VOLUME 16 • Fall-Winter 2016

FLETC Journal

Federal Law Enforcement Training Centers

Artesia ★ Charleston ★ Cheltenham ★ Glynco

ADVANCED TECHNOLOGY

Simulation and Operations in Law Enforcement Training

VIRTUAL FIREARMS RANGES

The Advantages Over Live Fire Training

WHAT'S IN THE BLACK BOX?

Vehicle Embedded Forensics

TWO WORDS YOU MUST KNOW

To Solve Modern Crime

Foreword

VALERIE ATKINS
Assistant Director
FLETC

THE RAPID EXPANSION of technology in our world has both helped and challenged law enforcement and law enforcement training. Those same technologies that capture data, allow instant messaging, and work to make everyday tasks more predictable, has fast forwarded organized criminal activity that requires law enforcement to quickly counter with investigative techniques using the same data. Five different 'takes' on technology are covered in this issue that explores the implication of both fighting crime and committing crime, as well as a look at technologies that facilitate better training for the sworn guardians of our communities and our nation.

- Technologies developed just for training such as the MAT-MP and FLETC's simulated ranges for firearms training are specifically designed to help instructors and students train more effectively and efficiently. Such technologies are important investments for training and must be carefully evaluated.

- Technologies currently in use by the public makes our lives easier, and then gets repurposed by criminal elements to aid and abet criminal activity.

- The use of technologies by investigators creates vulnerabilities for case investigators that can potentially leave their records vulnerable to compromise. Trainers must understand both the value of appropriately applied technologies, and how to protect data from criminal intrusion.

- Technological applications are costly to purchase, maintain, and secure. Trainers and law enforcement officials are dealing with financial challenges associated with the implementation and utilization of technology and its impact on modern day policing.

- Finally, emerging technology that is reshaping our world is also changing the landscape for law enforcement. Unmanned aerial systems not only aide law enforcement but can present challenges to law enforcement when used to further criminal acts. Tools like body worn cameras are a new frontier that will undoubtedly require significant judicial reviews to sort out the myriad of challenges that seem inevitable. Trainers must be ready to adapt to the next new thing. Looking ahead, we should be able to see some innovations coming. Driverless cars, biometric identifications, smart guns, and the 'internet of things' will impact law enforcement and will need to be addressed by law enforcement trainers. We must be ready.

As you read this issue, consider that law enforcement and law enforcement training have no option but to rapidly adapt and expand capabilities to counter emerging threats, and conduct investigations using new technologies. By proactively working on all fronts of the technological landscape, we will be poised to address such new innovations. One thing's for sure. Law enforcement is certainly going to get more interesting!

this issue

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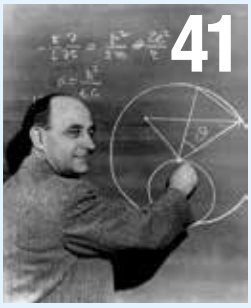

THE FLETC JOURNAL EDITORIAL TEAM from left to right, front row: Lauren Ware, Michael S. Milner, Michael Hullihan, Susan Thornton. Back row: Tim Miller, Preston Farley, John Stamp, Jen Tocco.

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The content of this publication is written in accordance with the guidelines of the Associated Press (AP) style. Articles, photographs, and other contributions are welcomed from the law enforcement training community and academia. Publication depends on general topical interest as judged by the editorial team.

The FLETC Journal's mission is to explore and disseminate information about law enforcement concepts, research initiatives, programs, and trends that impact or will potentially affect law enforcement training.

Reflections on Leadership

WAYNE ANDERSON
Site Director
FLETC Charleston

COUNTLESS BOOKS and articles have been and continue to be written in an effort to capture the very essence of what makes a truly great leader. I too have spent a considerable amount of time in study of this topic. Regardless of the amount of reading and reflection, I find myself circling back time and again to what really amounts to five dimensions of leadership: you must have a vision as to where you plan to take your organization, a strategy as to how you plan to get there, good structure or management, a sound process for your decision making, and finally, you must be a leader with great integrity.

For those like myself who are captivated by presidential politics, I would highly recommend the book The President as Leader by Michael Siegel. Siegel's core thesis is that effective presidents stay focused on a clear vision. They succeed by surrounding themselves with talented people, not necessarily friends, and give them the autonomy to do their jobs. They encourage conflict and at times differences of opinion as a positive force prior to decision making. They must be willing to make clear and strong decisions and never fear making modifications along the way, and accept it as a natural consequence of the process. Without giving too much away, let me just share that Siegel walks the reader through a historical review of how, when measured against the aforementioned criteria, at least two of the recent five Presidents received high marks in two or more categories, while two struggled in almost all categories. Let's pull out "good structure or management" as just one example. It has been reported by several sources that President Jimmy Carter would, in spite of hovering over a desk full of papers dealing with one world crisis after the other, fret over tedium like scheduling the White House tennis courts. In contrast, Ronald Reagan would abstain from the fine details of governance and would entrust them to his team to carry out vigorously. He shared his vision with each of them and then simply got out of their way.

While Siegel's book looks at leadership from the highest levels of government, the same tenants of great leadership are applicable to each of our own pursuits. The most challenging aspect of my leadership tenure at the Federal Law Enforcement Training Centers came after accepting the position of Site Director for the Office of Charleston Operations. I pursued the opportunity with the vision of transforming a dated and dilapidated facility into a modern, walking campus that would support the FLETC mission of not only training those who protect our homeland, but to be the best in the world at doing so. Not to say that I did not have many days where I asked myself just what I had gotten into. Successes began to follow, however, after sharing that vision and proffering a strategy as the road map to get us there.

