The human element that supports Automated Fingerprint Identification Systems

An exclusive *Evidence Technology Magazine* interview with

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In recent years, there has been a major advance in the technology of both the hardware and the software that serve the law-enforcement community's Automated Fingerprint Identification System (AFIS). As the system gets more sophisticated, some people question whether we are unknowingly downgrading the importance of the human element in the matching of prints and the identification of perpetrators. We posed this question to Peter D. Komarinski, a noted AFIS specialist and the author of a recently published book that focuses specifically on AFIS systems.

KOMARINSKI: In my opinion, the latent-print application of AFIS systems is even more intriguing than the ten-print application. I'm a big fan of latent-print work. I admire people who are able to go through and look at these images and say, "Yes, this belongs to the person in question." And they are able to do it with absolute confidence.

EVIDENCE TECHNOLOGY: *What is the biggest advantage of AFIS systems as it exist today?*

KOMARINSKI: What makes the AFIS systems so particularly useful for latent-print examiners is that they are no longer limited to just the cards that are available within their jurisdiction from previous arrests or eliminatin prints. In the past, the latent-print section had fingerprint cards of persons who had

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been arrested for—let's say—burglary in their community. And if there was a subsequent burglary, they would go through those cards and compare the latent-prints found at the crime scene against the known burglars—or other felons—in their jurisdiction. The process was very limited. It required a lot of manual work, going slowly through the cards and comparing a latent against the images on the cards.

EVIDENCE TECHNOLOGY: *But AFIS has changed all of that…*

KOMARINSKI: Right. With an AFIS system, you are no longer limited to just those cards in your community. You can have access to computerized records from your community, as well as from other communities. Some states have a statewide database where latent-print examiners from anywhere in the state can search the entire database. That's what we have here in New York. So if a person is arrested in the New York metro area, or in Buffalo, or in Albany—or wherever—if they have a criminal record within New York State, that record can be searched by latent-print examiners anywhere. After all, the perpetrator they're looking for may not be from their own community, but from another area.

EVIDENCE TECHNOLOGY: *But does this present any problems?*

KOMARINSKI: Some. One problem that it presents for examiners is that with so many potential candidates, they may be looking at a lot of records before they feel confident that they have positively identified the perpetrator. In the past, when you had those situations, you only had a limited number of cards— and you could just go to those cards, look at them, and say Yes or No. You had a very small database. But an AFIS system can search literally millions of images and present a list of candidates based on a probability score from the system. It is basically saying that these are the people whose minutiae points— and any other characteristics the latent-print examiner chooses to include—

A brief look at Peter D. Komarinski's background and experience

Peter D. Komarinski began his career more than 30 years ago. He graduated from Wheeling Jesuit University with a BA in Psychology and from the State University of New York at Albany with a MA in Criminal Justice. During his career he has served in a variety of positions, including the McKay Commission which investigated the Attica Prison Uprising. He was a research analyst with a medium-sized police department; a criminal-justice program analyst for a regional planning commission; a research analyst for a state correctional oversight agency; and a research specialist for the state criminal-justice planning agency. He retired from New York State Division of Criminal Justice Services

after fifteen years as a manager of the Statewide Automated Fingerprint Identification System (SAFIS). Komarinski has written extensively. He is the author of *Automated Fingerprint Identification Systems (AFIS)* published by Elsevier Academic Press. He is a regular presenter and lecturer at the annual Educational Conference of the International Association for Identification (IAI). He is also the Chair of the AFIS Committee of the IAI. He is the principal consultant of Komarinski & Associates, LLC, a biometric consulting firm that is located in Rotterdam, New York. Komarinski may be reached by e-mail at the following address: **peter.komarinski@gmail.com**.

most closely match the images in the database. After that, it is up to the latent-print examiner to use his or her skill and training to carefully check the list of candidates and either make the identification or dismiss it as a non-identification. When they have a match, they have their opinion confirmed by another latent-print examiner. In many cases, these final identifications are made using a ten-print record and comparing it with a latent print found at the scene. They don't always rely entirely on what they see in the side-by-side comparison on the screen.

EVIDENCE TECHNOLOGY: *What are some of the big issues that are facing latent-print examiners today?*

KOMARINSKI: There are a number of issues facing them. One of the major ones is that the findings of latent-print examiners are no longer being accepted at face value. Increasingly, their findings are are being challenged in court—mainly because the defense attorneys want to ensure that the person who has been identified by the latent-print examiner has been identified by someone who has the qualifications, skills, and training to make such a positive determination.

EVIDENCE TECHNOLOGY: *Yes, there has been a lot of talk about that…*

KOMARINSKI: Another issue that is emerging has to do with a drain on the personnel level.

