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Digital Evidence Photography: Historical Perspective and Law Enforcement Policy

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DIGITAL EVIDENCE PHOTOGRAPHY: HISTORICAL PERSPECTIVE AND LAW ENFORCEMENT POLICY

by

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This independent study, submitted by Jean Youshefski in partial fulfillment of the requirements for the Degree of Master of Science from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

Advisor

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To my mother and my sister.

ABSTRACT

This study examines the contents of police department policies pertaining to the use of digital photography. Content analysis findings are compared with evidentiary requirements of admissibility in a court of law to determine if the policies address these pertinent issues.

A history of evidence photography illustrates how judges have assimilated the use of photographic technology for evidentiary purposes and applied common rules of evidence to the process. The works of J. Mnookin (1998), C.C. Scott (1942), and case texts from the *National Reporter System* were used extensively as historic references.

Current literature about suggested standard operating procedures for the use of digital imaging was used to determine strengths and weaknesses of the policies. The combination of historic influence and present technology issues were foundational concepts in the content analysis.

CHAPTER I

INTRODUCTION

The technology of photographic image making underwent a massive transformation in the latter years of the 20th century and shows no sign of decline in the 21st century. The conversion to digital photography has been swift, rendering film photography a specialized medium rather than popular culture's medium of choice for picture taking.

Those in the fields of law enforcement and adjudication have not ignored the ubiquity of digital photography. Though assimilation of digital technology has not met with total acceptance, many agencies have either completely or partially converted their photographic procedures from film and Polaroid media to digital processes. Digital evidence photographs have made their way into the courtroom as well with only minimal resistance so far.

The purpose of this study was to examine actual law enforcement agency policies related to digital photography. These policies were solicited from municipal law enforcement agencies in the three-state area of North Dakota, South Dakota, and Minnesota. The new technology of digital photography demands policy that addresses its unique characteristics, primarily issues involving ease of image manipulation. Analysis of policy discovered specific ways in which admissibility requirements are addressed.

The primary question directing the course of the study was: Do law enforcement agency policies pertaining to digital photography sufficiently address the issues of

admissibility of digital evidence photographs in a court of law? This question engenders the inquiry into issues of admissibility and how the process of acceptance of evidence photography has been addressed historically.

Little has been written about the pre-digital progression of the use of evidence photography. Charles C. Scott's (1942) dedicated work extensively documents case history involving evidence photography in relation to a detailed analysis of various aspects of the progressing technology since the mid-nineteenth century. But it wasn't until the digital revolution that scholarly writers seemed to take notice of the phenomenon of evidence photography's evolution. Inherent in the domestication process of the new technology (Mnookin, 1998) was renewed significance of how evidence photography was addressed in the past.

In this study a history of evidence photography was guided by both Scott's and Mnookin's works as well as by examination of many legal cases involving the use of evidence photographs. The purpose of this examination was to identify the issues of acceptance of evidence photographs into the adjudication process. The recurring themes of admissibility discovered from these sources were relevance, authentication, reliability, accuracy, and security.

The qualitative research method of content analysis was used to examine actual law enforcement agency policy. This type of analysis enabled the author to sort through the policy texts, categorizing and classifying words and phrases with regard to themes of admissibility.

After the sorting process, tabulation of the data reflected strengths and weaknesses in individual department's policies. These characteristics are discussed in the concluding

chapter of the study, relating them to digital imaging policy issues discussed in current literature.

The importance of the study is twofold. First, it fosters examination of the history of evidence photography. History is foundational. It illustrates how the new technology of photography was assimilated by the legal system in the mid 19th century. Photography initially was thought to be almost magical and very pure. It was the hand of nature at work. What could be more reliable in a court of law? It was quickly discovered, however, that it was, at the same time, dangerously manipulable. This characteristic of manipulability has been inherent to the technology since its inception. To retain the use of photography as an evidentiary function legal professionals have had to and continue to grapple with ways to insure its integrity in spite of this glaring weakness of the medium.

Second, examination of policy brings attention to the fact that the use of digital photography technology requires policy that assures sustained evidentiary integrity. New technology requires new awareness, knowledge, nomenclature, and procedure. Policy should reflect this progression. The issue is so important that local, national, and international law enforcement organizations have convened for the express purpose of establishing policy related to digital technology. There is a worldwide effort to establish standard operating procedures for handling and generating digital evidence. It is to the advantage of every law enforcement agency adopting the use of digital imaging that there is a collective effort to address issues unique to this new technology and to admissibility concepts.

CHAPTER II

LITERATURE REVIEW

The advent of digital evidence photography has brought about a proliferation of writings on the topic in law enforcement and judicial journals and magazines. Along with these articles, many authors have ferreted out the long-silent history of evidence photography. As they analyze the new technology they look back to see how the progressive technology of photography applied to the realm of evidence was assimilated along the way.

History

The history of the use of photography as evidence in the fields of law enforcement and adjudication in the United States spans more than 150 years. The use of digital photography within that span of time is, comparatively, very short—about 15 years.

As law professor Jennifer Mnookin (1998) attests, the pre-digital history of evidence photography is not extensively documented. The history of photography itself has been written about, routinely, in journals and magazines of the late 19th and early 20th centuries but much of what is written about photography's early days is about fine art and how photography enhanced artistic endeavor. Moenssens (1962), however, cites Theophile Borgerhoff's account of the use of a mug shot to aid in apprehension of a serial thief in Belgium as early as 1843, four years after Louis Daguerre is credited with inventing the photographic process. Many of the records associated with the individuals photographed

within the Belgian prison system have been lost but the Daguerreotypes remain at the prison in Brussels.

Frizot (1998) notes many of the utilitarian functions of early photography, including accounts of use of the medium by law enforcement agencies, e.g. mug shots in France in 1854 into the 1860s. French photographer, Appert, photographed "Communards in the prisons of Versailles, generally full-face, and from the waist up" (Frizot, 1998, p. 263). Alphonse Bertillion is credited with the first use of the profile pose in addition to the full-face view in 1872. Bertillion made cards with the two photographs with descriptive measurements and information about the offenders. Practical use of the system quickly became problematic because of the sheer numbers of files—tens of thousands. However, this was the beginning of systematic photo documentation of offenders which continues today (Frizot, 1998, p. 264).

In the United States the first noted court case in which a photograph was used was *Luco v. United States*, (1859). Photographs were then given the same status as maps and illustrations—and not much notoriety.

In 1942, Charles C. Scott produced an extensive analysis of film evidence photography titled *Photographic Evidence.* While no such extensive study of digital evidence photography has yet been attempted, Scott's work is foundational in the study of evidence photography. The key to his research was in examination of hundreds and hundreds of court cases.

"The American appellate court cases declaring that photographs are admissible in evidence when relevant and when properly verified date back to 1859—thirty-one years before lenses really were good enough for use in the preparation of photographic

evidence and forty-seven years before a plate of general utility was placed on the market" (Scott, 1942, p. 2).

Scott's work is comprehensive. "Every case cited and discussed…was examined by the author personally both from the photographic and from the legal standpoint. To my knowledge the cases have never before been studied from this dual viewpoint" (Scott, 1942, p. vi). The foundation he laid can be useful in investigating the application of policy and procedure to the new technology of digital evidence photography. It is by comparing the new to the known that we proceed in new technologies (Mnookin, 1998). Scott used information gathered from court cases involving photographic evidence to expand and give bases for development of policies and principals of use of photographs in court. He impressed upon the reader the importance of evidence photography, "Photography…is not merely one of those subjects every lawyer should understand but probably doesn't; it is an essential medium for the presentation of evidence that all lawyers should master" (Scott, 1942, p. v). The same could be said of law enforcement professionals. To produce admissible, accurate photos of evidence, officers need to have an understanding of the medium they use to accomplish that task. Effective policies can foster that endeavor.

Protocol, Directives, and Policy

Because digital photography uses an electronic medium to make a picture from exposure to light, issues unique to that medium are created. These issues need to be addressed by establishing new protocols and directives within the agencies that use the technology.

of conversion to a new technology and the need for specific policies and protocols to address the change.

Both SWGIT and the Scientific Working Group on Digital Evidence (SWGDE) were instrumental in proposing guidelines and standards to the 13th INTERPOL Forensic Science Symposium in Lyon, France in October, 2001. Mark Pollit documents these proposals in his *Report on Digital Evidence* (2001). The guidelines suggested by the two working groups were targeted for international application among sovereignties. However, they are applicable at all levels of law enforcement. SWGDE recommends agencies review policies and protocols annually to insure continued effectiveness. They also recommend comparing standard operating procedures with other agencies. Details for proper seizure and thorough documentation are also included.

The guidelines proposed by SWGIT at the symposium were taken from the version constructed by the group in 1999. As mentioned above, the guidelines are a work in progress. They cover the physical procedures of image capture, processing and transmission. Also included are recommended elements of standard operating procedures: title, purpose, equipment, materials, standards, controls, procedures, calibration, calculation, limitations, safety, and references.

Pollitt's (2001) report also includes principles established by the International Organization on Computer Evidence. These principles directly address "establishing procedures for the collection, preservation and use of digital evidence..." (Pollitt, 2001, p. D4-115). These guidelines can be valuable resources for local agencies as procedures and protocols are added and/or amended.

Photo manipulation is certainly a central issue in developing new protocols but not a novel concept by any means:

> "...most lawyers seem to have the idea that a picture is just a picture. They have no concept of what can be accomplished by photographic misrepresentation, distortion, or manipulation. They do not know how to examine a photograph to determine whether it is a reasonably accurate reproduction of what it purports to be. Completely erroneous factual impressions from misrepresented photographs are routinely admitted into evidence. Many produce unfortunate results" (Houts, 1969, p. 1.02).

Again, the same might be said of the law enforcement professionals who make the photographs that are presented as evidence. In the 1960s, Marshall Houts (1969) wrote a comprehensive treatise solely about the topic of photo manipulation. If the digital revolution has prompted local law enforcement agencies to examine their policies on the making of evidence photographs, Houts' pre-digital work is a very important resource in dealing with all formats of still photography.