We started by meeting with a landscape architect and putting the vision on paper as to how we planned to reshape and refurbish our campus. While funding would certainly not allow us to execute the entire plan in whole, we began to look at what was most pressing and take a phased approach. After eight years on the job here in Charleston, that original architectural rendering still hangs in my conference room to ensure we keep our eye on the prize.

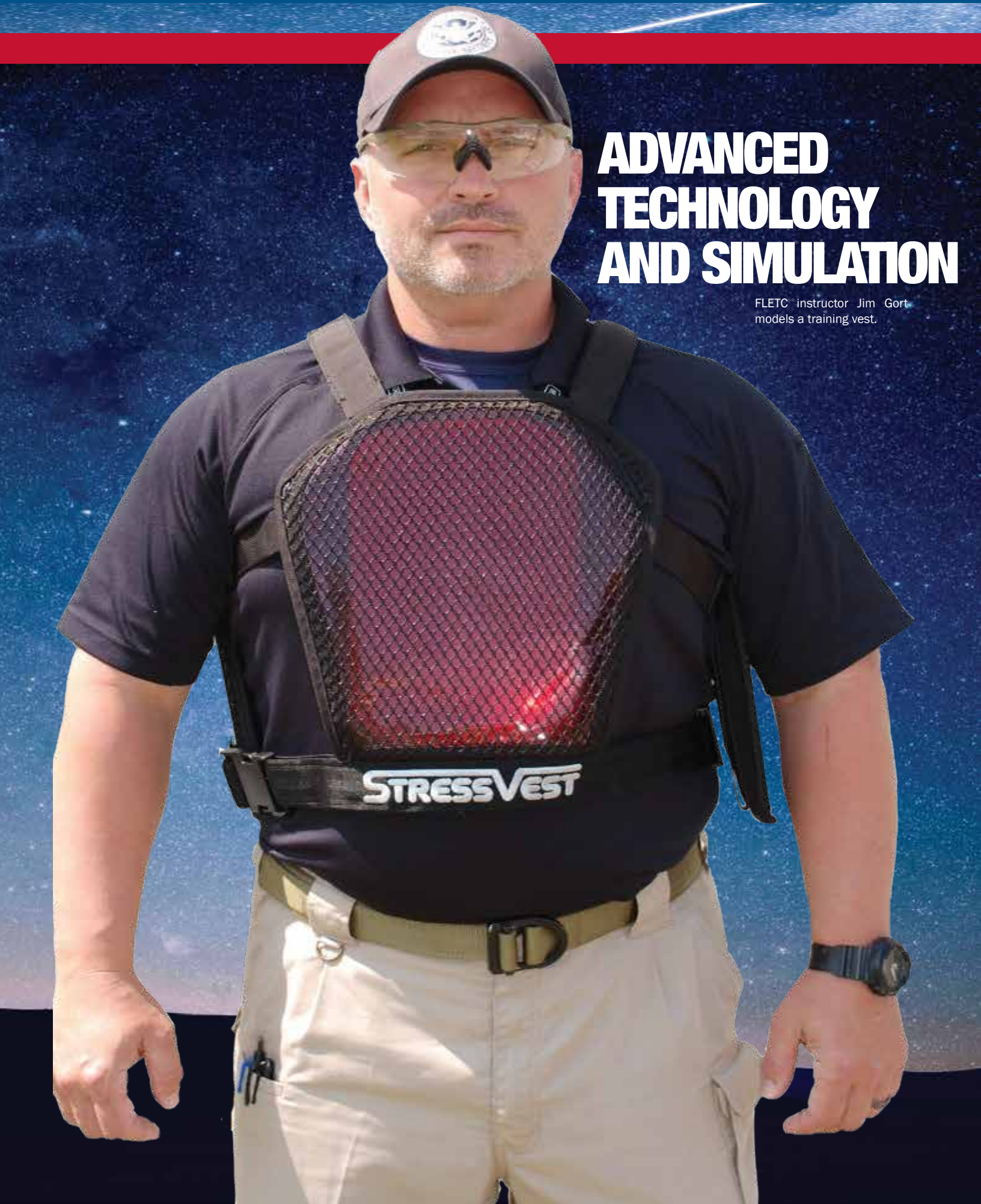
Fortunately, my tenure with FLETC Charleston has allowed me to establish my own leadership team. None of the many accomplishments at the Charleston campus would have been possible without a solid team of professionals in place that fully supports the vision. It is a team of true professionals that I have faith and confidence in to lead others. That trust allows me to keep the focus on the vision, share it with others, and try not to stand in their way. More simply put, I don't need to schedule the tennis courts, but I need to know how many I have, if I need more, and if so where I plan to put them!

Today we have demolished over 17 structures, and are eyeing the fourth phase of the overall campus plan. While I anticipated having completed the job at that stage, modifications are inherent within the process. To that end, we recently completed a business case to support building an additional new dormitory and are now in negotiations for additional property transfers with the South Carolina State Port Authority.

Lastly, if I could single out one other dimension of leadership that is vital to success at any organization, it would be integrity. I think it can be summed up best by the words of Billy Graham speaking to a group of leaders about the need for integrity. Graham defined it as "being the same person on the inside as you claim to be on the outside." He went on to say that leaders need "the ability to separate the trivial from the important. It's essential for daily tasks and direction in life. Until priorities are straight, everything else will be out of order."

L. WAYNE ANDERSON came to FLETC in 2002 as a detailed special agent with U.S. Secret Service. Prior to FLETC, he was assigned to Secret Service's NYC Field Office where he was serving on 9/11 and was awarded the Medal of Valor for assisting with evacuations of the World Trade Center. In January 2008, Anderson was selected as site director for FLETC Charleston and was most recently selected as the FLETC Leader of the Year for 2015.

