



The Evolution of Public Safety Training: How Public-Private Partnerships Can Assist

By: Alina Burroughs, Sr. Business Development Manager for Public Safety, FARO® Technologies, Inc.

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Knowing is not enough; we must apply. Willing is not enough; we must do.
—Johann Wolfgang von Goethe, German poet, 1749-1832.

In the long history of public safety — and the requisite training that comes with it — von Goethe’s words continue to resonate: abstract knowledge is not enough. Public safety professionals must apply their training in skillful, pragmatic ways.

From the earliest informal (and largely volunteer) groups of people charged by kings and local authorities with keeping the public safe, to the first municipal police departments in the UK and the United States centuries later, to today’s sophisticated interplay between public and private organizations, each varying in size, budget, jurisdiction and scope, it was clear from the beginning that only an adequately trained protective force would be an effective one.

And that training would need to evolve concurrently as technology advanced and as a more nuanced understanding of crime scene investigation began to take shape. Because without the necessary skills of documenting a scene, without the codified rules related to evidence gathering and the handling of physical materials, and without the ability to preserve and if necessary share that data at a later date (with other agencies, colleagues or courts), a key component of public safety would be lacking.

After all, keeping people safe requires the uneasy recognition that perfection is impossible. Crimes will *always* take place. People *will* be injured. People *will* die, through

negligence or intent, at the hands of others. At its core, crime scene investigation is about *learning* from these unfortunate acts and ultimately, holding criminals accountable for their actions while providing some measure of closure/resolution to next of kin and loved ones.

Today there are multiple factors impacting how investigative training takes place — both at the academic level and at agencies and departments around the world. Faced with the mass retirement of the baby boom generation (peak baby boom [birth years](#) in the US were 1957 and 1961, respectively, and individuals born in those years will turn 65 in 2022 and 2026) and a loss of legacy institutional knowledge, what’s the solution?

While crystal balls are in short supply and their prognostications dubious, what is clear is that training the next generation of CSI professionals is more than just teaching them about how to operate a laser scanner, a 360° camera or more traditional equipment. And it’s more than instructing them on proper evidence collection and handling. Rather, it’s a constellation of teaching that includes the integration of both old and new schools of thought as well as a fundamental rethink in how law enforcement communicates with the public. The good news is that it’s the type of training that can begin right now via enhanced public-private institutional partnerships.

From Tape Measures and Compasses to 3D Laser Scanning

By cementing robust relationships between academia and the private sector, younger millennials now in graduate programs and generation Z (those born from 1997 onward) will have the opportunity to learn from in-field experts on a variety of topics. In a growing number of cases, aspiring crime scene investigators will test the latest equipment in real-world simulations at forensic anthropology centers known colloquially as “body farms,” places of learning that have been evolving in their own right since the first centers of their kind opened in 1987. Not only that, but field experts will also be directly involved in curriculum creation in these graduate-level courses.

Prior to these developments and as recently as the early 2000s, forensic science and its academic application were, for all intents and purposes, practically prehistoric.

When I started my career, for instance, crime scene investigation was chiefly paper and pen-based, writing things down on notepads. I used a compass, because everything on scene had to be manually oriented relative to true north. Part of our routine was patting down our battle dress uniform pants to make sure we had all our physical gear. Fast forward to 2015. By the time I retired from law enforcement, I had a smartphone in my pocket. I didn't have a compass anymore — I opened my compass app.

Beyond bringing along a physical compass, pen and paper, film was among the most important gear. That — and a shoebox stocked with extra rolls of 12, 24 and 36 exposures each. Fujifilm, black and white (for comparison photography) and color film was standard. Because one of the worst things that could happen on-scene at the time was running out of film and having to go back to the office/station or radioing a colleague to bring more out to the field.

Pens and paper aside, data capture itself was profoundly basic. Sketches were drawn by

Contrary to popular belief these all-too-human snags were commonplace and could slow down the investigative process, exposing a scene to more degradation via natural and human-made elements — wind, rain, snow, traffic — and delay law enforcement's ability to keep pace with their caseload.

hand and investigators traced around simple body diagram templates to fill in the details of their particular case, even relying on plastic templates of small cars to complete their diagrams.

