators should also be aware that the search warrant exercised in the seizure of the device does not authorize the

digital examination of the device. An additional warrant is needed that authorizes the digital forensics examiner to investigate the contents of the device. Special care must be taken to avoid altering or destroying evidence contained on electronic devices. The National Institute of Justice provides a guidebook entitled, “Electronic Crime Scene Investigation: A Guide for First Responders”, for the proper handling of electronic devices, available at www.ncjrs.gov/pdffiles1/nij/219941.pdf (NFSTC, n.d.a).

DNA Analysis

Forensic DNA analysis is used to identify the source of biological materials collected in criminal investigations. This may include the identification of unknown human remains, the identification of the perpetrator of a crime, or the identification of an individual who handled or came in contact with an object or surface. There are primarily three types of DNA analysis used in forensic applications: nuclear DNA analysis (nDNA), Y-chromosome DNA analysis (Y-STR), and mitochondrial DNA analysis (mtDNA).

Nuclear DNA, the genetic material found in the nucleus of cells, provides the strongest power for identification. Sources of nuclear DNA include blood, semen, other body fluids, skin cells, and other tissues. Polymerase chain reaction (PCR) amplification allows analysts to develop a DNA profile from minute samples of biological material, essentially by making multiple copies of the DNA extracted from the sample. A DNA profile is created by measuring unique repeating patterns called short tandem repeats (STR) in the non-coding portion of autosomal DNA. DNA profiles can be searched against CODIS (the Combined DNA Index System maintained by the FBI), to identify

the contributor of the DNA or to detect links between two or more crimes (NFSTC, n.d.b).

In cases where it is difficult or impossible to separate the DNA of a male perpetrator from that of a female victim in a mixed sample, Y-STR analysis can be used to analyze short tandem repeats on only the Y chromosome, allowing for identification of the perpetrator. This is especially useful in cases of sexual assault when perpetrator and victim have shared alleles (Kayser, 2017).

Mitochondrial DNA, found in the mitochondria of cells, is passed down from mother to child, virtually unaltered. Identification to the exclusion of all others is not possible using only mtDNA sequencing because all descendants of a common female ancestor share the same mtDNA. However, it can be used to include or exclude an individual as the contributor of the sample or to establish a familial link between the contributor of the DNA and another individual. Because mtDNA is much more prevalent than nuclear DNA in human cells, mtDNA sequencing may be feasible when biological samples lack cells with nuclei or when the sample is compromised by degradation. Types of evidence that are commonly subjected to mtDNA analysis are skeletal remains and hairs that lack follicles (NFSTC, n.d.b).

There are a number of considerations investigators should take into account when evaluating the potential for DNA analysis in a cold case. The National Commission on the Future of DNA Evidence (2002) recommended that agencies consider such issues as statutes of limitations, the condition of the evidence and any analyses already conducted, the availability of witnesses to testify, and the resources needed for investigation and forensic analysis.

Entomology

Forensic entomology applies the study of insects and other arthropods to criminal and legal matters, focusing on the identification, ecology, and life cycle of organisms that colonize and consume decomposing remains. The stages of development and the succession of invasion of each genus and species are useful in estimating the time since exposure and/or the postmortem interval of human remains. Because necrophagus insects such as blow flies prefer to lay their eggs in areas of the body that offer the most direct access to internal parts of the body, an infestation of maggots in an area of the body other than a natural orifice may indicate a penetrating wound to the area. Forensic entomology may also be used to determine if the remains have been relocated from a different environment or geographical area prior to being discovered (Houck & Siegel, 2010).

Firearms & Tool Mark Analysis

Firearms examiners carry out a variety of analyses in the course of their work. Feed, fire, and, function tests are conducted to determine if all parts of submitted firearm are in proper working order. If attempts have been made to obliterate the serial number on the firearm, the serial number may be visualized through the process of serial number restoration.

A firearms examiner may be able to estimate muzzle-to-target distance in shootings by test firing the submitted weapon to produce exemplars for comparison. In hard contact shootings, particularly in bony areas, there is likely to be stellate tearing of the victim's skin at the entrance wound. In hard contact and close range shootings, there may be thermal injury around the entrance wound. In close and intermediate distance shootings, gunshot residue from the firearm may be deposited on the outer surface of the

target – often the victim's clothing or skin. The size and density of this pattern of gunshot residue allows the examiner to determine the range of proximity between the muzzle of the firearm and the target. In shootings involving shotguns, the size and distribution of the pellet pattern is similarly analyzed to arrive at a distance determination. Distance determination always requires that the firearm used in the shooting be used to conduct test fires using the same or similar ammunition for the purpose of analysis. The examiner can determine only a range of distance between the muzzle of the firearm and the target, not an exact distance.

A firearms examiner examines fired bullets and cartridge cases recovered at crime scenes to determine the brand, type, and caliber of ammunition used in the shooting. By examining marks left on bullets and cartridge cases, the examiner can determine what brands and models of firearms may have been used in the shooting. Identification of the specific weapon used in the shooting can only be accomplished through examination and comparison of ammunition components recovered from the crime scene with exemplars produced through test firing the submitted firearm(s). This is done through the use of a comparison microscope to examine striations left on bullets by the rifling of the gun barrel or marks left on cartridge cases such as firing pin impressions, extractor and ejector marks, chamber marks, and breech-face marks.

Because firearms are essentially a complex tool, firearms examiners are usually tasked with the analysis and comparison of tools and tool marks recovered from crime scenes to determine if a particular tool or type of tool made the tool mark. Class characteristics allow the examiner to narrow the possibilities only to the type, and sometimes the brand, of tool that could have created the tool mark. Individualization can

only be accomplished through comparison of striations and unique marks transferred to the surface on which the tool was used. Unique marks are usually the result of defects on the working surface of the tool caused by use or abuse (NFSTC, n.d.c).

The National Integrated Ballistics Information Network (NIBIN), maintained by the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), allows for searches of spent cartridge cases and bullets from crime scenes against the database to try to identify the firearm used in a crime by comparing marks left on the ammunition components such as firing pin and breech face impressions on spent cartridge cases and striations in land impressions on bullets. Additionally, the search results can indicate links to other crimes already in the system (Budden, 2001). The General Rifling Characteristics (GRC) database, maintained by the FBI, contains class characteristics of firearms and allows examiners to search for an unknown firearm based on the diameter and rifling patterns (lands and grooves) on fired bullets (NIST, 2017).