ADVANCED TECHNOLOGY AND SIMULATION



FLETC instructor Jim Gort models a training vest.

Using Advanced Technology and Simulation to Enhance Law Enforcement Training

BY KIERAN MORIARTY

Advanced technology and simulation have been used across a spectrum of disciplines to make training more realistic and cost effective and to improve the overall efficiency. Technology and simulation feed into the never ending quest of training organizations to maximize training dollars, decrease down time, and improve the overall realism of training. The earliest uses of technology and simulation included using blank rounds and inert explosives and using video cameras and pre-positioned closed circuit television (CCTV) in order to observe and critique training scenarios. As technology improved, computerized judgment shooting was introduced, and ultimately non-lethal marking cartridges and driving simulators added more realism into training than ever before. The recent technology boom over the last decade has led to an upsurge in available technology that can benefit learning and improve safety and efficiency.

The FLETC-Charleston Training Division and FLETC's Training Innovation Division are working to continue this trend of improving training efficiency and realism using technology and simulation. This partnership provides an ideal environment for testing these concepts to determine if they meet the high standards needed before introducing them into the training environment. Training Innovation Division Chief Shawn Beltramo explained, "With so many new technologies coming out, it's critical to have seasoned professionals like the FLETC-Charleston Training Division staff thoroughly test these items to see how they hold up to the rigors of law enforcement training. Many innovative technologies, while promising, are just not able to deliver the high level of performance we need for our training community. Doing small scale testing with these concepts really helps us determine what will and will not work in our training." Chief Beltramo added, "Being able to leverage the expertise and knowledge of our instructors is the single most important part of training innovation and working with the staff at Charleston dramatically increases our ability to find the best in training innovation technologies." Through close collaboration, the FLETC-Charleston Training Division and the Training Innovation Division recognized the following training concepts that are being examined for possible inclusion into future training including.

WEARABLE CAMERAS/TECHNOLOGY - In today's world where almost everyone has cameras on their phones, a law enforcement officer can be recorded at a moment's notice, sometimes without even being aware of it. Law enforcement officers need to be comfortable being recorded and critiqued. This is the reality of the world we live in and our training should closely replicate the real world. The GoPro Camera System, which is currently being used at FLETC-Charleston in the Active Shooter Threat Training Program, allows the instructor to mount a camera to the student's

helmet, record the scenario being executed, and debrief the student on-the-spot via a handheld tablet. As the student progresses through the scenario, the camera captures the entire scenario through the eyes of the student. The student can explain his or her actions based on what they observed. The instructor is able to provide feedback from the student's perspective, which would not be possible using a wall-mounted camera, since that shows an entirely different point of view. The ability for the instructor and the student to review the video from the same exact vantage point is extremely beneficial in the training environment.

Go Pro action camera system with helmet mount, instructor remote and tablet.

EVALUATION TABLETS – Students in the Seaport Security Anti-terrorism Training Program traditionally used a manual process to perform enhanced risk and vulnerability assessments. Students assess three key resources on a seaport and take into account all hazards such as manmade intentional, manmade accidental, and environmental. Once the students complete their assessments, they create a briefing via PowerPoint to show their assessment results and mitigation strategies.

Collaboration with the Training Innovation Division and the Department of Homeland Security Science and Technology Directorate resulted in the development of a program to automate the enhanced risk and vulnerability assessments that students conduct in the training program. The new tablets will have a program installed that calculates assessment values. Student teams will conduct pre- and post-assessments on the tablet, eliminating the need for 90 sheets of paper and students having to transfer their assessment information from hard copy to an excel spreadsheet installed on a laptop computer. The tablet also has a camera and computer software installed, which eliminates the need to issue a separate camera and notepad. Students will also be able to access the internet from the tablet to research additional information and create their presentations.

Tablet and holder used for Seaport Security assessments.

SS Cape Chalmers engine room.

SIMULATED ENGINE NOISE – Many of the maritime training programs conducted at FLETC-Charleston utilize the SS Cape Chalmers. The Cape Chalmers is a 494-foot break bulk freighter permanently moored along pier Q at FLETC-Charleston. Since the Cape Chalmers is not an active vessel, the engines are inoperable. As one can imagine, the noise generated from functional engines would prevent routine communication between team members as they are clearing the engine room and other spaces below deck. The lack of noise on the Cape Chalmers creates an unrealistic environment as students resort to traditional methods for communicating such as voice and radio. Since the officers may not be able to communicate via voice and radio in a real world scenario, the staff believed that we were missing the mark with a valuable teaching point. Staff at FLETC-Charleston contacted the Training Innovation Division and requested support in finding a viable solution for this problem. The Training Innovation Division staff identified a cost effective system that will provide the students with a more realistic training environment when operating in the engine room. Through a series of amplifiers and speakers, the instructor will be able to activate simulated engine noise and other alarm sounds when the students enter the engine room area. The simulated noise will expose students to communication challenges normally encountered while boarding an underway vessel.

ELECTRIC SHOCK TRAINING VEST – Conventional force on force training includes simulated projectiles such as marking cartridges, paintball, and airsoft. The FLETC-Charleston Firearms and Physical Techniques staff are currently testing a non-projectile, non-lethal force on force firearms training system that utilizes laser technology to deliver an electric shock. The electric shock is delivered to the student wearing the vest when the suspect registers a center mass hit. The shock is delivered to the abdomen for several seconds. So far, the noted benefits of laser technology include the requirement of only minimal safety equipment due to the system's use of a laser as opposed to firing a projectile. This system eliminates the recurring cost for marking cartridges and paintball rounds. Another benefit is the ability to move from scenario to scenario much more quickly since the students and role players are not wearing an abundance of safety equipment. The testing so far shows that using the electric training vest appears to offer the same level of realism and stress as when using non-lethal projectiles. Staff at FLETC-Charleston is still in the testing phase and will continue to monitor the system for durability, accuracy, and overall effectiveness. The final testing results will be documented and provided to the Training Innovation Division.