Adopting the use of a new technology brings with it a responsibility to know something about the way the technology functions and how it will impact the purpose for which it is used. Herb Blitzer, executive director of the Institute for Forensic Imaging, and Jack Jacobia provide a straightforward presentation of how to use digital imaging to present a reliable evidence photograph Blitzer (2002). Russ (2001), too, recognized the need for law enforcement professionals to understand the use of digital imaging. The concepts he purports "...are based on well accepted and widely used algorithms and

procedures, which if appropriately applied will survive *Frye* and *Daubert* challenges" (Russ, 2002, p. iii).

Courts' Influence on Assimilation of Digital Evidence Photographs

In the newsletter *Update*, from the National Center for Prosecution of Child Abuse, staff attorney Christina Shaw, J.D., (2002) briefly examines some of the cases involving digital evidence photographs that have already been adjudicated. In *Almond* v. *State*, (2001) the Georgia Supreme Court determined there is no difference in admitting digital photographs or film photographs. That affirmation upheld a previous appellate court decision. Massachusetts' high court hinged the admissibility of digital photographs on two main concepts: the proper functioning of the computer that generated the images and the general acceptance of the technology by the scientific community (*Commercial Union Insurance et. al.* v. *Boston Edison Company,* 1998). Nebraska and Ohio also adopted the same stance (*Kudlacek* v. *Fiat* S.p.A., 1994), (*State* v. *Clark,* Ohio App. 1995).

Mnookin (1998) addresses the acceptance of new technology by analyzing the way courts handled the progression of the use of evidence photography since the mid 19th century. She bases her discussion on the application of analogic reasoning used by judges to justify the use of photographs as evidence as photographic technology progressed, linking it to something that already existed. She lays out three lessons to be applied to the acceptance of new technology in court. The first, "Legal assimilation of new technology cannot take place in a [cultural] vacuum…" (Mnookin, 1998, p. 74). Two paradigms were evident at photography's inception: Photography as a completely mechanical, objective process and photography as a subjective, human involved process.

Both of these opinions needed to be considered as judges determined how photographs would function as evidence. The second lesson was that analogy might transform perspective on both the new technology and that to which it is analogized. According to Mnookin (1998), this was the case when photographs were analogized with maps and illustrations and drawings. Subsequent to the introduction of photographs as evidence these items were raised to a status deserving of more rigorous examination as reliable evidence. Third, "analogies may guide us, but they do not provide an iron cage" (Mnookin, 1998, p. 74). Initially, photographic evidence was to be exclusively a visual aid, like maps and charts and illustrations. It was soon realized that the representational nature of a photograph could be corroborative as well. As Mnookin explains, a drawing could illustrate the position of an item but a photograph could show that the item was actually in that position. Flexibility needs to be an inherent aspect of formulating governing rules for new technology—such as digital photography.

Sternbach (1995) endorses Mnookin's proclamation that legal assimilation of a new technology cannot take place in a cultural vacuum. It is his opinion that the court system has ignored the cultural, leading to continual inconsistency in handling photographic evidence.

> He "argues that the lack of a thoughtful or methodical approach to photographic meaning in the courts has resulted in widespread legal inconsistency and that greater awareness of existing bodies of photographic theory and their implications should result in decisions that are more consistent and persuasive....Semiotic, linguistic, cognitive, technological and cultural critiques of photography, film and video have flourished, but they have been

> largely ignored in law....Procedural rules with substantive implications, such as those regarding admissibility, authentication, relevance, and prejudice are fairly well developed, but underlying assumptions about photographic meaning are not" (Sternbach, 1995 pp. 1100, 1101).

Perhaps that is why photography, especially digital photography, has met with minimal resistance through its history in the judicial system. Grappling with transparent immediacy and its implications is much more expedient than bringing "the social construction of photographic meaning" (Sternbach, 1995, p. 1110) to bear on the determination of relevance and authenticity (Sternbach, 1995)

Determining authenticity refers more to the mechanical processes used in constructing a photograph. Cultural issues could potentially have more bearing on relevance, especially in determining if a photo presents prejudicial subject matter. Sternbach (1995) argues that the scope of present judicial consideration of the matter simply is not broad enough to render consistency. Cultural meaning is not the focus of this study, but it is important to realize the fact that there are those who believe the past and current way the judicial system handles photographic evidence is flawed because it ignores the concept of cultural meaning. It could be argued that that is precisely why photography has been so easily assimilated into the evidence realm.

Case opinions commonly include the phrase "a photo speaks for itself" (*Fisher* v. *State*, 1982, p. 574) an alien concept to Sternbach's argument that photographs convey only visual representation, meaning comes from individual interpretation. The two paradigms evident when the use evidence photography began have morphed into belief in the ideal of "pure transparent immediacy" or "the photo speaks for itself"; and the belief

that beyond "pure transparent immediacy" (Buccafusco, 2003, p.636) is cultural meaning—necessity of narrative (Sternbach, 1995, p. 105).

On the other end of the spectrum from Sternbach is the silent witness theory, endorsed in *State v. Pulphus* (1983, p. 161). This declaration states that a photograph does not need a percipient witness—i.e., someone to speak for it. After the discovery process for admissibility is completed, a photograph is considered substantive evidence (Bergel, 1985).

It is worth noting this decree did not become effective until 1983. Bergel (1985) cites two reasons photographs were historically treated in a more restrictive manner: first, because of the realization that photographs could be manipulated. With this realization came the courts' requirement of corroborating testimony. Second, judges concluded that jurors have a propensity to trust photographs implicitly. Consequently, actual testimony was the preferred proof of reliability (Bergel, 1985, p. 355).

Expanding upon Mnookin's analysis of analogic thinking, Buccafusco (2003) adds the concept of "pure transparent immediacy" (Buccafusco, 2003, p .636). Each new visual technological goal is to produce for the viewer a sense that the image is a representation of reality—immediacy. Buccafusco (2003) explains that the rules developed by Leon Battista Alberti in 1435 applying to linear perspective are the precursors of codes of visual interpretation used throughout history to bring about "pure transparent immediacy" (Buccafusco, 2003, p. 636). He equates or analogizes the algorithms used to manipulate the use of 1s and 0s into an image with the rules of perspective. The goal of both sets of codes is to help the viewer see the image as a representation of something real. As new visual technologies are introduced, they are

initially viewed with skepticism of the process making of the image. By integrating with the previous technology a sense of something known and trusted is brought to the new. "If photography can be seen in terms of historical progression of attempts to mechanize the creation of perspective images since the Renaissance, digital photography and computing completed this process with the achievement of algorithms for creating linear perspective automatically" (Buccafusco, 2003, p. 639).

Immediacy is a major goal of the evidence photograph—to enable the viewer see what the witness saw. However, authentication and relevance are two factors required by Federal Rules of Evidence 901 and 401, 402. "...Admissibility of digital photos is a function of both the validity of the underlying scientific concepts incorporated within the computer program and the reliability of the process in applying that program" (Buccafusco, 2003, p.609).

All of these issues must be resolved for a photograph to function as evidence in a court of law. Policies and procedures need to echo and support resolution of these issues.

Witkowski (2002) takes on the Federal Rules of Evidence, stating they do not sufficiently address digital imaging (Witkowski, 2002, p. 283). She relies mostly on Blitzer (2002) for her technical foundations, explaining how "digital images are not photographs" (Witkowski, 2002, p. 268) and therefore require added evidentiary consideration in the Rules of Evidence.

Witkowski (2002) enumerates the ten methods of authentication in Rule 901(b) and explains how a number of those methods have been applied to sound recordings, video recordings, and traditional photographs. She also explains common law methods of

authentication such as the *McKeever* seven-part test, the *Biggins* test, and the video four-factors test.

Recognizing the shortcomings of the current system, she suggests four reasons for the easy assimilation of digital photographs into the courts: (1) judicial figures are not familiar enough with the technology to understand the risks, (2) use of digital photography is so common in all facets of the culture that judicial figures may not even consider it to be "new technology," (3) law enforcement agencies, being "more technologically sophisticated than the legal profession, have prevented serious challenge by developing standard operating procedures and training," (4) "evidentiary rules have not caught up with the technology" (Witkowski, 2002, p. 285). Additions to evidentiary rules need to address "camera capability, operator competency, compression ratios, preservation of an original image, safeguards against changes, additions, and deletions, and identification of the subject matter" (Witkowski, 2002, p. 287).

It is possible that new rules imposed upon digital evidence will affect foundational requirements for all evidence. Consider again Mnookin's second lesson from the analogic history of evidence photography: "Analogies may have transformative effects in both directions, changing understanding not only of the novel entity, the target, but also of the sources, the preexisting entities that form the basis for the analogy" (Mnookin, 1998, p. 74). By knowing past technologic progression, we advance to the next technology.

A major portion of what has been written about digital evidence photography focuses on its manipulability. This review of literature shows that the topic is far more

encompassing. Policy makers need to be aware of issues beyond popular literature's focus on image manipulation.

CHAPTER III

HISTORY OF EVIDENCE PHOTOGRAPHY

The history of evidence photography is at times as paradoxical as it is a reasonable progression of the technology through judicial history. Paradigms surrounding the, at first, magical art of nature have evolved to bring the fields of law enforcement and adjudication to an understanding of assimilation of the ever progressive technology of photography into the judicial domain.

The case that inaugurated photography into the realm of evidence is documented to be *Luco* v. *United States*, 1859 (Scott, 1942, p. 2). The case involved an allegedly forged land grant title to 270,000 acres of land in California.

In his opinion of the case, Justice Robert C. Grier stated: "This case was remarkable for this one thing, amongst others: that in the trial…Mr. Vance, a photographer, was examined, who attached to his deposition photographs of original documents, of impressions of genuine seals, and of the signatures of [Governor] Pio Pico. These were exhibited during the argument in this court" (*Luco* v. *United States*, 1859, p. 515).

Prosecuting attorney, Mr. P. Della Torre, United States attorney for the northern district of California presented his case, stating the grant was a fraudulent fabrication, calling the defense a " confused, perplexed, tangled, and self-destructive mass of assertions" (*Luco* v. *United States,* p. 526). He stated that archival records proved the grant never existed. He went on to praise the virtues of the new art:

> "But even beyond all this, the whole case is more strongly concluded by the next consideration....By the employment of the beautiful art of photography, this tribunal can examine the assailed title, and contrast it with papers of undoubted genuineness, with the same certainty as if all the originals were present, and with even more convenience and satisfaction" (*Luco* v. *United States* p. 530).