Friction Ridge Examination

Fingerprint analysts examine friction ridge impressions left at crime scenes and compare them with known exemplars to identify the individual who made the impression. Friction ridge impressions are most commonly associated with fingerprints; however, friction ridge skin is found on all palmar surfaces of the hands and on the plantar surfaces of the feet. Prior to the advent of DNA analysis as a means to identify an individual, fingerprints were considered the most conclusive and reliable method of identification. Friction ridge impressions may be latent prints, patent prints, or plastic prints. Latent prints are created primarily by perspiration deposited on a surface through contact with the friction ridge skin of an area of a person’s hands or feet. Latent prints require

development for visualization through the use of powders or chemicals, sometimes in combination with cyanoacrylate, dye stains, and/or a forensic light source or laser. Patent prints are those that are deposited via a visible matrix such as grease, blood, ink, or paint. Plastic prints are three-dimensional impressions, such as fingerprints left in wax or clay. Fingerprint examiners analyze class characteristics such as pattern types (loops, whorls, and arches) and individualizing minutiae (bifurcations, ending ridges, dots, enclosures, islands, pores, and ridge shapes) in comparison with known exemplars to evaluate the print. Whether from the hands or the feet, friction ridge impressions are a reliable form of identification because the patterns formed by friction ridge skin are unique and permanent. Formerly known as the Integrated Automated Fingerprint Identification System (IAFIS), the FBI's Next Generation Identification (NGI) database has been updated to include palm prints and to employ a more powerful algorithm to search the database for potential matches. A search of the database produces only potential candidates. An identification can be made only by a qualified fingerprint examiner using the ACE-V method (Daluz, 2015).

Impression Evidence

Impression evidence describes a pattern of marks imparted on an object when it comes in contact with another object and applies to a wide range of physical evidence. Although fingerprints, firearms evidence, tool marks, and bite marks are types of impression evidence, their analysis is specialized, making each of them a discipline unto itself. As such, each of these disciplines is described separately within this glossary. Footwear impressions and tire marks are impression evidence commonly encountered at crime scenes. The pattern and size of impressions left by footwear outsoles and tire tread

can be examined to determine the brand, model, and size of the footwear or tire that made the impression. When random imperfections are present to a sufficient extent, it may be possible for and examiner to reach a conclusion of individualization to the footwear or tire that left the impression (Houck & Siegel, 2007). Footwear impressions found at crime scenes can be searched against a computerized reference collection database such as that maintained by the FBI (Bodziak, 2000). Additionally, there are footwear impression databases maintained commercially such as TreadMark and SoleMate. Foster & Freeman, proprietor of SoleMate, also maintains TreadMate, a commercially available tire tread reference collection (Bowen & Schneider, 2007).

Odontology

Forensic odontology is used primarily in the identification of unknown decedents through comparison of the decedent's dentition to dental records and x-rays of individuals suspected of being the decedent. Forensic odontologists take into consideration the combination of the size, number, and position of teeth as well as dental work that has been done to identify the decedent on the basis of shared individual characteristics between the unknown decedent and the individual's dental records. It is important to keep in mind that the pulp (tissue in the center) of teeth is a good source of DNA and is usually the most well preserved due to the hardness of the tooth encapsulating the tissue (Houck & Siegel, 2007). Historically, forensic odontology has been used to identify bitemarks found on human bodies (or other objects found at the crime scene) to the individual who caused the bitemark. However, bitemark evidence has been called into question as to its reliability due to wrongful convictions on the basis of

erroneous or exaggerated bitemark testimony and as a result of independent studies (PCAST, 2016).

Pathology

Forensic pathologists are medical doctors who conduct autopsies on deceased individuals to determine cause, manner, and mechanism of death. Additionally, the medical examiner may be tasked with collecting evidence from the body, identifying the decedent if unknown, and approximating the postmortem interval. The documentation of injuries and how they occurred and any physical evidence retrieved from the body, such as bullets, hairs, fibers, trace evidence, and foreign biological material, may be useful in confirming or refuting a third party's account of the event(s) resulting in the death. The pathologist will also collect body fluids and tissues for toxicological testing. Other findings of an autopsy include the presence of natural disease or other factors that may have contributed to the decedent's death. Depending on the condition of the remains, a forensic anthropologist may be consulted to assist in identifying the individual and/or evaluating injuries or taphonomy of skeletal remains (DiMaio & DiMaio, 2001).

Questioned Documents

Questioned document examiners attempt to determine the authenticity and/or authorship of any document containing inscriptions to include handwriting, typewriting, computer printing, photocopying, or any other means. Individual characteristics present in handwriting may be used to identify the author of a questioned document through comparison of the questioned document to known writing samples or exemplars. Questioned document examiners use a variety of techniques to detect alterations to documents such as obliterations, erasures, and added markings. The detection of indented

writing may also reveal clues as to the origin of a questioned document. The examiner may be able to approximate the age of a document by analyzing the ink and paper used in its composition (Houck & Siegel, 2010)

Toxicology

In death investigations, forensic toxicologists work with forensic pathologists to determine cause, manner, and mechanism of death. Toxicologists analyze human tissues and body fluids to detect the presence of poisons and drugs or their metabolites. In order to determine the effect of the toxic substance on the victim, the toxicologist must determine the amount present and must also have a thorough understanding of the victim's medical history and habits of drug use as well as the physical condition of the victim at the time of ingestion. It is also necessary to take into consideration any other drugs present in the body to determine if a toxic combination of drugs may have resulted in the victim's demise (Houck & Siegel, 2010).

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Chapter 11

Evidence

In order to successfully prosecute a criminal case, the prosecutor must prove beyond a reasonable doubt all elements of the crime – that a crime was committed, that the defendant is the person who committed the crime, and, in many crimes that the defendant intended to commit the crime. To prove the elements of the crime, the prosecutor will present evidence at trial. Evidence presented in court may be physical evidence, testimonial evidence, or demonstrative evidence. The prosecutor's case is built on the evidence and information uncovered during the criminal investigation (Becker, 2009).