EVIDENCE TECHNOLOGY: *What do you mean? A drain in what way?*

KOMARINSKI: Agencies that used to produce ten-print examiners who went on to become experienced latent-print examiners are not hiring as many people today to fill those functions. Why? Because many of those functions have been replaced by AFIS systems. You don't need as many examiners walking around, checking a physical ten-print record against a physical latent-finger-print card that's in a physical database —not if you can do the same thing on the screen of an electronic computer. As AFIS systems have become more powerful and more versatile, there has been an increasing reliance on those systems—and on the vendors of those AFIS systems—to provide both the technology and the direction for the

> **Even though some people think of AFIS systems as being totally independent electronic systems, the truth is just the opposite: These systems are totally dependent on people.**

systems. As a result, many agencies face the possibility of losing skilled staff over a period of time. Just five years from now, there may be a serious shortage of latent-print examiners.

EVIDENCE TECHNOLOGY: *Are there any other serious issues?*

KOMARINSKI: There are those people in management positions at police departments who may have been swayed by the popular media into thinking that AFIS systems are making the identifications in latent-print work. But I am not aware of anyone who actually does the work with latent prints who allows the AFIS system to make the identification. The AFIS system goes through the files and sorts out the possible candidates—but it is really the latent-print examiner who makes the final identification through training, experience, and skill. Even though some people may think of AFIS systems as being totally independent electronic systems, the truth is just the opposite: These systems are totally dependent on people.

EVIDENCE TECHNOLOGY: *Totally?*

KOMARINSKI: Let me explain. First: Latent-print identification in particular is a people process. It is a human who first captures the ten finger impressions on either a livescan device or a ten-print card. If that person does not take the time or have the diligence to do a complete nail-to-nail roll, then the opportunity for capturing the optimum amount of information on that finger image is simply lost—perhaps, forever. Second: It requires people to maintain the AFIS system. It requires people to

look for possible advances that could be developing in the system —advances in terms of better matching technology, or in the expansion of the size of the database to include new populations, or in upgrades that could permit a faster turnaround, or links that could provide better interaction with other agencies. Those things are people decisions. And when it comes to the actual latent-print identification, that is also a people-oriented process. A person looks at the potential match and says, "Yes, this is in fact a match." Or the person says, "No, this is not a match." Quite frankly, AFIS doesn't do that.

EVIDENCE TECHNOLOGY: *You're right.*

KOMARINSKI: There are some other interesting challenges confronting AFIS systems. One of the major ones is interoperability—or the lack of it.

EVIDENCE TECHNOLOGY: *What did you call it? "Interoperability?"*

KOMARINSKI: Yes. Let me give you an example. If you want to withdraw money from your bank account, you can go to any ATM machine, put in your card, enter your PIN number— and the money pops out, debited from your account. These different financial systems communicate seamlessly. And that's what I call "interoperability."

EVIDENCE TECHNOLOGY: *Okay. How does that apply to AFIS systems?*

KOMARINSKI: But that kind of inter-operability does not exist—either in a vertical or a horizontal mode—within the identification community. By ver-tically, I mean it is not easy for a local law-enforcement agency to search a local AFIS database, then to move up to search a state database, and then to move up to search a federal database. Nor is it easy for the federal databases to interact with each other. These AFIS systems were developed years ago independently—although there have been efforts in recent years to make them more interoperable. Nevertheless, for most local and state agencies, the ability to search multiple databases from one location is extremely limited. It is possible, of course, to put a latent-print photo in the mail and send it to someone—or perhaps even send it

electronically. But the reality is it's a very limited process in terms of what you can search and how easily you can do that search.

EVIDENCE TECHNOLOGY: *You are talking about sending files from one agency to another, right?*

KOMARINSKI: Yes. From one agency to another. Let's say, for example, you are sending a file from your local agency up to the state agency and then up to the FBI. And then from the FBI over to Homeland Security and from there to Immigration. There's a problem with interoperability, both vertically and then horizontally. That, to me, is a serious problem.

EVIDENCE TECHNOLOGY: *Do we need an AFIS World-Wide Web…?*

KOMARINSKI: What we need is the political will to make it happen. One of the reasons why AFIS systems began to develop in the first place is that the FBI recognized that it needed the ability to go through and process more quickly the number of inquiries that it was receiving both in criminal and civil cases—but primarily criminal. The backlog was increasing. To respond to that growing need, they built IAFIS—the Integrated Automated Fingerprint Identification System. At the same time, Congress approved funding for the NCHIP—National Criminal History Improvement Program—where millions of dollars were provided to state and local governments to improve their criminal-history systems. Those systems, by and large, developed into what we know today as AFIS systems. There was a large increase in both the technology that was available, as well as the number of people who were involved in the AFIS business. Those involved were from both the public sector—the local, state, and federal governments—as well as the private sector—the vendors of the hardware and software. All of these things are developing better and better. But there still is not that interoperability that is needed.

EVIDENCE TECHNOLOGY: *So where are we going in the future? Is anyone moving forward to help solve this interoperability problem?*

KOMARINSKI: Sure. A lot of people are working on it. We will eventually get there. Once again: I think it's a matter of the political will—and the dollars—to make these things happen. Not a week goes by that you don't see a reference to the need for interoperability. And, of course, after 9-11, there was a great deal of interest in interoperability when it was recognized that the kind of information exchange that people thought existed did not exist. But, here we are, a couple of years later, and we still don't see that kind of interoperability. We still don't see what amounts to a national standard for AFIS systems that would require them to be more interoperable. That could only come with additional funding from the government.