KIERAN MORIARTY currently serves as the chief of the Charleston Training Division for the Federal Law Enforcement Training Centers in Charleston, South Carolina. He is responsible for the development and delivery of training curricula at the Charleston Training Delivery site. Moriarty served as a FLETC instructor, senior instructor and branch chief in FLETC's Physical Techniques Division and a branch chief and division chief in the FLETC's Training Management Division (TMD).

Side Effects May Include...

The Security Implications Associated with New Technologies

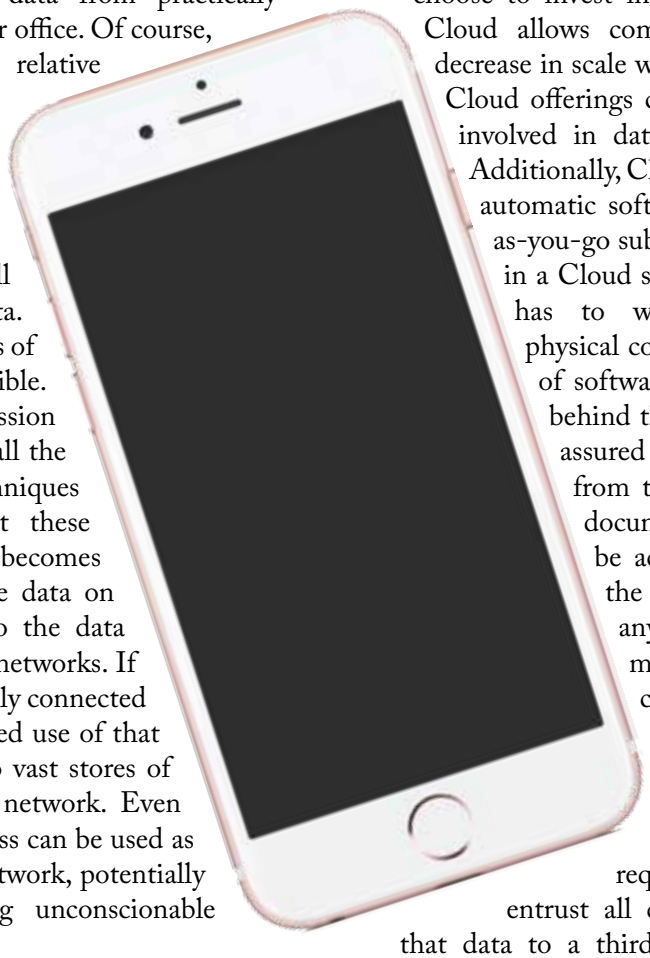
BY LAUREN WARE AND ROB PEIFER

We have all seen countless commercials advertising the latest wonder drug. Ridiculously happy people appear on screen, apparently without a care in the world, as a spokesperson lists the many benefits of the latest and greatest miracle pill. After what seems like an eternity listening to what this pill can add to your life, a short novel is speedily recited in the last fifteen seconds of the commercial that lists the many side effects of that new drug. Sometimes, the physiological costs of taking the new drug sound worse than the original condition requiring treatment. While this illustration may seem dramatic, there are similar considerations associated with the application of new technologies.

The selling point of almost all new technological developments are convenience and instant gratification. The more popular technologies tend to be physically smaller, wireless, and more mobile as a result. Similarly, the systems they operate on are increasingly becoming cloud-based, creating immediate access to vast quantities of data and enabling users to share information almost instantaneously across the globe. While these new technologies can be tremendously helpful to an organization, the "side effects" or accompanied vulnerabilities, must be addressed. Otherwise, what we gain in ease and speed of access we could potentially lose in security.

MOBILE DEVICES

The beauty of mobile devices is obviously that the user can access electronic data from practically anywhere outside the home or office. Of course, once that device leaves the relative safety of the home or office, it becomes vulnerable to inadvertent loss or theft and consequently unauthorized access. In that case, someone else may obtain access to all that device's electronic data. Passwords, and other methods of access control, are not infallible. When an attacker has possession of your hardware, they have all the time in the world to apply techniques that attempt to circumvent these controls. The concern then becomes not only the integrity of the data on that specific device, but also the data available through connected networks. If a mobile device is automatically connected to a network, the unauthorized use of that device can be a gateway into vast stores of data available through that network. Even worse, this unauthorized access can be used as a tool to attack the entire network, potentially compromising or destroying unconscionable amounts of critical data.



Mobile devices also present a security concern as updates and patches are often unable to be pushed to devices when not connected directly to the network. When computers were anchored to desks and reliant on wired connection, these patches and security software updates could be easily disseminated to all devices. This process was accomplished during non-duty hours to minimize interruption to the users and to ensure they were operating off of the most current versions of needed software. When mobile devices are physically removed from their network docking stations, they can miss the updates to the applications needed to run securely and effectively.