An investigator's duty in investigating a crime then is to determine not only what happened and who is responsible, but what evidence exists to prove the guilt of the person who will ultimately be charged with the crime. Such evidence is commonly referred to as inculpatory or incriminating evidence, meaning that it tends to establish the guilt or responsibility of the accused. Investigators must also be concerned with exculpatory evidence, or that which tends to exonerate the accused of guilt or responsibility. In addition to being required to prove their case with evidence, the prosecution is compelled by discovery laws to provide exculpatory evidence as well as evidence which can be used to impeach the credibility of witnesses (Becker, 2009).

Admissibility of Evidence

To be admissible in American courts, evidence must be both relevant and reliable. As with most other states, the rules of evidence governing the admissibility of evidence

in court are modeled after the Federal Rules of Evidence from the U.S. Code. Rule 401 of the Federal Rules of Evidence states:

> Evidence is relevant if:
>
> (a) it has any tendency to make a fact more or less probable than it would be without the evidence; and
>
> (b) the fact is of consequence in determining the action.

In Oklahoma, the admissibility of evidence is governed by Article IV of the Oklahoma Evidence Code found in Chapter 40 of Title 12 of Oklahoma Statutes and similarly states that relevant evidence "means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." Concisely stated, evidence is relevant if it is material and probative, meaning that it tends to prove or disprove a fact in issue. To meet the reliability standard, evidence must be shown to be authentic in that the item entered into evidence in court can be proven to be the same item recovered at the crime scene. For this reason, chain of custody is crucial in demonstrating that evidence is reliable.

Chain of custody. Chain of custody is established through documentation to record the names of every individual who has handled the evidence from its collection to its introduction in court. Each time the item of evidence changes hands or is checked out of the property room, the receiving party's name should be recorded on the chain of custody document attached to the packaging. Any break in the chain of custody of an item of evidence may result in its admissibility being challenged on the bases of relevance and reliability. Opposing counsel may reasonably claim that the party

introducing the item of evidence cannot show that it is authentic and/or that it has not been altered in a way that makes it unreliable. Chain of custody begins at the crime scene through proper documentation of the scene and all actions undertaken in processing the scene, making crime scene processing a crucial phase in the investigation of a crime (Becker, 2009).

Crime scene processing. The FBI Evidence Response Teams' model (2018) delineates 12-step guidelines for the processing of crime scenes:

1. Preparation
2. Approach Scene
3. Secure and Protect Scene
4. Initiate Preliminary Survey
5. Develop Evidence Collection Plan
6. Document Search Activity
7. Depict Scene Photographically
8. Prepare Diagram/Sketch
9. Conduct Detailed Search
10. Record and Collect Physical Evidence
11. Conduct Final Survey
12. Release Scene

A properly documented crime scene will include a narrative description, sketches and/or diagrams, photographic representation of the scene, and documentation of all items of evidence collected at the scene. If any of these items are absent from the case

file, the reviewer should document their absence and inquire with the investigating agency as to their availability.

Search and seizure. The admissibility of evidence is also dependent on the legality of the search and seizure through which the evidence was obtained. The individual's right to privacy is protected by the Fourth Amendment to the U. S. Constitution, which states:

> The right of the people to be secure in their persons, houses, papers and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched and the persons or things to be seized.

It requires that law enforcement officers obtain a warrant for most searches and seizures. In certain instances, warrantless searches and seizures are permissible. However, all searches and seizures must meet the standard of reasonableness. In requesting that a judge or magistrate issue a search warrant, the officer requesting the warrant will write an affidavit to establish probable cause to believe that the search will produce evidence of the crime. Evidence that is obtained as the result of a warrantless search that does not meet the standard of reasonableness is inadmissible. In addition, any evidence later obtained on the basis of evidence obtained through the illegal search and seizure, referred to as "fruit of the poisonous tree", is also inadmissible (Becker, 2009).

Evidence in Cold Case Investigations

Cold cases are subject to the same laws, statutes, and rulings as those governing evidence in active investigations. The additional challenge faced by cold case

investigators is that sometimes documentation may not have been properly created to reveal the origin of the evidence, to maintain chain of custody, or to document the reasonableness of the search. In other instances, the documentation may have been lost, misplaced or destroyed. In reviewing the case file, it is recommended that the reviewer make note of all documentation that would support the admissibility of significant items of evidence and include reference to those specific documents in reporting to the investigative agency.

Without fail, investigators should take care to follow the evidence in determining what happened and who is responsible rather than forming a theory of the crime early on and ignoring any evidence that does not support that theory while misinterpreting other evidence to fit the theory. This is referred to as confirmation bias, a type of cognitive bias. All human beings, including the most objective of investigators, are susceptible to cognitive bias. Cognitive neuroscientist Dr. Itiel Dror (2015) states that one way to minimize cognitive bias is to be aware of its potential to influence decision-making and to engage in proactive training to overcome it. Cold case reviewers must manage their own potential for cognitive bias in addition to guarding against the danger of being misled by any conceivably erroneous theories and opinions of the original investigators. The systematic approach outlined in this manual can be beneficial to the reviewer as a means by which to mitigate subjectivity.

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U.S. Const. amend. IV.

Appendices

Appendix A: Memorandum of Understanding

COLD CASE TASK FORCE COLLABORATION (CCTFC)

UNIVERSITY OF CENTRAL OKLAHOMA

FORENSIC SCIENCE INSTITUTE (FSI)

TULSA COUNTY SHERIFF'S OFFICE (TCSO)

MEMORANDUM OF UNDERSTANDING (MOU)

PARTIES

This Memorandum of Understanding (MOU) is entered into by the Tulsa County Sheriff's Office (TCSO) and University of Central Oklahoma on behalf of the Forensic Science Institute (FSI) at the University of Central Oklahoma. FSI will assemble a working group (FSIWG) that will consist of faculty members and students of the University of Central Oklahoma assigned to the Cold Case Investigations course. Any reference to the collaboration of these two parties will be as the Cold Case Task Force Collaboration (CCTFC).

