Working with Assault Victims

SOME OF THE TOPICS IN THIS ISSUE

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For the first 100 years in the history of friction-ridge technology, latent-print examiners were hunched over their desks, straining their eyeballs so they could compare fingerprint impressions. Various magnifying glasses—or loupes—were used to increase or decrease magnification, provide a wider field of view, or allow more illumination of the subject. Generally, a latent-print examiner would have one favorite loupe that helped him view the volumes of comparisons, some of which resulted in individualizations that required verification as part of the ACE-V process. The examiner would make identifying marks on the evidence and then forward the comparison to another examiner. The second examiner would then verify the first examination using his favorite method of comparison. The comparison process was also often slow and cumbersome, due to handling and transport of the physical evidence by both examiners.

Once the comparison was verified, marked, and reported, it was assumed that all were in agreement and the case materials were filed away without the verifying examiner having a clear understanding of what the initial examiner observed during the first comparison. The comparison process was also often slow and cumbersome, due to handling and transport of the physical evidence by both examiners.

Acquisition methods for known-print standards changed at the end of the 20th Century with the introduction of live-scan capture technology. The electronic capture and storage of fingerprint and palmprint records has made it possible to transmit and view these records on computer screens at remote locations. Utilizing digital-imaging technology, existing hard copies of known print cards and latent-print impressions may also be captured, transmitted, and viewed on computers. Digital records of latent and known impressions provide more forensic-examination options for the latent-print examiner.

It is no longer necessary for an examiner to physically handle the evidence or transport it to another examiner for verification. The other examiner can now be located in another office, city, state—or even a distant country—and that examiner can still accomplish the examination process with the exchange of digital images and reports.

A chance to finally get out of the loupe

A computer monitor—combined with contemporary software products such as Adobe Photoshop CS3, the Universal Latent Workstation (ULW), and other imaging and comparison products that are currently on the market—can now replace the common forensic magnifying loupe. Modern computers equipped with dual core processors and gigabytes of memory make it possible to process high-resolution images with large file sizes. The examiner is able to more effectively visualize third-level detail in latent impressions, make marks and notes on an image layer for explanation during verification, as well as record other important information in the image metadata—an information file that can be dynamically edited to contain information about an image.

In the last century, if an examiner wanted to demonstrate a comparison to another examiner, the process would involve capturing an image on film and performing the time-consuming process of developing film and printing enlargements. Both the latent and the known images could then be marked, possibly obscuring details and making it difficult to edit.

Today, with digital imaging technology, a latent-print examiner is able to perform an onscreen comparison that involves viewing the latent image on one monitor while sifting through numbers of known-print standards that are displayed on an adjacent monitor. The examiner no longer needs to pick up a loupe, scan a region of interest, put the loupe down…and continually repeat the process. When a possible candidate and focus area has been located, the examiner can quickly zoom in on the computer monitor to view the suspect region of the known print. If necessary, the image may be cropped to show a specific area of interest—such as a single finger or section of a palm—to facilitate the comparison process and reduce the file size.

Modern digital image-based comparison

In recent years, the police department in Lakewood, Colorado—a suburban area just west of Denver—has worked diligently to establish a smooth latent-print comparison workflow using the


LATENT PRINTS

The Lakewood PD’s workflow begins with the acquisition of digital fingerprint and palmprint images. A minimum laboratory standard of 1000 ppi is utilized for the capture of latent impressions and may be increased at capture by the examiner if more image clarity is desired. The live scan device captures standards at 500 ppi, transmits fingerprint standards to the state AFIS, and also transmits fingerprints plus palmprint standards to the AFIX Tracker in the laboratory.

The digital records in the AFIX Tracker system provide the opportunity to search latent fingerprints and palmprints. The examiner also gains access to an electronic database for onscreen comparisons with known suspects. The Electronic Fingerprint Transmission (EFT) records within the AFIX Tracker system can be accessed for comparison with the built-in Comparator software, or they can be exported and viewed with ULW or Photoshop. The EFT record contains each of the ten fingerprints, and either a segmented palm, full palm with joints, cropped palm, or the writer’s palm. The subject’s demographic information—such as date of birth, height, weight, and identification numbers—is also viewable with the ULW software. An AFIX Tracker latent search resulting in a possible identification may also be exported to the PC in the latent-print examiner’s office.