Today, much has changed.



Even if 3D laser scanning didn't exist, digital photography alone has had a revolutionary impact for on-scene information gathering and the training that goes along with the technology. No longer must field investigators worry about running out of film. SD cards have storage capacities in the 1-2 TB range. What's more, digital software has made pen-and-paper diagrams nearly obsolete. Plus, the visual effects software users can introduce are approaching Hollywood-like sophistication, including weather and even the position of the sun.

Perhaps most interesting is that much of the old-school (and presumably new-school) training, still comes up short. Much of what is learned today comes from institutional knowledge passed down from one generation to the next, more like an agency-wide apprenticeship versus degreed students adding their newly acquired skills to the institutional mix.

While some of that informal baton passing is a boost for morale and good for camaraderie, it becomes problematic on two grounds, both of which public safety professionals are facing today:

1. The increasing inability (or unwillingness based on their own skepticism and familiarity with older technology and traditional ways of doing things) for the previous generation to pass on the newest, most up-to-date knowledge and training, specifically as it relates to software, cloud-based networks and 3D laser scanning technology.
2. The rapid retirement of the baby boom generation — a process the COVID-19 pandemic accelerated as many people in that age group have had enough stress and anxiety associated with the virus, its ongoing mutations, and related work-life curtailments.

And while health care may have been the most impacted as it relates to the second bullet, public safety wasn't far behind.

Overall, in the third quarter of 2020, nearly 30 million boomers gave their two-week notices, (according to [Pew Research](#)) as part of a broader trend many are calling the "great resignation." As the world's health care systems strained under the pressure of rapid infection, many police departments also bore a unique burden, too. Around the world, many nations saw an uptick in violence after initial lockdowns were lifted. Economic hardship, increased drug use and poverty all were causal factors. That combination, along with boomers being the most at-risk group for illness and death, was in some sense the final straw; it was yet another catalyst for many to reexamine their work-life balance and conclude the time had come to opt out.

With this professional hole growing and a generational skills gap widening, the need to replace older employees with younger talent has grown even more acute.

The Power of Public-Private Partnerships



One of the best ways to combat these challenges is by partnering with academic institutions at the graduate level, as doing so will help today's students learn the skills they need to join the CSI workforce as effective investigators on day one, not having to rely on diminishing old guard institutional support.

Recently, FARO® did just that. In 2021, the technology leader lent Virginia-based George Mason University \$300,000 of equipment for use by students training in state-of-the-art forensic science technology. In addition to that, students will also have the opportunity to work with law enforcement partners such the George Mason University Police, Fairfax County Police, Fairfax City Police and others, including the U.S. Army. Meanwhile, much of the research will be conducted at George Mason's new five-acre Forensic Science Research and Training Laboratory in Manassas (a "body farm") that is one of just eight such facilities in the world capable of outdoor research in forensic science using human remains, according to a September 2021 [press release](#).

Beyond simply lending equipment, however, FARO has grander designs to draw up an actual course curriculum. While details still need to be ironed out, a new course is slated for 2022 and will be offered to some 14 students per class.

“Mason is the perfect location for FARO because of the proximity to the Metro DC area and the established relationship with local, state, and federal law enforcement as well as private labs,” says Michelle Edwards, FARO’s Director of Global Applications Engineering and Training and who has extensive experience training others on 3D laser scanning. “We additionally see many opportunities to train investigators from the military, the FBI, and even the Mason law school. The course will be called “3D Documentation” and will teach students how to use laser scanners and software for crime scene documentation. The end result will be the opportunity for students to achieve certification through FARO.”

At this preliminary stage, a draft curriculum would cover topics from laser scanning theory through practical applications in the crime scene world — including using drone data — all the way to providing court testimony and creating agency policy.