PURPOSE

The purpose of this MOU is to formalize relationships among parties; delineate the responsibilities, roles, and processes of all parties; provide a mechanism through which the parties will exchange ideas, training, and expertise to enhance the knowledge of forensic evidence within the Oklahoma Criminal Justice system; and establish a collaborative arrangement among the parties in the CCTFC.

MISSION

The mission of the CCTFC is to review case files pertaining to unsolved crimes against persons for the purpose of determining whether or not an investigation can be furthered through DNA

analysis or other forensic examination. Such cases may involve a review of the full spectrum of forensic analysis. Potential areas for further analysis may include but are not limited to: Bloodstain Pattern Analysis, Crime Scene Analysis & Reconstruction, Digital Evidence, Serology/DNA, Fingerprints, Firearms, Footwear and Tire Impression, Tool Marks, and Toxicology, or other types of forensic evidence and testing.

PROCESS

Analysis of cases by the FSIWG will begin with a review of the files submitted by the TCSO. Where potential forensic science issues arise, the FSIWG will recommend the type of analysis appropriate given the evidence in the case. When the review is complete, the FSIWG will generate applicable reports and consult with the TCSO to brief them on the findings and any recommended forensic analysis. The FSIWG will not conduct any forensic testing of the evidence or engage in any activity which may require future testimony.

ORGANIZATIONAL STRUCTURE

Leading experts from the FSI in each forensic discipline and select students will convene as members of the FSIWG. The FSI will designate a graduate student to facilitate and coordinate the FSIWG and serve as the FSIWG Liaison to CCTFC. The graduate student will be supervised by an FSI faculty member. Represented disciplines in the FSIWG may include but are not limited to: Bloodstain Pattern Analysis, Crime Scene Analysis & Reconstruction, Digital Evidence, Serology/DNA, Fingerprints, Firearms, Footwear and Tire Impression, Tool Marks, and Toxicology.

FSIWG will serve as non-paid forensic consultants to CCTFC, and make recommendations regarding evidence that may be suitable for additional testing. TCSO will identify potential cases

for review and send FSIWG all appropriate and relevant case materials excluding original evidence. In its role as advisor to CCTFC, all communications and reports involving the FSIWG will be treated as law enforcement sensitive and protected by attorney/client privilege, the work product doctrine, or Rule 1.6 of the Oklahoma Rules of Professional Conduct, as provided by law. FSIWG personnel will not handle or possess original evidence and; therefore, will not be included in chain of custody documentation. Further, all relevant case material provided to the FSIWG shall remain the property of the TCSO and be returned upon completion.

COLLABORATION

The primary focus of the CCTFC is to resolve cold cases in Oklahoma. Additional benefits from this collaboration will be the education of FSI students in the assessment of forensic science issues involved in cold cases and to learn how to work with experts in the review of such evidence. The FSIWG will address the types of evidence and testing best suited to the case and consult directly with the TCSO.

CONFIDENTIALITY AND NON-DISCLOSURE

All information contained in case files will be treated as confidential and members of FSIWG will sign confidentiality agreements. Any documentation created based upon information provided by the TCSO will belong to the TCSO.

LIABILITY AND INSURANCE

The parties intend that each shall be responsible for their own intentional and negligent acts or omissions to act. UCO shall be responsible for the acts and omissions to act of its officers and employees, including the FSIWG, while acting within the scope of their employment according to the Oklahoma Governmental Tort Claims Act, Title 51 O.S. Section 151 et seq. Further, UCO is

self-insured by Oklahoma State Risk Management. TCSO shall be responsible for any damages or personal injury caused by the negligent acts or omissions to act by its officers, employees or agents in the performance of the contract.

RELATIONSHIP OF INDEPENDENT CONTRACTOR ESTABLISHED

It is the express intention of the parties hereto that this MOU shall not be construed as, or given the effect of, creating a joint venture, partnership, affiliation or association that would otherwise render the parties liable as partners, agents, employer-employee or otherwise create any joint and several liability.

TERM OF AGREEMENT

It is agreed that this MOU will be in force until the end of the fiscal year following the date upon which the last required signature of acceptance is received. Neither party anticipates cancelling within the fiscal year. This MOU may be considered for automatic renewal after a review process that is to begin prior to the expiration date of the MOU. The MOU may be terminated at any time by a participating party delivering a written notice of termination to the directors of the remaining participating parties; however, such termination shall not occur until the end of the semester to allow the assigned graduate student(s) to complete their work.

_____
Dr. John Barthell, PhD.
Provost
University of Central Oklahoma

_____
Dwight E. Adams, PhD.
Director
UCO Forensic Science Institute

_____
Steve Kunzweiler
Tulsa County District Attorney

_____
Vic Regalado
Tulsa County Sheriff

_____
Mike Huff
TCSO Cold Case Task Force

Appendix B: Confidentiality & Nondisclosure Agreement

VOLUNTEER
CONFIDENTIALITY AGREEMENT
TULSA COUNTY SHERIFF'S OFFICE

As a Volunteer of the Tulsa County Sheriff's Office, I understand that I may learn of or have access to information (verbal, written, or electronic) which is of personal, safety-sensitive, or otherwise confidential in nature. Such information includes, but is not limited to incident reports, NCIC/CCIC information, Computer Aided Dispatch/RMS information, and other law enforcement or Police Services related information. I agree to maintain the confidentiality of such information and will not divulge it to anyone for any purpose without the express consent or direction of my supervisor or other management of Tulsa County Sheriff's Office personnel.

I further understand and agree that I am prohibited from using any of this information for my personal use or benefit or for any other non-Tulsa County Sheriff's Office business related purposes.

I understand and agree that my failure to comply with the confidentiality requirement set forth in this Confidentiality Agreement is grounds for discipline, up to and including termination of acceptance or termination of the Volunteer relationship. Additionally, the Tulsa County Sheriff's Office may seek other criminal or civil sanctions or damages as may be allowed by law.

The restrictions of the Confidentiality Agreement regarding disclosure and use of information shall continue to apply after termination of acceptance or other relationship with Tulsa County Sheriff's Office.

I have read and understand this agreement and agree to comply with it in every respect.