The latent-print examiner can compare the latent print and known print side-by-side on one monitor screen or, if more desktop area is required, the viewing canvas can be spread across two adjacent computer monitors. The process would be similar to folding the latent lift card and placing it next to the known impression under a magnifying loupe; however, the computer monitor provides more viewing options and less strain on the eyes and the body of the examiner. Depending on which software is being utilized for comparison, minutiae may be marked to demonstrate what the examiner observed in order to render an opinion of a friction-ridge individualization.

If the examiner is using Photoshop for the comparison process, layers can be added for the minutiae markers of the traditional Galton points, such as ending ridges, bifurcations and dots, and also the marking of third level details. The Brush and Pencil tools in Photoshop, along with choices of different colors, can be used to mark minutiae of good clarity, minutiae of questionable clarity, third-level detail, and possible red flags within a latent print. Notes can also be applied to the image to record the opinion of the examiner about a detail for future reference or to provide an explanation to another examiner. The marking of the images and metadata notations are treated as case notes documenting the examination process.

If the comparison requires consultation with another examiner, the images of the latent and known prints can be provided for simultaneous discussion by both examiners, either in person or over the phone. Unbiased verification may be achieved by providing a full set of digital known standards and latent-print images, all of which are unmarked and do not contain individualization information. Layers in the marked images can also be turned off during verification and turned on to show that minutiae confirming the individualization were similarly marked by one or more of the verifying examiners.

Development of the process

The development of the digital image-based comparison process at Lakewood PD began with the need to exchange comparison images and to share the services of an IAI Certified Latent Print Examiner (CLPE) with another agency that was an hour’s drive from Lakewood. Comparison verification was performed with a combination of ULW and Photoshop in conjunction with telephone and e-mail conversations. Although not yet implemented at Lakewood PD, the introduction of business-oriented software such as Microsoft Office Live Workspace or Citrix GoToMeeting lets the examiners share their desktops and provide a live demonstration of the comparison process, all of which makes sharing of services even more practical. Examiners will no longer be tied to the office to process comparisons, and the availability of qualified personnel increases laboratory capabilities. A majority of the digital-image-based latent-print comparisons performed in the laboratory are processed using Photoshop. To research better methods for the digital comparison process, the Lakewood PD acquired Photoshop CS3 for Forensics Professionals: A Complete Digital Imaging Course for Investigators, a book written by George Reis and published by Wiley Publishing in 2007. The book aided in establishing a file-management and image-processing system. The Adobe Bridge application is included in the CS3 software package and is a primary tool in the digital-image latent-comparison process. An “Active Casework” folder is created for each new case being worked by the latent-print examiner and all of the images for that case are temporarily stored until the casework is completed. Within the Adobe Bridge software, the images may be previewed at various canvas sizes, a zoom function is available to preview individual minutiae, and metadata may be viewed and edited. Guidelines that were established by the Scientific Working Group on Fingerprint Analysis (SWGFAST) and the Scientific Working Group on Imaging Technology (SWGII) were also used as a reference to establish protocols for the digital-image-based comparison process.

Reporting comparison results

When a latent-print examiner has completed the comparison process and is ready to report the results, the individualization information—along with a description of evidence, examiner’s electronic signature, and date of examination—may be recorded in the image metadata. To generate a laboratory report and minimize repetitive word processing, the information in the metadata is copied and pasted into the examiner’s report. Once completed, the initial examiner sends a draft of the report to the verifying examiner along with notification of images that need to be viewed. The verifying examiner is able to view unmarked images of the latent and known prints, marked images of both, and any other supporting images or documentation that the initial examiner has included in the casework folder. The layers in the marked image may be turned off if necessary, or the verifying examiner may add another layer to point out details within the image that require further discussion, along with additional
Latent Prints

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captured—such as ninhydrin-developed prints on a document—the supervisor is able to examine the level of quality of the print using the digital-image review. Since the examiners are marking the minutiae they use in rendering an opinion of individualization, the supervisor is also able to have a much better understanding of the comparison ability of the examiners.

Court presentation

The use of digital imaging enhances the capabilities for court presentation. In the event that the casework is to be reviewed by the prosecuting attorney or a defense expert, the images are readily available for viewing or they can be copied with relative ease onto a transportable medium. The digital images can also be included in a PowerPoint presentation for use in hearings or during courtroom testimony.

Automatic Fingerprint Identification Systems

The goal of the digital-imaging process is to scan a print once and use the images for a variety of purposes.