The appellate court's decision in this case was upheld for many substantial reasons but among the justifications was evidence presented conspicuously proved the case. The photographs were determined to be authentic representations of the real documents—a victory for the new technology.

In the 1860s, a highly publicized but scarcely documented case in legal annals threatened the prevailing paradigm that photographs were the pencil of nature, purely mechanical productions. In 1861 William H. Mumler used his business savvy and creativity to peddle what became known as "spirit photographs" (Mnookin, 1998, p. 30). These were portraits for which customers sat in the usual fashion, but when the prints were made, ghostly images appeared on the photo paper. The images were said to be deceased individuals known to the client. In each photo a spirit-like image appeared behind the subject. Mumler became known around the country and in Europe for his miraculous work.

In 1863, however, his business took a turn, which would result in the reexamination of the use of photographs as evidence in a court of law. The same spirit showed up in two separate photos. Complicating matters even more for Mumler, the spirit was actually someone who was still alive. Mumler was arrested for "fraud by false pretenses, cheating

under common law definition, and larceny by trick and device" and brought before the New York Court of Special Sessions for a preliminary hearing (Mnookin, 1998, p. 30).

Entertaining accounts of the ordeal can be found in various media archives—the *New York Daily Tribune,* April 1869 and *Philadelphia Photographer* to name two. But the case presented a paradox to the prosecution in terms of the acceptance of photographs as evidence. To charge Mumler with fraud meant that photographs could indeed lie, a concept of which photo artisans were already well aware. Many were called to duplicate Mumler's work and did so successfully. Many were also asked to testify as to how manipulation may be detected. Over century later the same question echoes as evidence photography enters the digital realm.

The prosecution failed to prove its case, according to the judgment of Police Justice Dowling. Charles W. Hull (1869), in a piece for *Philadelphia Photographer* in 1869, charged that the case was lost because Dowling failed to approve what today would have been a search warrant to seize Mumler's lab equipment. The article goes on to describe the absurdity of the decision. It was proven that photos similar to Mumler's could be made by mechanical means but the prosecution did not prove that Mumler's photographs were made by mechanical manipulation.

Mnookin (1998) describes how the fate of evidence photography was redefined by the prosecution's witness testimonies. By acknowledging the fact of manipulability, the limits of photography were identified. It was no longer a medium produced by nature or a ghost in the machine. It was manmade. But even with limitations of human intervention, photography could still be a valuable tool of evidence. And it showed no sign of being sidetracked for the rest of the 19th century. In *Udderzook* v.

Commonwealth (1874), a photograph was used to identify the body of a murdered man. The court acknowledged the scientific process used to produce a photograph, comparing it to images formed on the retina through the lens of the eye. Witness testimony provided probative evidence of the man's identity, but it is significant that the court also accepted the photograph as corroborating evidence.

Mnookin cites *Cowley* v. *People* (1881) because it is indicative of the general doctrine of the time regarding use of photographs in court. Justice Charles J. Folger validated the use of photographs by analogizing them to portraits made by an artist. "Photographic pictures do not differ in kind of proof from the pictures of a painter" (*Cowley* v. *People,* 1881, p. 472). Even more significant, Mnookin points out, is Folger's comparison to verbal testimony. Evidence, according to Folger is made up of signs and symbols. Written, verbal, or pictorialized—all are signs meant to convey representation of what was seen. By acknowledging the equal status of these modes of evidence, he brought photography to the level of verbal testimony, which had already been assessed to be occasionally flawed. "The portrait and the photograph may err, and so may the witness. That is an infirmity of which all human testimony is lamentably liable" (*Cowley* v. *People*, 1881, p. 473).

This opinion, given in 1881, illustrates that photography had been relegated to the ranks of a production of potential human infirmity, instead of a purely mechanical process of nature. Folger did not condemn the use of photography by any means. He cited cases in which photos had been used successfully for varying purposes to aid juries. He merely set the stage for closer examination and regulation of the photograph as evidence.

and more durable. Stereoscopic photos were deemed acceptable in *City of Rockford* v. *Russell* (1881). Photomicrographs or close-up photographs were admissible as well. In *Rowell* v. *Fuller's Estate* (1887), close-up photographs of signatures were presented to aid the jury in comparing a possibly forged signature. It was determined that the close-up photos were no different than being aided by a magnifying glass.

Leading up to the turn of the century and into the twentieth century a struggle was evident within judicial doctrine over the concept of demonstrative evidence (Mnookin, 1998). While doctrine had traditionally considered photographs the same as maps, illustrations, and diagrams, there was one glaring difference—photographs had the ability to be corroborative as well as illustrative. Mnookin points out that photographs were being used in cases to both illustrate and document or verify. She explains how this is subtly reflected in judges' statements and opinions on cases. For instance, in *Archer* v. *New York, N.H. & H.R. Co.* (1892), Justice Danforth asserted that photographs submitted in the case had been proven to be a fair and accurate representation and that was not disputed. Therefore the photographs were admissible. The same was determined in *Nies* v. *Broadhead* (1894). The fact of accurate representation "was not contradicted....If a photograph were understood merely as someone's testimony in illustrated form, the fact that it was disputed by other testimony might affect its weight and credibility, but not its admissibility" (Mnookin, p. 48). The conundrum was that judges were beginning to see that photographs functioned as more than illustrations or maps. But if they had the ability to mislead or prove a matter, that was something for the jury to decide. All that had to be confirmed for discovery, was that the photo was a fair and accurate representation.

In *Commonwealth* v. *Morgan* (1853), a photograph was submitted which illustrated an individual's testimony that the defendant had a beard and mustache in July 1887. Other witnesses said they had known the defendant since spring of 1887 and he had never worn a beard and mustache. The photograph corroborated the prior witness's testimony.

Clearly, the duality of the function of photography presented fertile ground for disagreement. The division was manifested in varying decisions on the admissibility of posed photographs, which had come to be a used as technique of illustration and explanation. (Mnookin, 1998, p. 51) In *People* v. *Crandall* (1899), two deputy district attorneys made photographs at the scene of a homicide and marked on the photos where the body had been and where the defendant was when he shot the person. All of this was corroborated by witnesses, and the photos were said to be used merely as diagrams to aid the jury. The photographs were challenged on the grounds they had been manufactured by the prosecutor's representatives.

> Justice Van Dyke: "The photographs were used only as diagrams, and, although more complete proofs of their correctness could well have been required, still it cannot be said the trial court abused its discretion in allowing them to be used....The evidence was no more hearsay than any evidence of a surveyor who makes a diagram to illustrate some theory of a case" (*People* v. *Crandall,* 1899, p.787).

Van Dyke went on to assert that, indeed the evidence was manufactured but not in an "offensive sense" (p. 787). It was up to the jury to decide the value of the photographs and they were not improperly admitted.

The same reasoning held in *State* v. *O'Reilly* (1895). A photograph was made of a murder scene after the fact, inside a saloon. Individuals were posed in the positions of the dead person, the dead person's father, and the person accused of the murder. Justice Gavon D. Burgess grounded his opinion in precedents, stating photographs were no different than diagrams or illustrations.

Not so in *Babb* v. *Oxford Paper Co.* (1904), a case for which photos were made some time after the incident, at the scene of an industrial accident, complete with posed figures to illustrate where individuals were at the time of the accident.

> Justice Albert R. Savage: "To be admissible, photographs should simply show conditions existing at the time in question. But photographs taken to show more than this, with men in various assumed postures, and things in various assumed situations, in order to illustrate the claims and contentions of the parties, should not be admitted" (*Babb* v. *Oxford Paper Co.*, 1904).

In *Fore* v. *State* (1898), Chief Justice Thomas H. Woods uses strong rhetoric but cites no precedents in reversing the admissibility of posed photos of a homicide:

> "They were not simply reproductions of the scene of the homicide. They were photographic representations of tableaux vivants, carefully arranged by the chief witness for the state, whereby his version of the tragical occurrence should be brought vividly before the mind's eye of the jury, and be impressed upon the jury as the view of the actual occurrence, and not as the mere statement of the facts of that occurrence as detailed by this witness....We repeat, the pictures are not photographic representations of the scene of the

lamentable tragedy. They were artistic reproductions of the situations, carefully planned by the state's chief witness" (*Fore* v. *State*, 1898, p. 712).

Mnookin cites the above cases to show "the disputes over staged photographs dramatically highlighted the fiction of the formal [judicial] doctrine" (Mnookin, 1998, p. 52). Perhaps that was to the great advantage of evidence photography as the technology progressed. It seems the new technology needed to be tested to its fullest extent before it could be harnessed by rules and formal restrictions. X-rays presented another technological advance and consequently another judicial dilemma. How could an x-ray be considered authentic if the subject of the photograph could not actually be seen by the camera operator?

At the turn of the century x-rays made their debut in the courtroom. In 1901 the Supreme Court of Wisconsin, in *Mauch* v. *City of Hartford* (1901), admitted x-rays on the grounds that they [the courts] should take every advantage of new technology so long as it had "passed beyond the experimental stage" (Scott, 1942, p. 711).

X-rays did meet resistance because of their, sometimes, shocking nature, but that objection was overruled by the fact that x-rays had the ability to show extent of an injury. (*Bledsoe* v. *Capital City Laundry Co.*, App.1923).

Authentication could be accomplished in the following ways:

(1) It needed to be proven that the body part or object in the x-ray was the part or item at issue in the case. This was usually done by verification of identifying marks on the film.

(2) Condition of the subject at the time the x-ray was taken needed to be corroborated by witness testimony.

(3) Verification of the proper working order of the x-ray machine was required. However, even if it was not in proper working order but the film was verified as an Accurate representation, there would be no exclusion.

(4) Qualified camera operator

(5) Process of taking the picture needed to be completely documented (Scott, 1942, pp. 724-727).

Witkowski's recommendations for additional evidentiary rules regarding digital images follow the above conditions very closely (Witkowski, 2002, p. 288.) The concepts are grounded in history, and translated into the vernacular of the incumbent technology.