Dated this _____ day of _____, 20_____

_____
Signature

_____
Printed Full Name

Appendix C: Course Syllabus

Cold Case Review & Analysis

Course Syllabus
FRSC 5910; CRN# 24394
UCO Forensic Science Institute
Spring 2019

Class Days: Monday
Class time: 1:00 – 3:30 PM
Classroom: FSI 109
Office Hours: One hour prior to class or by appointment

Instructor: Craig Gravel
Office: FSI 110L
Phone: 405-974-6912/Cell: 405-706-8489
Email: cgravel@uco.edu

The University of Central Oklahoma is a learning-centered organization committed to transformative education through active engagement in the teaching-learning interchange, scholarly and creative pursuits, leadership, global competency, healthy lifestyles, and service to others. This course addresses five of the university's transformative learning goals:

Discipline Knowledge – this course provides an advanced understanding of the modern crime laboratory and familiarization with leadership and management techniques.

Leadership – this course demonstrates leadership skills at all levels of the criminal justice system to include crime scene units and forensic science disciplines.

Research, Scholarly and Creative Activities – this course emphasizes best practices of U.S. law enforcement agencies crime scene and crime laboratory management.

Global Competency – this course highlights joint investigations and cooperation between international law enforcement agencies in addressing global crimes.

Service Learning and Civic Engagement – this course provides a comprehensive review from crime scene to courtroom as a critical component of American law enforcement, and consequently law enforcement's impact on maintaining an orderly society and providing justice for all U.S. citizens.

Course Description and Details:

To expose students to the job assignments within a cold case investigation. To explain investigative techniques and organizational policies as applied to cold case investigations. To integrate and apply the rules of evidence in investigating a cold case. To expose students to the viewpoints and functions of criminal justice professionals in investigating cold cases.

Prerequisites: Must be a Graduate Student. Students will be required to sign a confidentiality agreement with each participating agency.

Required Textbook: No text required, however independent research into cold case investigations will assist students in preparing for this course.

Course Objectives and Goals: At the completion of the course, the student should have a general understanding of and be able to:

- Explain how a cold case investigation is conducted.
- Describe and evaluate the makeup of a cold case unit.
- Identify, describe and demonstrate proper investigative techniques involved in working a cold case.
- Identify, compare and evaluate relevant terminology, equipment, technology and methods for conducting cold case investigations.
- Apply relevant terminology, equipment, technology and methods to real cold cases.
- Explain how to plan, execute, and manage a cold case investigation. Differentiate between various approaches and strategies involved in cold case investigations.
- Identify and describe the role of governmental offices involved in investigation of a cold case.

Distractions: To avoid unwarranted interruptions, students are expected to be punctual. It is expected that our learning experience **will not** be interrupted by cellular telephones or pocket pagers, or other audible electronic devices.

Academic Integrity: Academic integrity is foremost in this course. You are responsible for doing your own work. Plagiarism and/or academic dishonesty in any form will result in an automatic "0" for the assignment in question and further disciplinary action will be considered. Academic dishonesty includes the "giving" and "taking" of improper assistance in examinations and assignments; not adhering to correct procedures for identification of sources in reports, essays, etc.; intentional misrepresentation; cheating; plagiarism; and unauthorized possession of examinations. **Instances of academic dishonesty will be handled in accordance with the procedures explained in the UCO Student handbook.**

UCO subscribes to the Turnitin.com plagiarism prevention service. Students agree that by taking this course, all required assignments may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism.

Special Accommodations: The University of Central Oklahoma complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with disabilities Act of 1990. Students with disabilities who need special accommodations must contact the Assistant Director of Disability Support Services (DSS), Nigh University Center, Room 309, (405) 974-2549. Students with

special accommodation needs should also notify the course instructor during the first week of class.

FSI Classrooms:
NO FOOD OR DRINKS - No food or beverages are permitted in FSI classrooms.

Emergency Exits – The exit doors located in the back of FSI classrooms are for emergency use only; they are not to be used for general classroom access.

FSI Equipment – The UCO FSI is fortunate to have some of the most modern equipment and technology available. Students are expected to treat all FSI equipment with care and return it in good condition at the end of each exercise.

Course Grade Computation: This course is a working review and analysis of real cold case files provided by participating agencies.

- **Class participation (40%) - 6.25 points per class period missed**
- **Demonstration of understanding of how to conduct a cold case investigation (40%)**
- **Applying a case management system to be delivered to Cold Case Agency (20%)**

UCO Student Information Sheet and Course Concerns or Complaints

The best way to resolve any conflict is through the proper process. You will more likely be able to have your concerns addressed if you work with the instructor. If you cannot resolve your issues with your instructor, then you may proceed according to the guide below.

1. Talk to your instructor first. Make an appointment during his or her office hours to discuss your concern. Be prepared. If your concern is about a grade, be sure to bring in your papers.

2. If you are still unsatisfied, you can talk to the Institute Director. You can make an appointment by calling (405) 974-6910. Bring any notes or papers that are pertinent, as well as your course syllabus.

3. If you remain unsatisfied after you speak to both your instructor and the Institute Director, you have further options depending on the nature of the concern.
    A. If your concern deals with a grade issue, the next step involves a formal grade appeal. The procedures are explained in the UCO Catalog.
    B. If you remain unsatisfied with something other than a grade, you can consult the UCO STUDENT INFORMATION SHEET found at http://sites.uco.edu/academic-affairs/files/aa-forms/StudentInfoSheet.pdf

Please see the UCO Student Information Sheet for UCO policies on Academic Integrity; UCONNECT; D2L; ADA Statement; Incomplete Grades; Withdrawals From Class; Emergency Individual Class Drop or Complete Withdrawal; Important Dates; Semester Holidays; Library Hours; Weather Related Information; Emergencies During Final Exams; Final Exam Daily Limits; Contacting Faculty Members; Class Attendance; Expectations of Work; Helpful Numbers; Emergency Evacuations and Drills, and other academic and administrative matters.