More and more software manufacturers and global companies are transitioning to Cloud-based systems. This is because "the Cloud" offers a number of benefits that are appealing to large organizations. To begin, the Cloud offers greater bandwidth than most companies choose to invest in initially; the use of the Cloud allows companies to increase and decrease in scale with much more flexibility. Cloud offerings can also handle the work involved in data back-up and recovery. Additionally, Cloud offerings can provide automatic software updates and a pay-as-you-go subscription to the software; in a Cloud system, the user no longer has to worry about purchasing physical copies of the latest editions of software. Updates are handled behind the scenes, so users can be assured they are always operating from the latest version. Finally, documents saved in a Cloud can be accessed by anyone (given the right permissions), from anywhere in the world. This makes collaboration on a common project much more efficient. Of course, with these conveniences come vulnerabilities.

Use of the Cloud requires a data owner to entrust all data and the security of that data to a third party; this presents an unknown level of risk to the data owner. Under these

NEW RECORDING SYSTEMS. Body-worn cameras and unmanned aerial systems with small video cameras are two of the most recent and controversial items currently being explored by law enforcement.

circumstances, the data owner does not have direct control to ensure only authorized users access to the data. They may have no direct control over who audits or monitors the system, or a mechanism to directly ensure their data is encrypted properly. By forfeiting direct oversight of the security controls applied to their system and data, the user accepts the risk that the Cloud owner's security procedures may not be as robust as required.

Another concern is the accessibility of Cloud-stored data over the web. Any time there is greater access for authorized users, there is greater access for unauthorized users. There have been several high profile data breaches over the past several years, in part because the data was stored in a Cloud.

RECORDING SYSTEMS

Law enforcement and those who train law enforcement officers have been eyeing several forms of technology that involve recording systems. Body-worn cameras and unmanned aerial systems are two of the most recent and controversial items currently being explored. The obvious advantage of these systems is they capture video of areas and events that wouldn't otherwise be seen by a third party. This translates into more information, which on the surface, seems overwhelmingly positive; however, there are many unanswered questions and considerations that must be addressed before these forms of technology can be responsibly implemented.

In addition to the obvious privacy concerns, these recording systems come with a number of security challenges and vulnerabilities. The point of digital video recording is to retain video for some length of time; whether policy dictates the recording be saved for 24 hours or 24 years, there is still the need to store what can become significant amounts of data. Not only will the department retaining the data need to worry about temporary storage, they also will have to account for backing up that data. In the event specific footage must be retained long-term, they must provide sufficient storage, back up data, and protect it from destruction or compromise. Whatever this process ultimately becomes, it must also be designed with consideration that this digital recording is evidence and must be obtained, preserved, secured, and processed in a manner so it is admissible in court. Once again, the administrative and logistical burden this process may place on a department or agency must be considered.

Another concern is that recording devices are essentially small computers, and therefore possess all the same vulnerabilities and must be patched with updates and malware. And, just as with computers, these devices can be hacked. Additionally, in the case of unmanned aerial systems, this technology is operated remotely and physically distant from the law enforcement officer. This leaves the system rather defenseless and susceptible to being destroyed or intercepted. In the wrong hands, law enforcement could forfeit not only the video footage obtained, but also intelligence regarding its technical and tactical operating capabilities.

SECURITY RISK MITIGATION

The use of technology can never be wholly without risk. Instead, agencies seeking to use new technologies must

weigh those risks against the potential benefits, and take appropriate steps to mitigate as many risks as possible. When vulnerabilities are sufficiently addressed, the benefit of the technology can outweigh the risk to the agency and the agency can implement the technology responsibly.

First and foremost, agencies must mandate a specific set of cyber security policies. Users must be trained on what vulnerabilities exist with the new technology. Awareness of vulnerabilities and their impact to the operational security of the agency is critical if users are to reliably comply with mitigation efforts. This is accomplished by requiring users to acknowledge and sign an agreement stating they will take the necessary steps to comply with the relevant security policy.

Mobile devices require regularly scheduled connection to agency networks to ensure the onboard firmware or software is properly patched and updated. While this may seem to inconvenience the user, it is absolutely critical to ensure the technology and the data stored are protected. Additional basic security measures would be to limit the number of individuals with access to the technology, protect that access with two-factor authentication or complex passwords, and encrypt all associated data. Again, this may require some additional steps on the part of the user, such as establishing and remembering unique and complicated passwords and changing those passwords or pins frequently.

Agencies should carefully evaluate potential new technologies using a Cloud. They should consider the sensitivity of the data they intend to store on the Cloud, and whether the convenience of the Cloud outweighs the possible increased likelihood of the breach of the involved data.

Agencies should also ensure that the Cloud provider ultimately selected will comply with required data protection standards. Depending on the provider, the agency may be able to specify that its security personnel retain some level of visibility over its data, and perhaps even assurance of periodic system and security auditing. This additional service could increase the cost, but is a small price to pay when considering the value of the protected data.

Moore's Law implies that the growth of digital electronics and consequent technology doubles every 18 months, and indeed this rate has been demonstrated since 1975 to approximately 2012. While many argue an inevitable deceleration of technological advancement is occurring, few would dispute that law enforcement will encounter and incorporate new technologies for many years to come. It is therefore incumbent upon the agency to consider the security implications of these technologies during its evaluation. Fortunately, unlike the unavoidable negative side effects of ever-emerging pharmaceuticals, the vulnerabilities that come with new technologies can be mitigated by responsible identification of and diligent adherence to security policy and procedures.

LAUREN WARE serves as the chief of the Forensics and Special Investigative Skills Branch at the Federal Law Enforcement Training Centers. In this position, she leads a staff of 18 professional forensic instructors who are responsible for researching, designing, and delivering the most current, relevant, and accurate forensics and specialized investigative techniques available to federal law enforcement officers. Ware maintains professional affiliation with the American Academy of Forensic Sciences and serves as the Vice Chair of the Peace Corps Sexual Assault Advisory Council. She is an advocate for community service, working on the Feds Feeds Families Food Drive, the annual CASA program, and provides presentations to local school children in an effort to inspire them to pursue careers in science. Ware was awarded the 2014 FLETC's leadership award and is the recipient of the Women in Federal Law Enforcement's 2016 Outstanding Law Enforcement Employee Award.