Notes if needed. In most cases, the image metadata of the unmarked latent image is appended with the electronic signature of the verifying examiner; the draft report is signed electronically and sent on to the laboratory supervisor for final approval. After approving the laboratory report, the supervisor moves the casework images to the archive folder on the laboratory-imaging server.

The system hardware configuration

The Latent Print Archive Server is a 3TB NAS storage with RAID 5 rack-mounted appliance. Access to the server is limited to the latent-print examiners, who have restricted permissions, and to the supervisor, who has administrative permissions. Once the supervisor moves an original image to the archive on the server, the examiners are only able to work on copies of the image. Each of the latent-print examiners and the supervisor are provided with latent-print workstations consisting of a mini-tower with an Intel Core 2 Duo processor, 4 GB RAM, a second hard drive for scratch memory, dual 20-inch flat-panel monitors, 16x DVD+/−RW and 16x DVD drives, media and USB ports, Windows XP, the Microsoft Office suite, Adobe Photoshop CS3, ULW software, and Epson scanners. If any images need to be printed for court or other purposes, the system is equipped with network printers that include an Epson Stylus Photo R2400 printer or Noritsu DDP-421 digital dry printer.

Advantages of the system for the supervisor

The digital-image-based latent comparison process is a definite advantage for the latent-print supervisor, as it provides readily available examples of the latent evaluation and comparison work being performed daily by the examiners. The CLPE supervisor is able to serve as the first or second verifier, review the case to render a decision on any differences between examiners’ opinions, and—most importantly—review the casework images before they are moved to the archive or, if necessary, review past cases for employee evaluations. If an image of the entire piece of evidence is captured—such as ninhydrin-developed prints on a document—the supervisor is able to examine the level of quality of the print using the digital-image review. Since the examiners are marking the minutiae they use in rendering an opinion of individualization, the supervisor is also able to have a much better understanding of the comparison ability of the examiners.

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The Lakewood PD currently has three varieties of AFIS that are used regularly. The Colorado Bureau of Investigation’s state AFIS is an older Sagem Morpho system and is due for replacement. This system is not currently compatible with digital processes and requires that the images be printed prior to entry. The Lakewood PD’s current local AFIS is an AFIX Tracker system from AFIX Technologies. The AFIX Tracker receives livescan fingerprint and palmprint records from the Lakewood PD booking facilities, as well as inked standards that are scanned into the database when necessary. The AFIX Tracker system provides the opportunity to access the databases of other departments across the country that have an AFIX Tracker system and agree to be part of a remote-searching network. The newly formed Denver metro area AFIX remote-search network expands the capability of searching palm latents, which cannot be searched in the current state database. As a third option for AFIS searching, Lakewood PD has an Internet-based FBI IAFIS connection accessible through Law Enforcement Online (LEO) and the Joint Automated Booking System (JABS). An IAFIS search expands the fingerprint-search capabilities to the national database, as well as providing access to digital known-print standards for digital image-based latent comparison. The IAFIS access has proved valuable in solving cases involving transient suspects who regularly cross state lines, as well as identifying unknown deceased subjects.

Digital-imaging processes have been evolving over time at Lakewood PD and the personnel there will continue to adapt as the technology progresses. Wireless technology and portable computers will make it possible to expand the work location of the latent-print examiner. No longer tied to an office environment, the latent-print examiner can work directly at a crime scene, in hotel room, or at other remote locations. The latent-print examiners and the supervisor will continue to explore the capabilities of the system and find new ways to access and utilize the digital fingerprint data.

About the Authors

Gregory Eilers is the supervisor of the Lakewood (Colorado) Police Department Criminalistics Forensic Identification Team. He is a Certified Latent Print Examiner and Certified Senior Crime Scene Analyst with 25 years of experience working in latent prints and crime-scene investigation. He can be reached by e-mail:

greil@lakewoodco.org

Robert Patterson is a latent-print examiner at the Lakewood (Colorado) Police Department. He is a Certified Latent Print Examiner with 13 years of experience in latent prints and crime-scene investigation. He can be reached by e-mail:

robpat@lakewoodco.org

Jonathon Markham-Gallegos is a latent-print examiner at the Lakewood (Colorado) Police Department. He is a Certified Senior Crime Scene Analyst with nine years of experience in latent prints and crime-scene investigation. He can be reached by e-mail:

jongal@lakewoodco.org