Academic Honesty and other UCO Administrative Issues Link:

http://www.uco.edu/academic-affairs/files/aa-forms/StudentInfoSheet.pdf

Complaints may be sent directly to the Forensic Science Institute using the following email: forensicscienceinstitute@uco.edu

Appendix D: Case Assignment Log

Cold Case Review & Analysis
Case Assignment Log

Case Name	Case #	Agency	Analyst(s)	Review Status

Appendix E: Case File Access Log

Cold Case Review & Analysis
Case File Access Log

DATE	NAME	CASE FILE	TIME OUT	TIME IN

UCO Forensic Science Institute

Appendix F: Case File Organization Template

Case File Organization

Reports and documents in the case file should be organized using the table below with documents in chronological order. If working with the original case file, a working copy should then be made. The working copy should then be placed in a 3-ring binder. Depending on the size of the case file, more than one binder may be required.

I	Crime scene report
	• Crime scene photos, sketches, and diagrams
	• Crime scene sketch/diagram
II	Supplementary investigative reports
III	Medical Examiner report & photos
IV	Property receipts
V	Evidence photos
VI	Forensic reports
VII	Other
	• People
	• Places
	• Lead sheets
	• Handwritten statements & notes
	• Transcripts

Clearly, this list is only a guide and may be amended as necessitated by particularities of the case file. Once the case file has been organized, the pages can be given sequential numbers. If the case file is so large that it requires organization into more than one binder, number the pages in a *book number – page number* format (i.e., 1-1, 1-2, 1-3, etc.).

Appendix G: Organization Strategy for Large Case Files

Case File Organization Strategy for Large Cases
Provided by Jim Hardin, TCSO Cold Case Task Force

Book 1
- Book index
- Original offense reports
- Original investigation reports
- Original – other documents for first 72 hours

Book 2
- Subsequent investigation reports for 72 hours to 1 year
- Other documents for first year
    - People
    - Places
    - Lead sheets
    - Automobiles
    - Other agencies
- Scope of investigation report

Book 3
- Investigation reports after 1 year
    - By year, or
    - By task force

Book 4 – People
- Suspects
- Associates
- Witnesses
- Index these to Books 1, 2, 3, and 5

Book 5 – Digital Devices
- Index
- Digital forensic reports
- Photographs/Screenshots
- Records
- Transcripts

Book 6 – Legal Documents
- Search warrants
- Rights waivers
- Court orders
- Motions
- Grand jury

Appendix H: Case File Cover Sheet

Tulsa County Sheriff's Office
Case #_____

Jane Ann Doe, age ___

DOB: _____

[Photograph of Victim]

Incident: [Ex: Homicide, Kidnapping, & Sexual Assault]

Incident date: _____

Property Receipt # _____

Cause of Death: [Ex: Ligature Strangulation]

Appendix I: Evaluation of Completeness Checklist

Case File
Evaluation of Completeness

	Yes	No
Are all investigating agency reports present?		
Are all reports complete?		
Are crime scene photographs present?		
Are crime scene diagrams present?		
Are investigative notes present?		
Is the medical examiner's report present?		
Are autopsy photographs present?		
Are evidence logs present?		
Are property receipts present?		
Are evidence photos present?		
Are forensic reports present?		
Are reports from other agencies present?		

Appendix J: Report Template

Case File Review & Analysis

Click or tap here to enter case file name. EX: John B. Doe

Click or tap here to enter case number. EX: 85 – H - 3

Prepared for

Click or tap here to enter agency name.

EX: Tulsa County Sheriff's Office

Cold Case Task Force

Prepared by

Click or tap here to enter your name(s).

Forensic Science Institute

University of Central Oklahoma

Click or tap here to enter semester. EX: Fall 2018

Table of Contents

Click or tap here to list any additional documents in the report.

Appendix K: Case File Summary Sheet

Click or tap to enter case name. EX: John B. Doe
Click or tap to enter agency name. EX: TCSO
Click or tap to enter case number. EX: 85 – H - 3
Click or tap here to enter property receipt #. EX: Property Receipt #12345

Victim(s)	Sex	DOB	ID	Date of Incident	Method *[Ex: GSW, SFI, BFI, Asphyxiation, etc.]*

Crime Scene	Location	Investigating Agency(s)	Notes

Persons	Designation	DOB	ID	Contact Info

Narrative:

Appendix L: Solvability Factors Template

Case #_____
Case Name: _____

SOLVABILITY FACTORS

Type of crime:	☐ Homicide ☐ Missing Person	☐ Sexual assault ☐ Other _____		

	Yes	No
Have there been any newly documented leads in the last year?		
Has the case been linked to any other unsolved crimes?		
▪ Agency & Case #		

EVIDENCE

	Yes	No
Does physical evidence exist that can be analyzed with modern forensic methods?		

Type(s) of evidence:	☐ DNA	☐ Latent prints	☐ Firearms evidence	☐ Other:
Is chain of custody intact?				
Recommended further analysis:	☐ DNA analysis ☐ CODIS ☐ Phenotyping ☐ Genealogy	☐ Development ☐ NGI ☐ ACE-V	☐ Bullet comparison ☐ Cartridge case comparison ☐ NIBIN ☐ Shooting reconstruction ☐ Distance determination	Describe:

PERSONS CRITICAL TO THE INVESTIGATION

	Yes	No
Suspect or suspects identified?		

☐ Living	☐ Location known	☐ Incarcerated ☐ Paroled	☐ Location unknown

▪ Arrest warrant previously issued?		
▪ DNA and/or Fingerprint exemplars available?		
Known associates currently incarcerated or under investigation for other crime?		
DNA and/or Fingerprint exemplars of the victim available?		
Are witnesses or surviving co-victims available?		
▪ Have relationships, lifestyles, or values changed?		
Were any other individuals wrongfully convicted, charged, or focused on to the exclusion of others?		