Miller (1998) cites the first appellate court case to approve the admissibility of color photographs as *Green* v. *City and County of Denver* (1943). Colorado Supreme Court Justice William S. Jackson saw no prejudicial error in the admission of color photographs of alleged putrid meat. The photographer testified that the film was underexposed and yielded a photo in which the color of the liver in question appeared darker than it actually was at the time the photograph was taken. Justice Jackson ruled that the photos were admissible because the photographer had explained the facts involved in making the photo and the result.

During the original trial, the defense argued that the photographs were offered in lieu of the objects photographed and that this was improper. The City of Denver cited *Parris* v. *Jaquith* (1920) and *Reed* v. *Davidson Dairy Co.* (1935). In *Parris* photographs were taken at the scene of a fire several days after the fire, but since there was satisfactory proof that nothing had been altered at the scene since the fire the photographs were admissible. The same, evidently, held true in the case with the meat. It had been kept

refrigerated since it was seized and pictures of it were taken just before the municipal court hearing. The photographs were used in the subsequent hearing at county court. The time factor had not altered the bearing of the photographs on either case were thus admitted.

As photographic technology progressed, rules governing its use as evidence progressed. In *Reed*, the prosecution presented photographs of the accident scene taken six months after the fact. The defense argued that photographs are not intended to help explain theories or hypothetical situations. However, Colorado Supreme Court Justice E.V. Holland concluded that the photos were being used merely as a map or diagram would be, and were more accurate than words. In essence, the issue of color was really a non-issue in this case. The photographs were declared admissible mostly because of precedents set by use of evidence photographs in general.

In *Commonwealth* v. *Makarewicz* (1955), photographic slides of a victim of a "brutal sex murder" (p. 299) were shown to illustrate testimony of a pathologist. No error was found in allowing these photos. The defense objected to their use because they would have been inflammatory and prejudicial. The judge stated that they had been properly verified and declared to be a fair representation and in light of the "extreme atrocity and violence [of the crime]…these slides could add little to inflame or prejudice the jury" (p. 299).

No significant distinction seems to have been made between black and white photos and color photos. Of course, they seemed more inflammatory because they are more graphic and were usually met with objection on those grounds, but seldom, were they excluded solely because of the issue of color.

Error was declared in *Wright* v. *State* (Dist. Ct. App. Fla., 1971), however, when three, color photographs of a murder victim were admitted. It was determined that the photos did nothing to prove the case and were frightful and shocking. The court cited *Albritton* v. *State* (Fla. App. 1969) to illustrate the distinctions in the cases. "The key to admitting such photos is that their probative value is not outweighed by their prejudicial effect (i.e., gruesomeness or inflammatory character)" (Miller, 1998, p. 6).

Frye v. *United States* (D.C. Cir. 1923) was a pivotal case for introduction of new technology into the courtroom. The rule affirmed in this case dictated that new technology or scientific knowledge must have achieved general acceptance in its field. Admittedly, the time frame for such acceptance was debatable—the ruling justice in the case termed it a "twilight zone" (*Frye* v. *United States*, D.C. Cir. 1923, p. 1014), but the ruling stood for nearly 70 years, becoming known as the general acceptance standard.

For the most part, still photographs had achieved general acceptance. Their precedential relation to illustrations and photographs was preserved in determining admissibility. However, after admission, maps and illustrations were deemed distinctly different from photographs. Scott (1942) cites three notable distinctions: (1) Photos are generally accepted as "absolutely correct", therefore no inaccuracies can be accepted in a photograph as they might be for a hand drawn illustration or map. (2) Photographs, because they are representations of reality, can incite emotion and possibly prejudice. (3) Photographs are recognized as an impartial and truthful witness *(Franklin* v. *State,* 1982), a silent witnesses (*King* v. *State*, 1922), unvarnished testimony (*Hartley* v. *A. I. Rodd Lumber Co.,* 1937).

In order to be admitted as evidence it was established that photographs had to be first of all, relevant—they must either help the jury understand the case or they must help a witness explain testimony (Scott, 1942, pp. 479-483). Second, photographs must be accurate. Restrictions on who could verify a photograph were initially very stringent. Usually the photographer was called upon to testify about a photograph's accuracy. The rule became more flexible, however, allowing "any witness having sufficient knowledge of the subject to say that the photograph is a faithful representation thereof" (Scott, 1942, p. 490).

It is left up to the court judge to determine whether or not a photo is sufficiently verified as accurate (Scott, p. 493). This decision is rarely reversed in appellate courts, but reversal is not unheard of—*Cunningham* v. *Fair Haven & W. R. Co.* (1899). Justice Hammersley reversed a decision by the trial court to reject photographs of a faulty area of railroad track. The reasoning was that the angle of the camera when the picture was taken could skew interpretation of the photograph. Hammersley ruled it is up to the jury to decide that. After a photograph is deemed relevant and accurate it is admitted as evidence and from there it is left to the jury to determine its probative value, just as they would evaluate verbal testimony (Scott, 1942).

Evidence Photography in the Mid To Late Twentieth Century

The above rules pertaining to evidence photographs prevailed into the rest of the century. Of course, many more case precedents are cited in decisions for admission or exclusion. The author will proceed with a brief historical survey of the mid to late twentieth century, citing cases from North Dakota, South Dakota, and Minnesota since these are the states from which information was solicited in the analysis that follows. By

photographs are admissible as any other photographs if they correctly portray the subject matter, do not convey false impressions, and if their probative value is such as to outweigh the possibility of undue prejudice from such circumstances as their gruesome character" (*Teegarden* v. *Dahl*, N.D. Sup. Ct., 1965, p. 686). He affirmed the general rule regarding photographs—their admissibility is left, for the most part, up to the trial court.

Johnson v. *Chicago & N.W. Ry. Co.* (S.D. 1946): Photographs taken around the time of the accident were admissible because they helped explain the facts of the case. There seemed to be conflict between oral testimony and what the photos portrayed. Circuit Judge Beck determined that it was up to the jury to decide if the photos were an accurate representation of the scene. He asserted that the photos were not conclusive, citing 55 *American Law Review* 2d, 932, where several similar cases can be found—some in which the photos were admitted and some where they were not admitted for various reasons.

Larson v. *Meyer* (N.D. 1965): Justice Teigen found error in allowing a Christmas card photograph, showing a deceased mother and her husband and children. Identity was not an issue, nor were her health and condition. Teigen ruled the photo prejudicial, especially since the trial was right around the Christmas season. He cited 74 *American Law Review* 2d, 932. Many precedential cases illustrated his ruling. It is always stressed that admissibility of photographs is left up to the trial court, yet many cases are cited where admission was declared error, especially in wrongful death cases. Photographs in many of these types of cases were found to be prejudicial.

Tufty v. *Sioux Transit Co.* (S.D. 1943): Four photos of a child killed in a vehicle accident were allowed because the health and physical condition of the child was pertinent to the case, but Justice Herbert B. Rudolf endorsed the appellant's request that the jury be instructed not to be swayed by the photos in consideration of their pecuniary decision.

State v. *Morrison* (Minn. Ct. App. 1989): Color photos of an autopsy of a three-year-old felony-murder victim were allowed. The court determined, over objection by the defense, that the photos were necessary to prove the extent of injury and how old some of the injuries were. In the court's opinion,

"The mere fact that they [the color autopsy photos] vividly bring to jurors the details of a shocking crime so as to tend incidentally to inflame the jury does not render the photographs inadmissible" (p. 428).

In *State* v. *Friend* (Minn. 1992): Photos of a murder victim were admitted. A new phrase is evident in the vernacular of this case—"balancing test" (p.544), which is required by Minnesota Rules of Evidence, Rule 403. The test involves an explanation of the probative value of each photo admitted and a balancing of "their probative value against their potential for creating unfair prejudice" (p. 544). These are the same concepts referred to in above cases, Minnesota has just put a name to the process in their Rules of Evidence. It is also interesting to note that no mention is made, distinguishing the photographs as color or black and white, although it can probably be correctly assumed they were color.

These cases illustrate adherence to foundations stated previously in describing early history of evidence photography and how it came to be accepted. The cases show that

admissibility depends on relevance and accuracy and that prejudice is a sensitive issue that is exacerbated by the introduction of color photographs. Judges must carefully ascertain if a photograph's probative value outweighs its prejudicial characteristics. Rules applying to admissibility of evidence photographs have evolved from common law and have endured technological change. The next section explains the federal government's attempt to standardize rules of evidence in general.

Federal Rules of Evidence

Any discussion of handling of evidence of any nature needs to include at least a brief explanation of the Federal Rules of Evidence (FRE). The concept of codification of evidentiary procedures at the federal level has been a paradoxical one. Most in the legal professions agree that evidentiary codes are a necessity, but most also resist the rigidity code adoption implies (Saltzburg, 1998). The idea floated through history, gaining some momentum with the enactment of the Federal Rules of Civil Procedure in the late 1930s.

"On March 8, 1965, Chief Justice Warren appointed an Advisory Committee on Rules of Evidence" (Saltzburg, 1998, p. 1). The final draft of the rules was approved by the Supreme Court on November 20, 1972. The draft was reviewed by the Senate and the House of Representatives and was finally signed into public law by President Gerald Ford on January 2, 1975 (Saltzburg, 1998, p. 2).

The author will not address conflicts of opinion regarding relevance of common law under Federal Rules of Evidence, however, it is pertinent to the issues of new technologies discussed here, to determine if the Rules can be amended. Saltzburg cites Becker and Orenstein (1992) to explain that the FRE were amended six times during the

first seventeen years—compared to the Federal Rules of Civil Procedure which were amended over one hundred times (Saltzburg, 1998, p. 7).

Generally the amended rules dealt with making the Rules gender-neutral, insanity defense, resulting from issues in the John Hinckley trial, clarifying language in certain rules, and an amendment to Rule 407 dealing with "subsequent remedial measures" (Saltzburg, 1998, p. 6). In an effort to keep the Rules in step with the times, an Advisory Committee on the FRE was again appointed by the Judicial Conference in 1993, since the original concept of having an Advisory Committee was abandoned after the Rules became public law.