ROBERT PEIFER is an information system security officer in the Cyber Security Division at the Federal Law Enforcement Training Centers. He began his career in information technology working for private industry in the 1990's. He came to the FLETC in 2003 as a government contractor and transitioned to federal service in 2009.

Unmanned Aerial Vehicles

Uses for Law Enforcement

BY JOHN STAMP

In 2011 six cows strayed from a neighboring property on to the farm of Rodney Brossart. A dispute between the farmer and Brossart ensued after Brossart argued that the cattle became his once they crossed onto his property. A deputy from the Nelson County Sheriff's Office and an inspector from the North Dakota Stockmen's Association went to Brossart's farm to handle the dispute. When asked about the cattle, Brossart stated he wanted to finish his work on the farm before dealing with the livestock. The deputy and inspector insisted on settling the matter. Brossart responded by brandishing a rifle and threatening the officers. The situation escalated, resulting in a sixteen hour standoff between Brossart and law enforcement. In an attempt to arrest Brossart, the Grand Forks Police Department SWAT team requested the use of an unmanned aerial vehicle (UAV) to pinpoint Brossart's location. A UAV from U.S. Customs and Border Protection was used to locate Brossart and lead the Grand Forks SWAT team to his location. Brossart was arrested without incident.

The Federal Aviation Administration (FAA) reports that there are approximately 2.5 million drones or UAVs in use in the United States as of March 2016. By 2020, the FAA expects the number of drones used by Americans to rise to approximately 7 million. The use of UAVs in society is becoming commonplace and will be an

FLETC has been researching a variety of potential platforms for future program development.

cameras and other equipment carried on the UAV can be used for remote examination of a suspicious device without having to place police personnel in danger. UAVs have been used to map and document fatal traffic investigations, and the U.S. Border Patrol has incorporated drones along the nation's borders to police for illegal border crossings. In 2009, Persistence Surveillance Systems of Dayton, Ohio, partnered with the city of Ciudad, Mexico, to study the effectiveness of drones as a police aid. During the study local law enforcement used UAVs to conduct aerial surveillance. At the end of the study images captured via UAV detailed 34 murders as they occurred in real time, including a cartel-sponsored killing within the city. Further video analysis taken during this time captured images of the murderer, the getaway vehicle, and multiple accomplices.

Currently, the most popular design in UAVs is the quadcopter, a small robot suspended under four, six, or eight rotors. Most UAVs can be augmented by a number of sensing packages from the standard still and video camera to forward looking

accepted facet of society very soon. As with all emerging technology, law enforcement agencies are adopting UAVs to enhance their respective missions.

Local, state, and federal agencies have begun using UAVs on various missions, including surveillance operations, crime scene analysis, explosive ordinance disposal, search and rescue, and SWAT operations. The Federal Bureau of Investigation stated in response to a query from Senator Rand Paul that UAVs have been used in surveillance operations both in criminal and national security investigations since 2006. The San Jose Police Department in California has added a UAV to its inventory for use by the bomb squad. The rationale is that the

infrared, radar, and mapping equipment. In the future developers believe UAV's will take on a more biomorphic design and miniaturization. This will mean that what was once a loud and obvious aerial platform roughly the size of a pizza delivery box will shrink to the size of a dragon fly or a mosquito and thereby will be able to deploy largely unseen.

In 2012, the FAA established regulations governing the use of UAVs by both the public and commercial entities. Essentially the same general rules apply to UAVs as apply to manned aerial platforms. The FAA requires that in order to operate a UAV commercially the aircraft must be registered and authorized to fly either by certificate or exemption. The UAV is required to have a valid registration number and can be flown only by a certified pilot. UAVs cannot be flown within five miles of an airport and operators are required to abide by temporary or permanent flight restrictions. The FAA periodically releases updates on UAV operation rules and regulations via its website: https://faa.gov/uas.

The International Association of Chiefs of Police Aviation Committee issued guidance on the use of UAVs in 2012 as well. The model policy offers protocols governing such procedures as image/media retention, operational procedures, system requirements, and community engagement.

FLETC has initiated a feasibility study regarding the development of a UAV training program. The study consists of not only the examination of aerial platforms for their use, but also how best to implement a potential program. FLETC will disseminate an assessment to its 93 federal partner agencies to determine which missions the partners believe UAVs can best serve or enhance. Once FLETC determines the platform and demand, it can develop and implement a training program. Another major point in the feasibility study for UAVs is where a potential training program could be best implemented. Given FAA regulations, UAVs cannot be flown within five miles of an airport without authorization or exemption, and UAVs can only be flown by certified pilots. Two of FLETC's training sites are within this restriction, and developers are seeking FLETC personnel who are both certified instructors and pilots. FLETC has identified several potential aerial platforms and a number of potential certified pilot instructors. FLETC is also awaiting pending FAA guidance on UAVs before it further pursues potential training related to this technology.

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Drones:

Your Agency's New Best Friend or Worst Enemy?

FLETC Assistant Director Dominick Braccio and Physical Techniques Instructor Paul Sanchez demonstrate the launch of a hand-held Unmanned Aerial Vehicle at FLETC Artesia.