Appendix M: Forensic & Investigative Recommendations Template

Click or tap here to enter case name. EX: John B. Doe
Click or tap here to enter case number. EX: 85 – H - 3

Questions and Recommendations about Persons:

1. Click or tap here to enter text.

Questions and Recommendations about Evidence:

1. Click or tap here to enter text.

Other Questions and Recommendations:

1. Click or tap here to enter text.

Appendix N: Timeline Spreadsheet

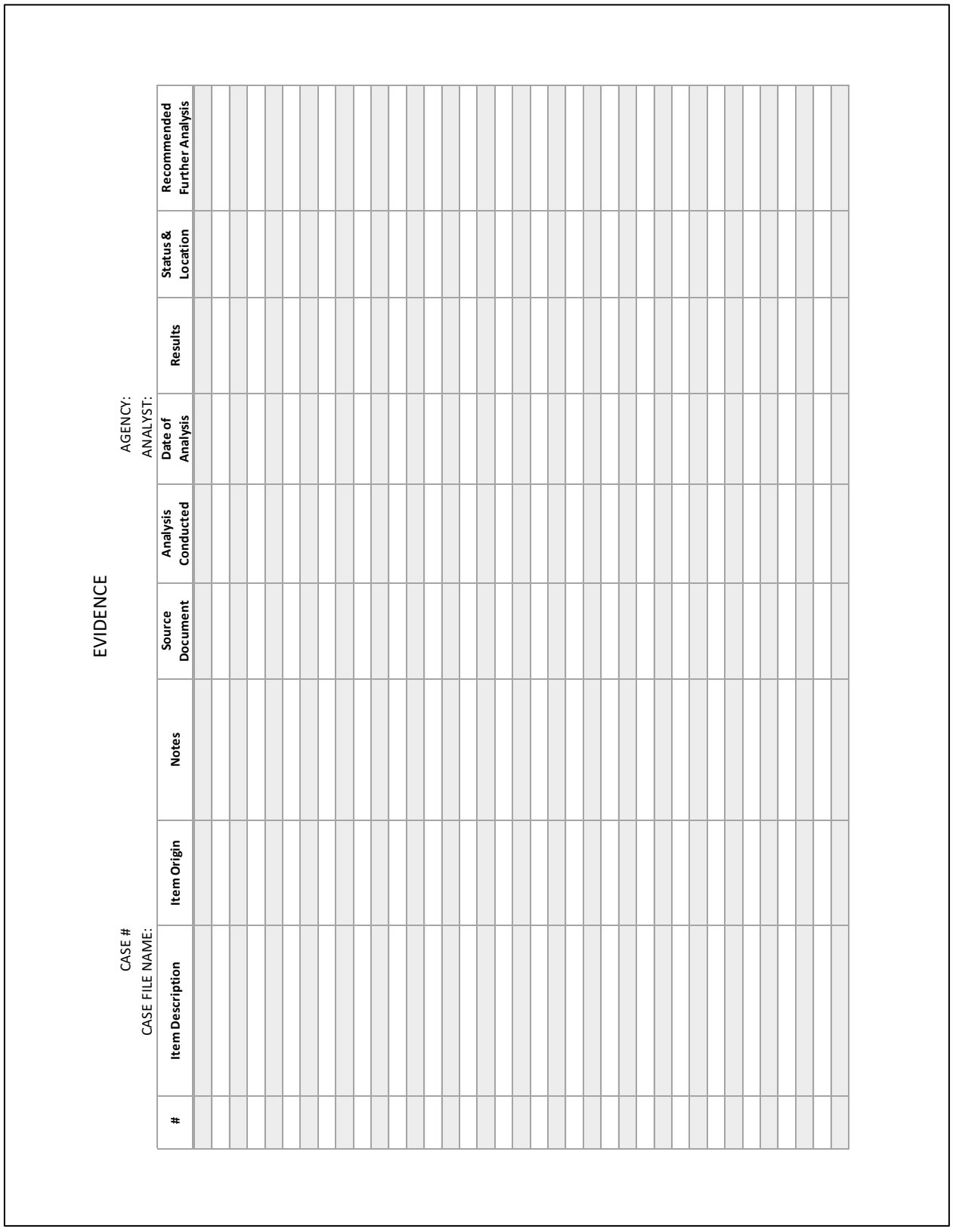
TIMELINE EVENTS

CASE # AGENCY:

CASE FILE NAME: ANALYST:

Date	Time	Description	Location	Source Document	Notes

Appendix O: Evidence Spreadsheet



EVIDENCE

CASE #
CASE FILE NAME:

AGENCY:
ANALYST:

#	Item Description	Item Origin	Notes	Source Document	Analysis Conducted	Date of Analysis	Results	Status & Location	Recommended Further Analysis