The FRE deal with all manner of evidentiary issues, but a few bear significantly on the consideration of photographic evidence in general, and according to some, like Jill Witkowski (2002), bear on digital photographic evidence insufficiently. Rule 901 addresses the requirement of authentication. Before being admitted, all evidence must be authenticated. In the case of photographs a foundation must be established based on testimony, asserting the photograph is a fair and accurate portrayal of the subject in question. Authentication can be established in many ways, including use of one or more of the ten basic principles of authentication (Saltzburg, 2002). Common law tests also address the issue including proof of accuracy, authenticity, proper chain of custody, relevance and competency (Witkowski, 2002, p. 277).

Witkowski (2002) analogizes the use of digital images with audio recordings and video tapes. Since case law regarding digital photographs is minimal, some generalizations can be observed from legal authentication of these media. Witkowski explains that authentication tests for both media were initially very extensive. The seven-

> "...If one were to call the first assembly of the image data [the picture made in the camera] the 'original image,' one would have to deal with the questions put before lay people regarding why the 'original image' was erased. Since it is necessary to separate the first data assembly from its replication on a fixed medium [archiveable, unalterable medium] it was decided to call the first instance the primary image and the second, the original" (Blitzer, 2002, p. 51).

Rule 401 defines the term "relevant evidence." Relevance is a condition of admissibility of a photograph, even before accuracy. If a photograph is not relevant, no matter how assured the court is of its accuracy, it has no value as evidence. "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" (Saltzburg, 1998, Vol.1).

Rule 403 declares that the probative value of any relevant evidence may not be "substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury..." This is a frequent consideration when gruesome photographs are admitted or photographs depicting any emotional or issue of passion.

As policies and standard operating procedures (SOPs) are constructed to codify concepts and issues unique to digital evidence photography, those in position to create these procedures need to look to the FRE for foundations of admissibility. Perfect photographs of a crime scene may be rendered useless if gaps in SOPs exist.

Furthermore, if gaps in admissibility tests exist in the FRE, the issue is complicated even more. Whether or not the FRE should be amended to further accommodate digital

the medium. There are many parallels between the transition from handmade illustrations to photography in the mid-nineteenth century and the transition from film photography to digital photography in the twenty-first century. Issues like admissibility, accuracy, reliability, and manipulability all need to be revisited in light of the new technology.

It is interesting that early digital photographic evidence images were linked to their digital predecessors, computer simulations (e.g. accident reconstruction programs) and animation (Joseph, 1998.) Similarly, film photographs were linked to illustrations, maps and diagrams in the mid 1800s. Authentication for digital images depended heavily on "(1) the validity of the scientific or technical theories embodied in the program [used to generate the image] and (2) the trustworthiness and reliability of the program and the competence of the operator" (Joseph, 1998, 8.04[4]). The general acceptance test based on *Frye* v. *United States* (1923) applied in some early cases but is "superseded by the Federal Rules of Evidence" (Joseph, 1998, 8.03[2]).

In 1993 *Daubert* v. *Merrell Dow Pharmaceuticals Inc.* the *Frye* admissibility test was finally, after 70 years, dethroned as the single test for admissibility of scientific evidence. Justice Harry A. Blackmun noted the prolonged influence of *Frye* was not without contention. He cites cases that found the Federal Rules of Evidence superseded *Frye*, cases that found they coexisted with *Frye,* authors who affirm that *Frye* lives and authors who profess that *Frye* is dead. He carefully laid out the intents of Rules 702, scientific reliability and subsequently relevance and reliability; 703, and 706, procurement of expert opinion holding that neither make any mention of general acceptance (by the apropos scientific community). He was firm in his acknowledgement

that the Federal Rules of Evidence did, indeed, rule. *Daubert* is now considered a landmark case in determining admissibility of new technologies.

Daubert established that trial courts should "look to peer review and publication, the known or potential rate of error of the process or technique, and whether the process or technique has been tested" (Witkowski, 2002, p. 275, 276, note 35). Justice Blackmun citing *Beech Aircraft Corp.* v. *Rainey* (1988):

"The drafting history [of the Federal Rules of Evidence] makes no mention of *Frye*, and a rigid 'general acceptance' requirement would be at odds with the 'liberal thrust' of the Federal Rules and their 'general approach of relaxing the traditional barriers to 'opinion' testimony" (*Daubert* v. *Merrell Dow Pharmaceuticals, Inc.* 1993, p. 483).

An examination of a few rulings regarding the use of digital evidence photographs will show how the new technology is being accepted or not accepted in the courts. For example in *Almond* v. *State* (2001) the prosecution admitted digital photographs. It was ruled the photographs were properly authenticated as fair and truthful representations. "We are aware of no authority, and appellant cites none, for the proposition that the procedure for admitting pictures should be any different when they were taken by a digital camera" (*Almond* v. *State,* 2001, p. 805). *Ray* v. *State* (1996) was cited, analogically comparing admissiblility of video tapes on the same grounds.

State v. *Hayden* (1998) involved challenge of the use of enhanced digital photographs of a handprint taken from a bed sheet. Washington is a state that still adheres to the *Frye* test for general acceptance, so the trial held a *Frye* hearing to determine the admissibility of the photographs. Keep in mind this was 1998—it was found that a *Frye* test would not have been necessary since the digital imaging process

was not considered novel scientific evidence (p. 1026). One of the expert witnesses in the case was Erik Berg, a forensic specialist at the Tacoma Police Deparment and Washington's digital imaging expert. Literature by Berg, presented at the hearing, stated that the enhanced digital imaging process was being developed in 1994 based on research done in the late 1960s and early 1970s (p. 1026.) It should be noted that the enhancing process used on these photographs was subtractive. Berg testified that the "software he used prevented him from adding to, changing or destroying the original image" (p.1028).

In *State of Florida* v. *Victor Reyes* (2003) Erik Berg used software called More Hits to digitally enhance an image of a fingerprint on duct tape. Reyes was acquitted because the jury was not convinced the print proved he was guilty. The technology passed the *Frye* test and numerous expert witnesses testified but the verdict was so closely linked to the technology that the legitimacy of digital image evidence was cast in doubt, even though it was the fingerprint itself that was determined not to be probative (Witzke, 2003).

Conn. v. *Swinton* (2004) could prove to be a pivotal case in future consideration of admissibility of digitally enhanced photographic images. Two types of software were used to enhance photos of bite marks pertinent to the case—Lucis and Photoshop. The photograph enhanced with the software Lucis was determined to have been properly admitted because it passed the tests of reliability—a key factor applying to admissibility of computer generated evidence. The photographic overlay enhanced with the Photoshop software was determined to have been improperly admitted because the expert witness, who was trained in bite mark identification, could not testify about the processes used to produce the overlay. He had only watched someone else make the overlay. The

improper admission of the enhanced overlay was determined to be harmless because of other factors in the case but the importance of reliability is illustrated in this case.

Connecticut Associate Justice, Joette Katz, notes that while FRE Rule 901 may seem liberal in its application to computer generated evidence, states have the ability to apply stricter standards for admissibility, thereby establishing the foundation of reliability. Katz cites J. Witkowski (2002) to point out that using this approach encouraged the use of sound and video recording technologies. Admissibility requirements were at first stringent, but as the technologies have become more common, admissibility requirements have become more lax.

As the history of evidence photography has been both paradoxical and reasonable, the assimilation of digital evidence photography will be equally challenging. The paradigms of those who believe digital photography is the same as traditional photography and should be treated the same and those who endorse amendments to the Federal Rules of Evidence to address the unprecedented nature of the medium will be debated. Whatever direction case law takes it will be important for law enforcement agencies to have written policies that reflect and withstand current trends in evidence photography.

CHAPTER IV

METHODOLOGY

The purpose of this study was to examine law enforcement agency policy pertaining to digital photography to determine if such policies address admissibility factors required by the court system. These factors include reliability, security, accuracy, and authenticity. This chapter includes an explanation of how that examination was accomplished, beginning with an introduction to the method of analysis that was used followed by explanation of the procedures, including data collection and the coding process.

Qualitative Method of Content Analysis

The qualitative method of content analysis was used to closely examine the texts of five law enforcement agencies' policies pertaining to digital evidence photography. Qualitative analysis does not use statistical transformation of data to explore meaning. Some topics, such as exploration of words and phrases are better suited to a concept-based strategy of coding to discover meaning in the words—to discover descriptive conceptual categories rather than descriptive statistical significance. "In qualitative analysis, coding… themes is not preliminary to any analysis, but is part and parcel of interpretative practice itself" (O'Leary, 2004, p. 195).

Research for this study was directed by questioning the effectiveness of law enforcement agency policy in addressing issues of admissibility of digital evidence photographs. Content analysis was used to discover areas of focus, action terms, and

nomenclature pertaining to digital evidence photography. The physical manifestation of policy is written text—words and phrases used to convey concepts that are the abstract sum of words and phrases. The method of content analysis is used to accommodate a process of breaking down data into its simplest components. The author used the process of "open coding" for this purpose, borrowed from Strauss and Corbin's grounded theory procedures (Strauss, 1990). They define "open coding" as "the process of breaking down, examining, comparing, conceptualizing, and categorizing data" (Strauss, 1990, p. 61).

This process helps the user focus objectively on the text by isolating the words and phrases, allowing their intrinsic meaning to become evident. By constructing lists of words and phrases from the texts of submitted policies, the author was able to establish conceptual categories to compare with concepts of admissibility discovered through prior historical research.

Procedure

Preliminary stages of research for this study required narrowing the topic to a specific aspect of digital evidence photography. Constructing a list of questions about the topic helped narrow the focus to the question of whether or not policy at the local law enforcement agency level adequately addresses admissibility concepts. A review of literature pertaining to digital evidence photography revealed that the novelty of digital imaging technology and the ongoing controversy over its legitimacy as evidence has demanded examination in both the court system and at the local law enforcement level. Policies have had to be constructed to address the pertinent issues.

police department in South Dakota. No indication was given about when or if they would adopt the use of digital imaging. One of the respondent agencies used digital imaging but the policies sent were embedded throughout general policy on evidence procedure and did not specifically address digital imaging. This set of policies was not analyzed for this study. A total of five sets of policies was used for content analysis.

Throughout the study the five departments are referred to by the letters "A" through "E." Although only one of the departments expressed concern about having their name published, it was decided that each department would be designated by letter.