BY PRESTON FARLEY

The concept of an Unmanned Aerial Vehicle (UAV), also known as the drone, has been theorized since the late 1800s. Initial development and utilization of early prototypes began in the early 1900s in military usage, which historically has driven many of mankind's innovations over the millennia. The United States developed and used remote controlled full-sized aircraft in both World Wars. The U.S. Air Force used UAVs extensively throughout the Vietnam War for dangerous reconnaissance missions. The Israeli military developed and deployed the first modern UAV in 1973 during the Yom Kippur War. It had all of the hallmarks of the modern UAV including data-link systems, endurance-loitering, and live video-streaming. These same capabilities, along with miniaturization, ease of use, reduced infrastructure requirements and, most of all, dramatic decrease in costs have allowed the formerly nation-state-only tool to be used by all segments of society including law enforcement today.

The first robots used extensively by civilian law enforcement in the United States were probably bomb handlers due to the very risky nature of that activity. Use of these machines saved and continues to save people from danger or even death. So too with the UAV. Due to its myriad functions and capabilities, it can now perform tasks that are deemed dangerous for officers to perform. UAVs are uniquely suited for surveillance, patrol, videography and photography, and some more advanced functionality discussed below. As UAVs

UAVs in a public space allows unique capabilities to law enforcement.

have matured, they have been created in a vast array of sizes and forms, from the size of a housefly to that of the U.S. Air Force Reaper with a wingspan of 84 feet! UAVs are available in both fixed and rotary wing configurations, which provide differing functionality depending upon their intended use.

A logical primary use scenario for UAVs is as a surveillance tool. As UAVs have the ability to fly over terrain and buildings, they have a natural bird's-eye view. This view can be augmented for specific missions like low-light or for viewing heat signatures in a smoke or fog-filled environment. The camera resolution of these devices can be 1080p or greater, depending upon operational need. Some stated use scenarios by a California law enforcement agency include tactical intelligence gathering in SWAT scenarios, crime scene photography, search and rescue in rough terrain, and finally, traffic control observation. Depending upon need, some of the UAVs available today are capable of sustained 12 hour flights. One new use for camera-toting UAVs is that of mapping. One company sells a "swarm" of smaller UAVs, which are optimized to go to a predefined geographic area, deploy, and then create three-dimensional maps of the target area including to-scale elevation with a precision to five centimeters. These UAVs have a 10-mile range. The major advantage of UAVs over conventional aircraft is that of cost; UAVs are much cheaper to purchase, maintain, and actually fly.

NEFARIOUS USE THAT AFFECTS LAW ENFORCEMENT: There have been numerous reports in the media over the past few years regarding how both ignorance and malevolence have revealed the downside to UAV deployment. Initial reports were of UAVs being operated by people to observe others in places that were heretofore considered private. Specifically, many people have reported being spied upon on while on their own property, or in places previously considered private, like clothing-optional beaches. One United States Senator reported that she awoke in her second-floor bedroom, looked out her windows, and observed a UAV looking in the window at her! Another misuse of UAVs has occurred in aircraft flight zones. It seems that there are weekly reports of near-misses of UAVs and aircraft in and around airports. In fact, a mid-air strike occurred in April 2016

Assistant Director Dominick Braccio examines a UAV remote control with Instructor Paul Sanchez and Branch Chief John Newman. Below photo: A UAV with remote control.

between a UAV and a British Airways 727, which was carrying 132 passengers and five crewmembers. Fortunately, the UAV hit the nosecone of the aircraft and not an engine intake as that would have probably destroyed the engine. Another use of the UAV for nefarious purposes has been discovered at numerous prisons both inside and out of the United States. Confederates of prisoners are attempting to bring contraband into prisons via UAVs. A high profile attempt failed at a South Carolina maximum security prison when the UAV crashed in the brush just outside the walls of the prison. One of the operators of the UAV was apprehended near the scene, but a second eluded police. The current extreme example of UAV's potential for abuse was revealed in a recent viral video showing an amateur UAV enthusiast attaching a running chainsaw to one. He then actually cut limbs off of a tree before embarking upon decapitating unsuspecting snowmen with the airborne chainsaw. And then there's the remotely controlled UAV with a pistol attached, which allows the operator to get very close to his target and then fire the weapon with a high degree of accuracy. The potential for this tool to be abused is limited only by a criminal's imagination.

ANTI-UAV TECHNOLOGY: As the public and other political entities around the globe have deployed UAVs, the need to possess counter-UAV capabilities has emerged. Some major military arms suppliers have begun to market various anti-UAV systems with different approaches for different goals. Some low-tech solutions have also been developed, which are proving very effective. The first problem with counter-UAV solutions is that of observation and discovery. By their very nature UAVs are difficult to observe. They are small and quiet and can move from hiding place to hiding place with a skilled operator, which makes detecting them quite a challenge. Fortunately, there are solutions already on the market. As almost all UAVs contain a functional digital camera, there are already well established technologies in place that can detect these cameras and track them. One company sells a solution that looks in a 360 degree arc for the UAV camera signatures and upon locating one alerts the user. It will then track the camera as long as it is within the device's field-of-view. Once identification of the UAV occurs, the problem of "what next" occurs. A European company has created a man-portable device

which allows the operator to lock on to the UAV and essentially overpower the UAV operator's controls and force the UAV to land where it can then be secured by authorities. An American company built a second system, which takes a more aggressive stance by allowing the user to send a huge blast of energy to the UAV thereby "killing" it in midair. A Dutch firm developed a decidedly low-tech anti-UAV tool, which has adapted the ancient art of falconry to teach the raptors to identify and attack UAVs!

As the public continues to embrace UAV technology, your agency will be impacted by it. For many agencies, the use of UAVs can enhance your current work practices, often lowering costs. It may also give smaller agencies a path to provide previously cost prohibitive services like search and rescue. Again, as with any tool, the criminal element will also adapt to the new technology and leverage its use in nefarious schemes. At this stage of development and deployment, remaining UAV-ignorant is no longer an option. Forewarned is forearmed. UAVs are both your best friend AND worst enemy.