It all comes down to identifying the challenges and opportunities that exist. Because even if new partnerships are forged between technology companies and private colleges, there’s still the related challenge of encouraging existing police departments and courts to utilize the revolutionary technology that’s being taught in those schools.

For many organizations, cost is only one part of the equation. As noted above, institutional inertia is real. And at least for the moment there’s sound logic behind a police department’s desire to hold out. If an agency is staffed, for instance, with investigators more comfortable working with older technology and they’re obtaining quality data from that technology, a cost-benefit analysis will likely confirm that in the short term, conversion costs could be high — even as the agency in question undergoes that workforce transition.



In other words: Change. Is. Scary.

Perhaps surprisingly, it’s the smaller stations that are quicker to adopt 3D laser scanning and related technologies. With a smaller organization, information flow tends to be less bureaucratized. There’s also less overhead and lower pension/retirement costs. This means that if there’s an infusion of unexpected funds (through local budget passage or ordinance) or a redistributing of city monies from one agency to another, it can more easily go toward new purchases and new in-department training opportunities.

In either scenario — large department or small, courtroom or classroom — the best way to grease the product adoption wheel is to market new technologies based on their *effective-use* compared to what was used in the past.

“Describing a scene to the triers of fact, the jurors, with photographs from a fixed perspective, and 2-dimensional diagrams, is an incredibly difficult task,” adds Noreen Charlton, a FARO Field Applications Engineer with extensive experience in public safety and forensics. “They get lost in all the descriptions: to the north of, next to, east of, etc. With 3D laser scanning, there are no more fixed perspectives or trying to overlap photographs to achieve a similar view had by an officer, subject or witness.”



“I have spent hours in court describing scenes in thousands of photographs, desperately trying to get a jury to visualize 3D spaces in their mind, by piecing together these individual images,” Charlton continues. “The CSI effect is real, especially in the courtroom, and 3D laser technology fills the need for the public to see more and feel like they have the whole picture. It provides the fulfillment for that desired CSI effect, as a juror can become fully immersed in the scene and navigate through it as if they were present that day, standing next to the investigator, by way of fly-thru videos and virtual reality. These courtroom presentations provide clarity and very quickly become collective ‘ah ha’ moments.”

The Future of CSI Training and the Great Data Deluge

A final point that must be emphasized is the pressing need to train for and teach about data security, cloud-based computing, and managing the newly emerging “civilian cop,” — men and women who possess off-the-shelf technological capabilities to potentially assist — or derail — an active investigation.

In some sense, it’s a concern that brings an article like this full circle. If a dearth of data was the chief challenge decades ago, when investigators were wholly reliant on analog collection methods, today the challenge out in the field is just the opposite — there’s almost too much data to handle. A 3D laser scanner can capture a scene in a matter of minutes and a compatible software can process the data, but humans can still draw conclusions and introduce unconscious bias despite the

mitigating effects of computer-rendered analysis.

More troublesome is that agenda-driven civilian actors can complicate eyewitness accounts, introducing bias with intent. Even officials and company employees, both in the US and abroad, have been known to doctor data in what’s called “forensic fraud.” Several years after Hurricane Sandy battered the mid-Atlantic and New England coast, there were [growing reports](#) that “rogue actors” had doctored engineering reports, providing cover for insurance companies to reject payout claims. Considering the level of physical and emotional destruction left in that storm’s wake, an anecdote like this on what will be the storm’s tenth anniversary later this year, stands as proof that criminals aren’t always lurking on-scene and that unscrupulous actors can be peppered throughout an investigation.

Learning how to screen, evaluate and properly train for this enhanced noise-to-signal ratio will be even more important in the years ahead.

For now, in the age of social media, in the age where large-scale data breaches are common, transparency is key — as is agency-based social responsibility. That is, teaching both departments and students alike the value of better communication with the public. Such training is far removed from a simple technology review checklist. It’s a fundamental rethink in how law enforcement, in all its iterations, must interact with and engage the community they serve. That’s true not only in the United States, but around the world.