Since emphasis was on policy text, no historical or biographic information was solicited. Population of the cities where the five agencies are located ranges from 20,000 to 70,000. Some departments did, however, send some background information with their policies.

Department A began major use of digital imaging in 2002. Policies and procedures were developed as the technology was implemented and was revised in 2006. It appeared from the date on the policies that Department B began using digital imaging in 2005. The department solicited policies from other agencies around the country and modeled theirs after Department C's policies. In 2003 Department C began using digital imaging for photographing evidence. By 2006, 99% of the agency's evidence photographs are digital. They occasionally use film photography since they also maintain negatives from their county sheriff's office. Department D is just beginning to use digital photography and their policies were in the "draft" stage." The correspondent had received digital imaging training from the Federal Bureau of Investigation. Even though their policies were still in the beginning stages, they were chosen to be analyzed for this study. Department E's

policies were also in the "draft" stage but they, too, were far enough along to be considered for analysis for this study.

Coding Process

The first step in the coding process was to carefully read all of the policies and break the text down into lists of words and phrases. Lists were prepared for each individual department whose policies were to be analyzed. The words and phrases on the word lists, as they will be referred to, consisted mainly of nouns and verbs of prominence. Not every verb, noun, and phrase in the text of the policies was included. Those excluded were determined by the researcher not to have any significance in reference to digital photography procedure. Some terms on the lists are included more than once.

There are phrases that were left intact, as opposed to splitting up the words, resulting in one line containing two categories, causing a minor error in results tabulation. It was the author's decision to leave the phrases intact for coherence of thought. For example, in one instance the verb "place" might have ended up on a line by itself. That would have been ambiguous, since the word can function as a noun or a verb. The words "in property room" after the word "place" make a more coherent thought. But the result was that words from two different categories ended up on the same line, slightly skewing the percentage tabulation. The author decided this would not threaten the overall analysis of the material.

Finally, there are words and phrases on the word lists that were not included in any of the categories of analysis. For instance the word "non-networked" was used in the text to describe a computer in an office. In the initial sorting of the policy texts into words

The final category is "Places Images Can Be Found." This refers to both storage media and physical locations where digital images are either stored temporarily or permanently archived.

With the conceptual categories established, the author used a system of color coding to designate words and phrases for each category. Red indicated terms associated with "Purpose of policy." Blue indicated terms associated with "Composition." Green indicated "Actions Performed on Digital Images." Purple indicated "Personnel Who Handle Digital Images." Orange indicated names of "Places Where Images Can Be Found." Assigning colors to each group accommodated tabulation of terms used in each category.

The data was tabulated according to color. For example all of the words and phrases that were colored red were tallied for each individual department. Using this number, a percentage was calculated from the total number of lines of words and phrases on the department's word list. One line contained one word or one phrase. These percentages were then used to aid in comparisons and interpretation of the data.

The coding process along with recommendations on digital imaging policy from the Scientific Working Group on Imaging Technology (SWGIT) and Herb Blitzer (2002) were used to analyze the policy texts. Strengths and weaknesses in the effectiveness of each department's policies became apparent using the coding data, historical research, and law enforcement agency peer recommendations.

CHAPTER V

DATA WITH DISCUSSION

"Open coding" (Strauss, 1990, p. 61) techniques were implemented in examination of policies from five police departments selected from the three-state area of North Dakota, South Dakota, and Minnesota. The process involved breaking the texts down into lists of words and phrases, examining the lists for concepts related to admissibility of digital photographs into a court of law, and comparing the words and phrases to those concepts of admissibility. Using the emergent concepts from this examination, five categories were established and a color coding system was used to assign the words and phrases to a category: "Purpose of Policy" (red), "Composition" (blue), "Management of Images" (green), "Responsibility for data" (purple), and "Places Images Can Be Found" (orange).

Words and phrases of each color for each individual department were then counted and recorded. The number of words and phrases of each color represented a percentage of the total number of words and phrases on each list. These percentages were then calculated and used for observation and comparison of the data.

The author chose not to use the city names of the police departments involved in the study. Though only one department had concerns about their name being published, it was decided that each department would be assigned a letter of designation starting with the letter "A."

In this chapter the results of color coding of the word lists are illustrated using tables. Each table represents one conceptual category. Each shows the percentage of lines of

words and phrases drawn from the departments' policy texts that address the category. One line on the word lists refers to one word or one phrase. A description of each category precedes the table.

Tabulation of Data

"Purpose of Policy"

The stated "Purpose of Policy" is a very small portion of each department's policy text. It is the statement of a reason to have policies pertaining to digital photography at all. But it is also an indication of what the policy's emphasis will be. Examination of the word lists shows that the policies are intended to safeguard, insure, preserve, maintain or establish. In four of the departments' stated purposes, protection of the integrity of images so they will be admissible in court is clearly and directly written. This is an acknowledgement of the ultimate potential purpose of evidence photographs—to be used as evidence in a court of law. The table represents the percentage of total lines of each department's policy designated to "Purpose of Policy."

Table 1. **"Purpose of Policy"**

	Total lines	**% "Purpose of Policy"**
Department A	35	8.56%
Department B	77	2.59%
Department C	65	3.07%
Department D	50	4.30%
Department E	74	8.10%

"Composition"

"Composition" includes any reference made to elements that should be included in a photograph, descriptions of images, exposure, compression ratio—references to the result of image capture. The admissibility concept related to this category is the necessity of an evidence photograph to portray a fair and accurate representation of a scene. The table represents the percentage of total lines of each department's policy designated to "Composition."

Table 2. **"Composition"**

	Total lines	**% "Composition"**
Department A	35	0%
Department B	77	11.68%
Department C	65	13.84%
Department D	50	4%
Department E	74	36.48%

"Management of Images"

This category addresses movement of data. Images can be captured, copied, compressed, and deleted, among other things. However, they can also be turned in, downloaded, transferred, and archived, which implies movement from one place or medium to another. Emphasis in this category is on transfer of images, but the category is represented by many different actions that have potentially significant results upon how that data will function as evidence. Importance of these actions becomes more transparent in relation to the categories that follow—who performs these actions and

Table 4. **"Responsibility for Data"**

	Total lines	% "Responsibility for data
Department A	35	20%
Department B	77	12.98%
Department C	65	9.23%
Department D	50	4.3%
Department E	74	6.76%

"Places Images Can Be Found"

Digital images may be found in a number of formats. This category refers to the places those images may be located, whether it be on a digital flash card, a computer hard drive, a CD-R, or a hard copy image. These all must be tracked and they must be secure to be admissible as evidence. Processes of transfer and storage must also be reliable. The technology involved in these processes may be called into question in a court of law. The table represents the percentage of total lines of each department's policy designated to "Places Images Can Be Found."

Table 5. **"Places Images Can Be Found"**

	Total lines	% "Places Images Can Be Found"
Department A	35	25.71%
Department B	77	18.18%
Department C	65	18.46%

Table 5 (continued). **"Places Images Can Be Found"**

	Total lines	**% "Places Images Can Be Found"**
Department D	50	30%
Department E	74	32.43%

Discussion

Department A

"Purpose of Policy"

Department A's stated purpose for its policy on digital imaging is to "establish procedure for the accountability of all photographic evidence collected…" This wording puts the focus of the policy on personnel and their responsibility to carry out management of digital photographs. This differs from the four other agencies in the study whose stated purposes emphasized securing the integrity of the images so they will be admissible in court.

"Composition"

No references to composition are found in Department A's policy. However, in keeping with the accountability theme, one policy assigns the responsibility of training personnel in the areas of equipment and procedures to The "Technical Services Bureau and the Criminal Investigations Bureau." It is possible that concepts of composition are taught under the auspices of these bureaus.

"Management of Images"

This category addresses the actions involved in handling images. In Department A's policy action words include retrieval, collection, storage, downloading, archiving,

depositing, turning in, creating, augmenting, enhancing and documenting. These words are important components of the department's policy because they show an acknowledgement of several different processes that are involved in handling digital images.

"Responsibility for data"

Table 4 above shows that Department A has the highest portion of words and phrases in its policy dedicated to identifying and directing personnel who handle images. This is reasonable considering the policy's emphasis on accountability. The "Property and Evidence Function" is designated to process and download images and to "maintain an accountability system for all photographic evidence." Other references to personnel who handle images are officers, investigators and trained personnel.

"Places Images Can Be Found"

Some of the words and phrases used to refer to locations of images include on a writable CD, in a permanent CD file, on a memory card, in a locker, in an unaltered archival format, and in an investigator's working case file. Department A's policies in this area seem to be weak in emphasizing security except to assure accountability for security. Only one reference is made to "unaltered archival format."

Department B

"Purpose of Policy"

Department B's policies begin with a statement of purpose but in the author's opinion nothing in the paragraph states exactly what the department's purpose is in establishing policy pertaining to photography and digital imaging. The paragraph includes a sentence that states how physical evidence should be handled—"it must be identified, collected,

safeguarded and properly transported"—but that is not a statement of this department's intended purpose for the policies pertaining to digital imaging.

Two lines out of 77 on the word list directly address purpose. That is 2.6% of the total lines. The policy statement begins, "The department recognizes…" This connects what is to follow to the department. A short statement about imaging technology is followed by, "Regardless of the technology used, image integrity must be maintained to ensure those images are admissible in court." That, to this author, is a direct statement of purpose.

"Composition"

Department B does not deal with "Composition" extensively. Reference is made to what types of occurrences should be photographed—criminal acts, incidents and trafic accident. Policy directs that photographs should be of "high quality and accurately represent the scene as it appeared at the time it was photographed." Appropriate file format and compression ratio are also mentioned, however the word "ration" is used. The author assumed this was a typing error and the word "ratio" was intended. These factors must be considered "to ensure high visual quality when viewed or printed." Both terms are included on a list under the heading "Definitions" included within the policy text.

"Management of Images"

In Department B's policies on actions which may be applied to digital images include capturing, archiving, transferring viewing , printing, storing, deleting, and removing. This is a wide range of activities acknowledged by policy on digital imaging. This recognition gives more substance to the policy because with each mention of an action a

statement is made about digital imaging showing the range of movement of images along the chain of custody.