Appendix P: Persons Spreadsheet

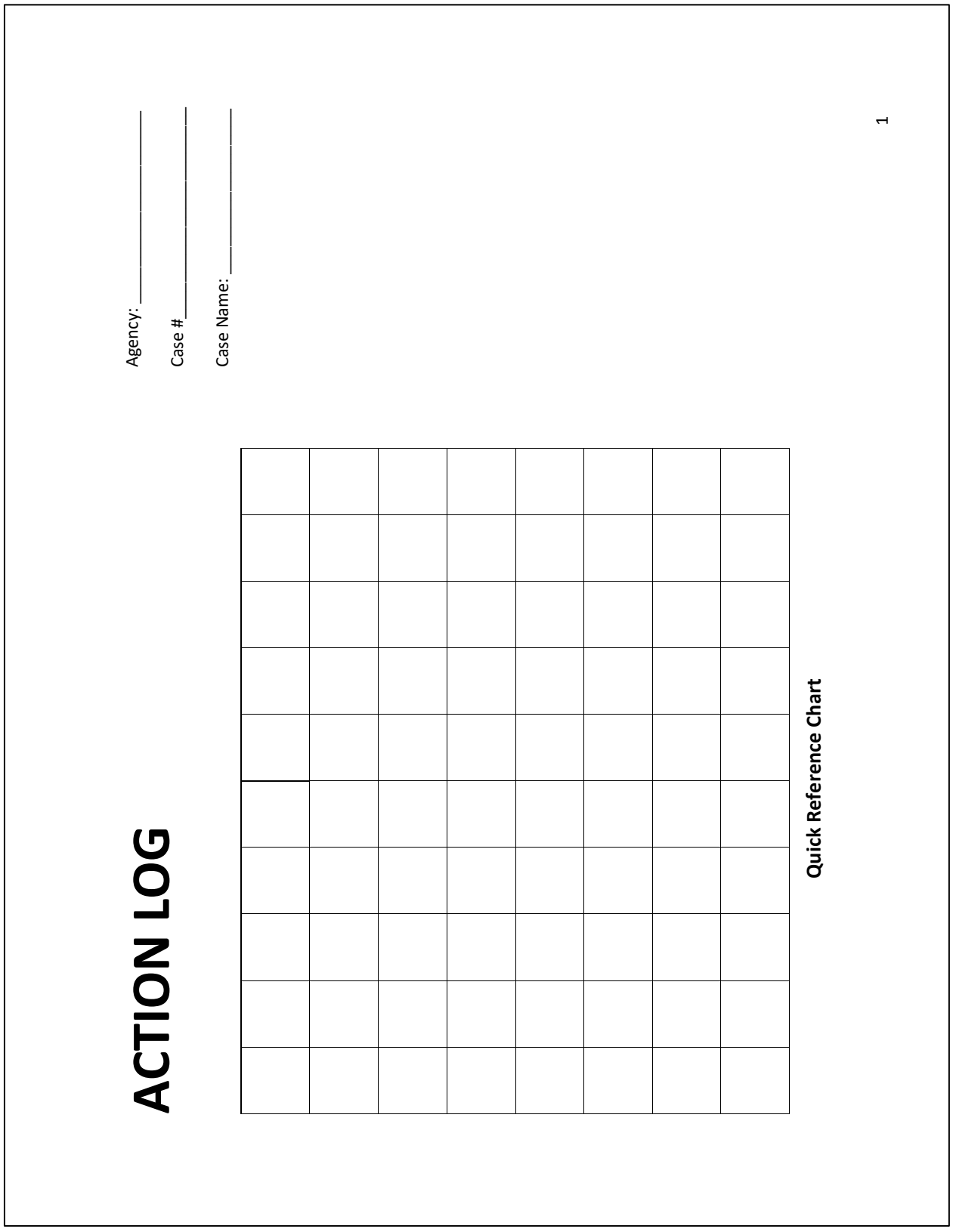
PERSONS

CASE #
CASE FILE NAME:

AGENCY:
ANALYST:

#	Name	X	Description	Source Document	Address	Phone Number	Relationships	Questions and/or Information

Appendix Q: Action Log



ACTION LOG INSTRUCTIONS

	Column Label	Instructions
1	**#**	**Each action to be taken will be given a consecutive number.**
2	**Action**	**Enter brief details of the nature of the action.**
3	**Source Document Type**	**Denote the type of document providing the basis for the action.**
4	**Binder Page #**	**Record the binder page number of the source document.**
5	**Evidence #**	**Enter evidence item number if applicable.**
6	**Remarks**	**Enter any significant remarks here.**
7	**Status**	**Record when the action was completed and by whom.**

Each time an action is recorded in the Action Log and a consecutive number is given to it, record the same number sequentially in the quick reference chart on the cover of the Action Log. When an action has been completed, mark through its number on the chart in red ink. [See example below.]

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
11	**12**	**13**	**14**	**15**	**16**				

1	2	3	4	5	6	7
#	Action	Source Document Type	Binder Page #	Evidence #	Remarks	Status

Thesis Conclusion and Discussion

A number of jurisdictions across the United States have enlisted the help of college students in reviewing cold case homicides, noting the advantages offered by a fresh set of eyes paired with enthusiasm for the work. The author reached out to ten university cold case programs to inquire as to written protocol and procedure utilized by students in conducting case file review and analysis. The majority of respondents advised that they have no written protocol, relying instead on journalism principles or direction from the partnering investigative agency for guidance (see Table 1). Dr. Bryan Byers, professor of Criminal Justice and Criminology at Ball State University, graciously provided the written protocol used by his students to review case files, conduct research, interview subjects, and create reports and public service announcements for partnering agencies.

Table 1: Protocol for university cold case programs

Protocol for Case File Review	***n***	***Course for College Credit***	***College Project***	***Student Club***
Formal written protocol	1	1		
Apply principles of journalism	2	2		
Rely on investigative agency	2	1		1
No response to inquiry	5	2	3	

As demonstrated by the collecting of written protocol from other university cold case programs, these programs take a variety of forms, and there appears to be a lack of formal protocol and procedures for case file review. This research sought to understand the needs of law enforcement agencies investigating cold case crimes in order to develop best practices guidelines for a cold case program in collegiate setting. It was determined that the creation of written protocol and procedures would require an amalgamation and synthesis of information from a variety of sources. In addition to the materials provided by Dr. Byers, the author consulted experts in cold case investigations at regional, state, and local agencies, sought advisement from the faculty of the University of Central Oklahoma (UCO) Forensic Science Institute, and tried and tested a variety of methods with students in a cold case review & analysis course over the span of a year.

The best practices and guidelines manual developed through this research is intended for use by institutions of higher learning with a focus on educating students for careers in the field of forensic science. Application of the guidelines provided herein will assist instructors in implementing an upper level course for students to engage in the review and analysis of case files pertaining to unsolved crimes designated as cold cases by the collaborating law enforcement agency. Such a course is ideally suited to graduate students and as an in-house practicum for seniors, as these students have completed the coursework necessary to prepare them for such an endeavor and should have greater levels of maturity and responsibility than students at an earlier level in their education. The best practices and guidelines manual developed through this research addresses the importance of those and other important characteristics of the cold case analyst. Additionally, administrative and course structure issues are addressed, and guidelines for

the process of reviewing cold cases and producing meaningful reports for the investigative agency are laid out. Educators considering establishing such a course should keep in mind that its purpose should be twofold – providing a meaningful experiential learning opportunity for students of their institution while performing a needed service for law enforcement agencies within the community. Remember that our purpose as forensic scientists is to seek the truth and serve justice. The survivors of unsolved crimes await answers. If anything can be done by us to contribute to the resolution of cold cases, let their wait not be indefinite.

Due to the progressive nature of technological developments, the best practices and guidelines manual should be updated periodically to provide contemporary information regarding forensic science and investigative techniques. In addition to its use in developing and managing a cold case program, the guidelines developed through this research can be used to attract other law enforcement agencies by informing them of the services offered by a university cold case program. Additionally, future research would allow the content to be expanded upon and adapted for cold case units in law enforcement agencies, particularly those staffed by volunteer personnel. Although other texts in existence provide guidelines for cold case investigation to law enforcement agencies, the majority of their content focuses on investigative matters rather than on the process of case file review and analysis.