EVIDENCE TECHNOLOGY: *Are there any other changes coming?*

KOMARINSKI: Well, there is more technology coming down the line to support the AFIS system. For example:

There are photographic software and hardware items that will enable the latent-print examiner to mask a background or mask a pattern or mask another print that overlays the print image that they're looking for. They're not adding anything to the latent-print image. What they're doing is subtracting items from the back of it to make it appear more visible. Of course, you are going to need training and special knowledge and good record-keeping procedures in order to explain in court how you got from that smudged image to the good print image that you're using as evidence. All of those things require that the latent-print examiner have additional skills that weren't required of them just a few years ago. They have to be not only good latent-print examiners, but they also have to understand the nuances of the AFIS system in order to get the best candidates out of the system. That's a big jump from 20 years ago, when you might have just gone through 100 or so cards and said, "No, the image isn't in there from the list of felons in our community."

EVIDENCE TECHNOLOGY: *Do you see a shortage of latent-print examiners developing? Is the AFIS technology in some way causing a reduction in the number of personnel who are working in crime-scene units?*

> **AFIS systems do require upgrades and maintenance. Everything has a lifetime. If you want to have an effective AFIS system, you should consider it a long-term relationship with hardware, software …and personnel.**

KOMARINSKI: I'm not sure that all police-department managers fully understand the true impact of the AFIS system. What the system does is to automate the identification process. It can make it faster. It can make it more accurate. But the speed and accuracy of the AFIS system doesn't mean that you can minimize the importance of the people who really implement the system. The managers must understand that they're still going to need people with unique skills: latent-print examiners, computer experts, communications people. And they are also going to have to make an investment to continue those job positions as their latent-print examiners retire. Unless a department has a good succession plan where people are coming though

and being trained to fill the positions of the senior people as they retire—well, that department could end up with an absolutely fantastic AFIS system that nobody can use.

EVIDENCE TECHNOLOGY: *How about the future of AFIS systems?*

KOMARINSKI: AFIS systems started out working mainly on finger images to make identifications. But recently, some of the programs have been getting into palmprints, as well. So during the booking process, officers will start capturing palmprints, along with the fingerprints and the mug shot. The availability of palmprints in the database will be a big change. Popular opinion is that as many as 30 to 35 percent of crime scenes contain some portion of a latent palmprint—either the so-called "writer's palm" or the full palm-print itself. As agencies begin to capture palmprints at booking, there will be an increase in the size of the database to be searched. Let's say the database grows by 40 percent. That does not necessarily mean that the examiners are going to make 40 percent more identifications. What they may find is that they are making the same number of identifications as they had in the past, but there will be identifications from palmprints as well as from fingerprints. A 40-percent increase

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in the size of the database to search, without a corresponding increase in something else—whether it's the speed of the search or the number of latent-print examiners that you have—will not necessarily guarantee an over-all increase in your number of identifications. It just gives you a bigger database to search.

EVIDENCE TECHNOLOGY: *What about the hardware and software that make up an AFIS system?*

KOMARINSKI: That is also an important point. The AFIS system does require upgrades and maintenance. Every component requires maintenance, including the monitors and the printers. You don't just buy these things once and expect them to last forever. It's like any other piece of hardware or software. There are improvements or upgrades that come out periodically. The agencies that are able to embrace these improvements and upgrades find that they have a better chance of making the identification than those who don't. So, once you buy into the AFIS system, you're looking at a long-term relationship and a long-term pattern of expense in terms of hardware and software—as well as personnel—if you want to have a really effective system.

EVIDENCE TECHNOLOGY: *The software upgrades can make a difference…*

KOMARINSKI: Absolutely. There are a lot of opportunities when systems are improved—such as new coders, new matchers, new enhancements to the systems—where cases that were not able to be solved at some point in the past can be searched again on the new or upgraded system and identifications can be made. That, to me, is one of the important things about AFIS systems. Managers should look at them and think about different ways that they can use these systems with the staff and the technology that they have available. They may want to take another look at their business practices and ask, "Is the way that we've been doing it for the past couple years still the best way to do it?" As I said before, this really is a people process. I truly believe it is.

EVIDENCE TECHNOLOGY: *Thank you for speaking with us today.* ⦿
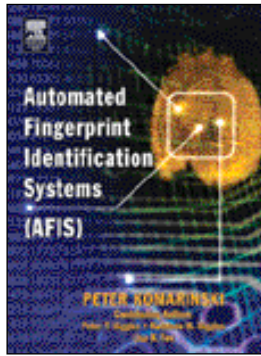
Peter D. Komarinski is the primary author of an in-depth study of AFIS which is appropriately entitled **Automated Fingerprint Identification Systems (AFIS)**. *The book covers a wide range of topics, including both praise and criticisms of the system and discussions about how it might evolve in the future. The book is published by Elsevier Academic Press. For more information about the book—or to learn how you can obtain a copy—go to the publisher's website:* **http://books.elsevier.com/forensics**.