“In a time where people question the integrity of visual data due to things like deep fakes and Photoshop, it’s comforting to know companies ensure the integrity of customer data through features like hashing, which generates a unique fingerprint for each data set at the point of capture and can be used for verification,” says Matt Stockham, FARO Principal Security Architect.

While a feature like this won't fully eliminate intentional or unintentional bias, it's at least a healthy start. And it's something that can — and will — be trained on when the next generation of CSI students complete advanced forensic science training courses like the one discussed.

Is Your CSI Training on Track?

CSI training, from proper equipment usage and forensic documentation, to eliminating human bias, is a multifaceted process. Public-private partnerships that help shape in-classroom curriculum and in-field simulations is one solution driving systemic change.

But even without such partnerships, agencies and departments alike can begin their own internal conversations about their CSI training now. At stake is nothing less than the public trust to which law enforcement takes an oath to uphold.

Here are five steps your agency or department should be doing right now to bring your data collection and analysis and its conversion into compelling unbiased accounts into the 21st century:

Evaluate your process...

1 For obtaining measurements

Ask yourself questions like: Does the process you use offer known error rates? Do you have the ability to obtain additional measurements without returning to the scene? What does the solution you use offer you in the future if the case goes cold? Can you "revisit" the scene virtually and make additional observations from the data?

If you woke up tomorrow and found your agency at the center of a high-profile case, would you be prepared and proud of how you'd respond and how you'd represent your community? Does the data you currently have protect your agency and your officers in the age of complete transparency and accountability? Can you incorporate other data, drone data, body camera footage, etc., into your existing process to corroborate or refute witness statements?

2 For training your team and maintaining proficiency

Are you playing telephone with your learning by transferring knowledge informally through a "hand me down" process? What vital information is lost through this method and are you prepared for the time those who possess the knowledge move on? Do you have a formal process or a manufacturer certification which can aid investigators when testifying in court? Do you have set standards to meet through ISO or other compliance outlets?

3 For data analysis

Do you have software available that is backed with validations, white papers and scientific research, which can assist in accurate analysis of data to make a determination of what events occurred in the crime? Does the method you use provide a value to your agency in the form of time savings, officer safety, cases won or justice served through the presentation of precise data and fact backed assertions?

4 For data storage and sharing

Is the data you collect stored in a secure way that will be readily available over time and easily accessible by the right people when they need it? The power of data lies not in the holding on to it, but in the sharing of the information to the people that need it. Communication is key in solving cases and facilitating justice.

5**For interpreting and translating the data for others**

Data collection is HALF the job. We must translate the story for the people tasked with making important decisions — judges, jurors and key players in the judicial system. Do you have tools to present the data in a way that tells the true story? The job of the investigator is not done when the scene is cleared, but when the facts of the evidence are transmitted to the jury — and many times we need demonstrative aids to assist with this task. We are better equipped now more than ever to do this with 3D data, virtual fly-through videos, witness perspectives, and more. You don't have to jump to virtual reality — but you can take steps in that direction. How you present your case speaks volumes to the jury. You wouldn't testify in shorts and a T-shirt. Why would you present your data informally with a hand drawn sketch?

About the author:

Alina has a Master of Science Degree in Criminal Justice from the University of Central Florida where she graduated with Honors from the National Criminal Justice Honors Society and the American Criminal Justice Association. During her 21-year career in the law enforcement arena she spent 12 years as a Crime Scene Investigator, obtaining the qualification as a Certified Senior Crime Scene Analyst with the International Association for Identification. She has spent many of those years as an instructor of forensic science and technology topics and has received recognition from the Federal Bureau of Investigation and the Orange County Sheriff's Office for investigative skills and is a published author in the Journal of Forensic Identification.

At FARO Technologies, Alina is currently the Sr. Business Development Manager for Public Safety where she ensures customer's voices are represented in the products and software FARO creates. She focuses on developing partnerships with institutions which allow both FARO and customers to benefit from innovation in technology.