"Responsibility for Data"

Terms referring to personnel who capture images were quite general in Department B's policies. The word "employees" is used to refer those who will capture the images. The policies are more specific, however, when referring to personnel who will handle the images—"authorized Records Section personnel" and "authorized Investigations personnel." Image transfer is performed by the Records Section personnel who have access to the digital image server. Access to this server is "strictly limited."

Image enhancement is carried out exclusively by the Investigations Section because of the specialized nature of the task. If the enhanced work is saved, another "examiner" must be able to "validate the original enhancement process if required."

Department B's policies acknowledge the importance of limiting the handling of images after capture to a small number of authorized personnel.

"Places Images Can Be Found"

Observation of the terms Department B uses for "Places Images Can Be Found" shows a chain of custody for digital images. They may be found on a camera's viewing screen or on the removable storage media, in a plain envelope, in the Evidence drop box, on the digital image server, in individual files.

There is an absence, however, of any references to archiving images on any type of CD-R. No references are made to CDs for any purposes. According to the policies, the only place digital images are archived is on the digital image server.

Images may be viewed by camera operators—"employees"—on the viewing screen of the camera to check exposure and composition. "Images shall not be opened and/or viewed with a device that enables editing of digital images. (Except by authorized investigations personnel)."

Department C

"Purpose of Policy"

Department C's policies begin with a statement of purpose but in the author's opinion nothing in the paragraph stated exactly what the department's purpose was in establishing policy pertaining to photography and digital imaging. The paragraph includes a sentence that states how physical evidence should be handled—"it must be identified, collected, safeguarded and properly transported"—but it is not worded as a statement of purpose.

Two lines out of 65 on the word list directly address purpose. That is 3.07% of the total lines. The statement reads, "image integrity must be maintained to ensure those images are admissible in court." That again, as in department B's policy, to this author, is a direct statement of purpose.

"Composition"

Compositional techniques are not addressed in Department C's policies, however digital images need to be of high quality and must be an accurate representation of the scene "as it appeared at the time it was photographed." Quality is to be accomplished by selecting the appropriate file format and compression ratio. Exposure and composition are mentioned in relation to viewing images on the cameras viewing screen, recognition of the fact that there are expectations of a properly composed and exposed image should be submitted.

and stored on the computer in the Crime Lab. It is a "non-networked" "stand alone" computer.

Images are also stored on a CD-R that "is placed into the property room with an evidence tag attached to it. This allows for [Department D] to possess two copies of the digital photographs, an original on CD-R disk and a copy in the Crime Lab computer."

Department E

"Purpose of Policy"

The "Purpose" of Department E's policy is "to set standards" for using digital imaging. Under the heading "Policy" another statement of purpose is that images need to be "preserved to maintain their integrity as evidence." The next statement addresses preserving "the integrity of the image and the chain of evidence." The purpose and policy combined indicate that Department E has set standards to protect the integrity of digital evidence images and the chain of custody of those images.

"Composition"

Department E is the only one of the five sets of policies examined that addresses some of the techniques of composition. A section on "Taking of Pictures" addresses starting with a general view and moving in to specific scenes, showing relationships of items with the scene. Close-ups are recommended along with the use of a scale. The policy suggests that after the images are transferred to a CD, all the images should be viewed to "verify that they are a true and accurate representation of the scene/evidence…photographed."

This policy acknowledges the need for the photographs to be a true and accurate representation to function as evidence.

"Management of Images"

Department E's policies reflect a wide range of actions that may be applied to digital images. They may be recorded, submitted, printed, distributed, processed, altered, obliterated, transferred, verified, documented, published, permanently stored, and archived. This list shows recognition that digital images need to be dealt with on many different levels.

"Responsibility for Data"

There are three different references to personnel in Department E's policies: employees, Evidence Technician, and State's Attorney. Much of the policy text is procedural with few references to who will carry out the procedures. The first mention of personnel occurs midway into the text, "the employee shall maintain custody of the CD until it is submitted to the evidence techni[cian] for archiving." It is a very general reference and is not as detailed as explanation of the procedures. Two other references are made to the evidence technician and one to the State's Attorney who may grant permission for transfer of custody of an original image from the Evidence Technician.

"Places Images Can Be Found"

Many references are made to CDs in Department E's policies. CDs appear to be a major mode of storage and movement at this department. Other locations where image data may be found are on a computer used as an "intermediate storage device," on an unaltered native file format, on a 3.5" disk, on a "write only compact disk," in permanent storage, on a copy of the original, and in court.

CHAPTER VI

CONCLUSION

Techniques of "open coding" (Strauss, 1990, p. 61) were implemented for the analysis of five sets of police department policy used for this study. "Open coding" consists of a process of breaking down, examining, comparing, conceptualizing and categorizing data. The material in the policy texts was examined and lists of words and phrases were compiled from each department's set of policies. Conceptual categories were developed and a system of color-coding was used to assign the words and phrases to categories. The data for each individual department was then tabulated to find what portion of the words and phrases were designated to each category. After these processes were completed the author was able to identify areas where the policies effectively addressed issues of admissibility of digital evidence images as well as areas where there were significant shortcomings.

This chapter will explain components of digital imaging policy recommended by the FBI working group SWGIT (Scientific Working Group on Imaging Technologies) and by Herbert Blitzer (Blitzer, 2002). These recommendations and the results of the "open coding" (Strauss, 1990, p. 61) process will be interpreted with analysis of each individual department's policies.

Policy Components

Organizations at local, national, and international levels have convened for the specific purpose of developing appropriate and effective policies and procedures for

representation and security of the original image, two concepts that emerged from analysis of the five sets of police department policies in this study.

SWGIT and Blitzer (2002) also recommend that equipment maintenance and calibration be addressed to assure reliability. For officers and investigators in the field, this means making sure the image capture equipment is functioning properly. For those handling the processing and archiving of images, "the image processing system should be checked by its diagnostic each and every working day and the results filed…" (Blitzer, 2002, p. 218).

Blitzer (2002) explains the importance of using correct nomenclature, defining use of the terms primary image, original image, duplicate, and copy. This is also an important aspect of reliability—being able to testify intelligently about the technology used. "Primary images are the direct result of the image capture process" (Blitzer, 2002, p. 203). The original image refers to the "first permanently recorded version of the image" (Blitzer, 2002, p. 203). A duplicate is an exact replica of an image. The data contained in a duplicate image is the same as the primary image from which it was generated, only the medium it is recorded on changes (Blitzer, 2002, p. 204). A copy of an image implies that the data it contains is not necessarily an exact replica of the image from which it was generated. An example of a copy would be an image generated from a primary image using a lossy compression format—a format, which compresses the image data. In the process some of the data is lost or altered. Lossy compression formats are not recommended by either SWGIT or Blitzer for evidentiary purposes.

Finally, SWGIT recommends policy that addresses issues of personnel who handle digital images. The guidelines suggest that all personnel involved in handling digital

images should be "trained and tested for competency and proficiency" (Pollitt, 2001, p. D4-111).

Department A

For the purpose of this study all policy texts analyzed are referred to as policies. The text sent by Department A was titled "Memorandum" and the subject of the memorandum was "Photographic Evidence." For this study it was considered Department A's policy on digital images and will be continue to be referred to as such.

The purpose of Department A's policy is to "establish procedure for accountability" as well as procedure "relevant to the storage and retrieval of all photographic evidence." These phrases convey that one should be able to rely on the policies to determine who is responsible for photographic evidence and how photographic evidence will be handled in terms of transfer and archiving of image.

The "accountability system" is to be maintained by the Property/Evidence Function within the Administrative Division Bureau. This explicitly answers the question of who will be responsible for the system of accountability. Since the Property/Evidence Function is within the Administrative Division Bureau there is an implication that there is a chain of command which also shoulders ultimate responsibility of procedures.

Maintaining the focus of accountability, the policies next state that officers and investigators will be responsible for documenting entrance of the photographic evidence they possess into the "evidence accountability system" on the computer and placing the evidence in a named secure location. No distinction is made between film and digital image evidence until the statement "digital format is the preferred method for

Department A's policies address accountability for "Management of Images" as the intent of the purpose of the policies stated but procedures of storage and retrieval or "Places Images Can be Found" are not adequately defined nor is any reference made to anywhere else these procedures might be found. If an image from this department is challenged in a court of law, lack of written step by step procedure to account for security of the images at all stages of handling and to reflect reliable handling of the technology itself, may cause the use of the image to be compromised on the grounds of accuracy and reliability. The policies primarily reflect "Responsibility for Data"—the department's ability to hold someone accountable for such an occurrence.

Departments B and C

Department B has been using digital imaging for approximately one year. When it was decided they would be implementing its use, policies on digital imaging were solicited from law enforcement agencies from around the United States to use as a resource for developing their own policies. The policies of Department B and Department C are nearly identical and were analyzed as one unit for the purpose of this chapter. Any differences are noted within the text.

The purpose for these departments' policies on digital imaging is to protect the integrity of the image to ensure admissibility in court. The goal of the policies, no matter who handles the images, how they are composed, the equipment used, or where the images are stored, is to protect them so they can be used in court. Department C's text includes a statement that the policies "are subject to change as needed to accommodate developing technology and computer systems." This indicates the department's policy on digital imaging is intended to keep pace with changes in the technology.

media remains with the "employee" until it is passed to the Evidence Section where the transaction is documented and the storage medium is placed inside a sealed envelope.

Evidence Section personnel handle transfer and storage of images to the "evidence digital image server." Access to this server is strictly limited. The policies reflect recognition of the importance of regulated chain of custody and security of the images but there is no procedure for storage and no assurance that the images cannot be manipulated during transfer. There is no indication of backup storage.

Image enhancement will be done only by Evidence Section or Audio-Visual Unit personnel. This at least narrows "Responsibility for Data" for enhancement procedures. The purpose of enhancement is "to make an image clearer for analysis or interpretation." Steps used for enhancement are documented so another "examiner can validate the original enhancement process if required" and the image is attached to the documentation sheet. Enhancements are "conducted on a working copy of the original image."

Department B and C's policies show an emphasis on security of the images as they move through the chain of custody. Documentation along the path is mandated and images are handled by a limited number of personnel. These policies reflect an emphasis on securing the integrity of the images as stated in the departments' purpose.

The process of image storage needs to be expanded to show a step by step procedure of what happens to the images after they are submitted into the Evidence Section. This would serve the purpose of supporting reliable testimony about the technology used for the transfer and storage processes.

Department D

Department D's "Purpose of Policy" is to "safeguard the integrity of digital photographs that are captured as part of any investigation." Another statement of purpose follows under the heading "Procedure." The policies are intended to "ensure that digital photographs are downloaded and stored in an appropriate format and system to safeguard their integrity and authenticity." Department D's stated "Purpose of Policy" addresses both the field process of image capture and the processing of images after they are admitted into evidence.

The first policy addresses a time element—"when" images should be downloaded. Images are to be "downloaded to an appropriate medium and system as soon as practical." Blitzer recommends this as well. It shrinks the window of opportunity for image manipulation and encourages images be downloaded before a theory of what happened evolves, meaning, if someone wanted to manipulate images they wouldn't know what to manipulate to bias the case one way or another.

Downloading is the focus of Department D's policy. Three areas where this can be done are named: in the Gang Strike Force Office, In the CID Sergeants Office, and in the Crime Lab. In all cases, "those" using the equipment for downloading must be properly trained. No specific references to personnel are made, only "those." Access is authorized through chain of command, implying a limitation on the number of personnel handling the images.

There is not a list of definitions included with Department D's policies. Terminology referring to how images will be stored is limited to a CD-R disk. The images may be transferred to CD-R disks using the computers at the three locations mentioned above.

The disks are then placed into the property room. The computer in the Crime Lab is the only computer upon which evidence images may be stored. Access to the Crime Lab is documented through use of a sign-in sheet.

Further on in the policy text it is ordered that all evidence photographs will be stored on the "stand alone, non-networked" computer in the Crime Lab. The images are then copied onto a CD-R disk that is stored in the evidence room. " This allows for [Department D] to possess two copies of the digital photographs, an original on CD-R disk and a copy in the Crime Lab Computer." With correct nomenclature this policy creates a very important back-up system for image storage. The images should be transferred to the computer from the removable storage medium. Without opening the file containing the images, a duplicate set can be generated to a CD-R creating a set of images whose data replicates the data on the computer. At this point a choice can be made determining which set will be maintained as the original unopened set. An original image will always be available to present in court.

Department D's policies focus almost exclusively on "Management of Images" and "Places Images Can Be Found." This leaves "Composition" and "Responsibility of Images" untouched. Maintenance of an unopened set of images prove very valuable in court but personnel must testify to security and reliability—or the technology involved in processing the images.

Department E

The "Purpose of Policy" for Department E is to set standards for using digital imaging technology. The objective of that purpose is to ensure integrity of the images and protect the chain of custody so the images can be used effectively as evidence.

A comprehensive list of words and definitions is included with Department E's policies. The term "primary image" is defined as " the first instance in which an image is recorded onto any image that is a separate, identifiable object or objects." Although the meaning is somewhat unclear there is recognition that the primary image is the first generation of the image from the image capture device to a storage medium. No definition is given, however, for the term "original image."

Department E's policies address three main facets of "Composition": subject matter, range of view, and documentation. Directives suggest photographing the overall scene, followed by mid-range scenes and close-ups. Use of a scale is recommended with close-ups. This is an example of policy directing general composition. The details of how this is to be accomplished are what should be included in a training setting.

Personnel who handle images are not named throughout most of Department E's policies. The Evidence Technician is referred to three times regarding archiving images and maintaining custody of the images. Movement of images prior to turning them in to the Evidence Technician is related in a "how-to" format to the reader. It is not specific to any personnel.

After the images are downloaded to the computer and to a CD, there is instruction to "view all the images for [the] incident …and verify that they are a true and accurate representation of the scene/evidence …" This should be done at the scene. Images should be viewed on the camera to ensure proper exposure and composition. More photographs can be taken of the scene if needed.

Images involving felony incidents are placed on a CD containing only one case. Any images of incidents that are less than felony status are placed on a CD until the CD is full.

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Images involving felony incidents are placed on a CD containing only one case. Any images of incidents that are less than felony status are placed on a CD until the CD is full.

"The employee shall maintain custody of the CD until it is submitted to the Evidence Technician for archiving." This procedure could be problematic in terms of security. First, there is no mandate that CD-Rs be used to store images. There is no indication that the images are to be stored in an unalterable format. Blitzer (2002) recommends that images be transferred to an unalterable format as soon as possible after image capture. Second, if an employee is to maintain custody of the CD until it is full of images from several different cases as the policy implies, there must be a way to document chain of custody for that entire period to ensure the images are not tampered with.

"No original images contained on CDs will leave the custody of the Evidence Technician without written request from the State's Attorney." This is a strict custody directive. There is no explanation of what an "original image" consists of. An original would never have to leave custody of the Evidence Technician since a duplicate could be made which would be an exact replica of it. "Duplicate image" appears on the list of words and definitions accompanying the policies. It is defined as "an accurate and complete replica of an original image, irrespective of media."

There is no location given as to where the images are to be archived. The are placed on a CD and the Evidence Technician has custody of them. There is no procedure for maintaining a back-up set of images.

Under the heading "Working with images" the concept of a "write only compact disk" is finally mentioned in reference to permanent storage. This concept should have been addressed throughout the policy text.

"Primary images must be stored/ archived on compact disk in their native file format from the camera." This is an illustration of why there must be standardized definitions of

"primary images" and "original images." Primary images are the result of the image capture process and as such, are stored on the removable storage media in the camera or "on a computer hard drive or removable drive…during a scanning process" (Blitzer, 2002, p. 203).The original image is stored on the write only compact disk.

Further reference to "Composition" in Department E's policies involves "processing to improve the image quality." Those processes are limited to sharpening the focus, correcting contrast and color balance, and enlarging a portion of the image. Manipulation of an image is defined within the policy as "actually altering properties of the image." The policy goes astray at this point in conveying intent. Processes to be used in manipulation of an image include "a. sharpness enhancement, b. removal/addition of objects/features, and use of images in court displays." Removal or addition of objects from a photograph bound for use as evidence in a court of law should not be advocated in any way in policy pertaining to digital evidence images. This policy reflects lack of understanding of the enhancement process and nomenclature to properly describe it. Recommendation is made, however, to perform all manipulations on a copy of the original and all procedural manipulations must be documented in a supplemental report.

Department E's policies contain more text than any of the others analyzed for this study but they also contain the most serious errors in wording which provides a very inadequate foundation for evidence photographs. An evidence photograph produced by Department E based upon its present policies would likely have strong compositional elements. However, accuracy could be an issue of contention since compression of image data is not mentioned at all in the text. Technically, compression formats could be

considered alteration of the image since data is potentially lost or added in the compression and reopening process of an image.

Security may also be an issue. "Management of Images" and "Responsibility for Images" are not clearly addressed. Documentation, however, is stressed and could be a redeeming factor in a courtroom challenge.

This analysis of the digital imaging policies of five police departments reflects the strengths and weaknesses of each individual department. It illustrates the importance of standardized nomenclature for clear and accurate reference to digital imaging processes as they are implemented in producing evidence photographs.

As a cumulative body of policy text each major consideration for successful use of digital imaging recommended by the Scientific Working Group on Digital Technologies and by Blitzer (2002) is addressed except one—calibration and maintenance. These two factors give bases for reliability in court and should be referenced at least briefly with a department's policies on digital imaging. If the equipment used to transfer image data does not function properly on a daily basis, images produced by that equipment may be subject to challenge.

Written policies are a key element in achieving admissibility requirements for photographs in a court of law. Whether the mandates are called policies, procedures, directives, or anything else the importance lies in the fact that a department has written mandates to rely upon if evidence photographs are challenged in a court of law. Policy should dictate procedure from the time a medium is chosen to photographically document a crime scene to the time an image is presented in a court of law. And the main function of the policy should be to protect the integrity of the image along the way.

After examining the policies submitted for this study the author realized three major requirements essential to writing an effective set of standard operating procedures for digital imaging for law enforcement agencies. First, a thorough understanding of digital photographic technology must be applied to the naming of software, hardware, and imaging processes. Second, an understanding of legal requirements for evidence such as validity, reliability, authenticity, and admissibility in general must be integrated with concepts of the science of digital imaging processes. Third, basic grammatical structure needs to be implemented to convey clear and effective ideas. Along with attention to grammar, meticulous proofreading needs to be employed as the final step before issuance of policy.

Complete and accurate written policies focusing on digital imaging are a reliable foundation for witness testimony if they are adhered to. Written policies show a law enforcement agency's willingness to stand behind the technology they are using. " When they [policies] are not followed, or when there are no established policies or procedures, the witness is left to him or herself against a group of people who are paid to find fault, no matter how small or insignificant" (Blitzer, 2002, p. 13).

APPENDIX

Jean Youshefski
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Dear Chief

I am a graduate student at the University of North Dakota and have been an employee at the Grand Forks Police Department since 1991. I am a Community Service Officer.

I am currently working on my master's research study which involves the use of digital evidence photography at the local/municipal law enforcement level. I plan to examine policies and directives that apply to digital evidence photography from several departments in North Dakota, South Dakota and Minnesota. Throughout the research I will be looking at the ways the policies assure proper chain of custody and how they address court issues for evidence photography like discovery, authentication and relevance.

In order to conduct this research I need your help. Please send me the following by January 31, 2006:

1. A paper or electronic copy of all of your department's policies and directives that apply to both film and digital photography.

2. A short explanation of who wrote the policies and directives, and the basis for their contents—that is, how was it decided what to include in the policies.
3. A contact person with whom I can exchange information during the project, preferably the individual most responsible for the direction of photography within your department.

If you have questions, please feel free to contact me at the Grand Forks Police Department, 701-787-8000, or email me at **jeanski@gra.midco.net**. My advisor for this project is Dr. Lynda Kenney, University of North Dakota. Her contact information is 701.777.2197 or lynda.kenney@und.edu.

Thank you for your attention to this request. I really appreciate your assistance.

Sincerely,

Jean Youshefski
Graduate Student, University of North Dakota
Community Service Officer, Grand Forks Police Dept.

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