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Virtual Firearms Ranges

CONTRIBUTORS:
DAVID BAND
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In 2010, the Federal Law Enforcement Training Centers conducted an evaluation of the performance of local college students and FLETC basic training students, half of whom completed firearms training using a combination of virtual and live fire methodologies (virtual) and half of whom received only live fire training (traditional). It was found that for both local college students enrolled in criminal justice and for several classes of FLETC trainees, the pistol qualification scores were statistically similar regardless of the methodology used (Hawthorne, Wollert, and Burnett & Erdmier 2011). Based on the results of this work, as well as similar findings from the Royal Canadian Mounted Police (RCMP, Kratzig, Hyde & Parker, 2011), FLETC expanded its initial pilot and constructed three 24-lane Virtual Firing Ranges at its headquarters in Glynco, Georgia.

A Virtual Firing Range offers a number of advantages over live fire training. For new shooters, it creates a safe, low stress environment to learn the basic marksmanship fundamentals, such as how to grip and draw, sight alignment, trigger control, and range safety protocols. Regarding safety, virtual training also eliminates the risk of accidental discharges for new shooters. For instructors, the virtual range allows for more effective communication because hearing protection is not required; offers the ability to work with students from all positions, including in front of the shooter; and permits more time to train because time spent on setting up targets, collecting brass, and cleaning weapons is not required. From

Left: Student examines his score from the Virtual Firing Range at FLETC Glynco. Below, right: Firearms Instructor Ed Sizemore assists student.

the institutional perspective, sessions used with this technology save money, maximize space, and expand student throughput. Training in a virtual environment also enables students to use an unlimited number of virtual bullets, thus increasing the capacity to dramatically augment student trigger pulls.

In late 2013, an initial class piloted the substitution of the live fire training with the new virtual firing ranges for four two-hour sessions of Basic Marksmanship Instruction for a single class. In 2014, FLETC integrated this methodology into its basic training programs – the Criminal Investigator Training Program (CITP), the Uniformed Police Training Program (UPTP), and the Land Management Police Training Program (LMTP). In 2014 and 2015, FLETC also constructed virtual ranges at its Artesia, New Mexico, and Charleston, South Carolina, locations. Since the implementation of virtual firearms training, there is now a larger sample of qualification data than in previous comparisons of these methodologies. This article provides a review of the qualification data for FLETC law enforcement students who completed training before and after this change in methodology.

OVERVIEW OF MARKSMANSHIP TRAINING AT FLETC

FLETC BASIC MARKSMANSHIP INSTRUCTION consists of four two-hour sessions on the Virtual Firing Ranges. Those who train on the virtual firing ranges use firearms that have been modified with a laser insert, "firing" on simulated live fire ranges with images of paper targets projected in front of students. The instruction with this methodology is intended to be similar to the instruction on traditional live fire ranges.

Following this basic exposure to marksmanship skills, training continues with eight to eleven two-hour live fire sessions, depending on the training program, that culminate with the Semi-Automatic Pistol Course (SPC) qualification course of fire.

The SPC consists of 60 rounds fired from a variety of positions and distances. This is broken down into a "front half" (distances of 3 to 7 yards) and "back half" (distances from 10 to 25 yards). Students can earn a maximum of 5 points for each round on target for a total of 150 points per half, or 300 points in total. Rounds on the target silhouette are assigned points that range from 5 points (center target) to one point (outer areas of the silhouette), with rounds not striking the silhouette receiving no points. The majority of partner agencies that train at FLETC have set a score of 210 (70%) as the minimum qualification score while a few have opted for 240 (80%).

FINDINGS FROM THE INSTITUTIONAL USE OF THE VIRTUAL FIRING RANGES

STUDENT POPULATION:

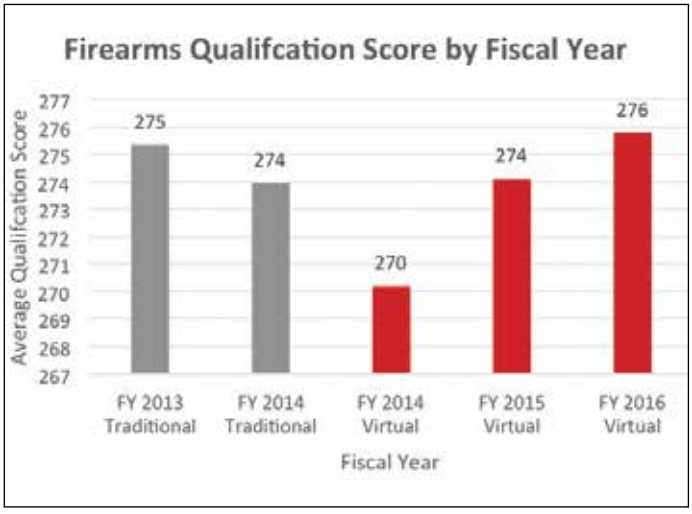
Data from 5,718 students from 159 classes (76 CITP, 63 UPTP and 20 LMTP) who underwent SPC qualification from Fiscal Year (FY) 2013 through the second quarter of FY 2016 were included in this analysis. Of the 5,718 students, 1,592 received traditional live-fire training and 4,126 received the blended environment of virtual and live fire training. This is a much larger sample than previous evaluations from FLETC and the RCMP (115-256 students). Data on these classes were gathered from end of class reports. These reports include summaries from each class, including average qualification score, number of students attending intermediate sessions, and number of students who successfully qualified, but do not include each students' raw scores.

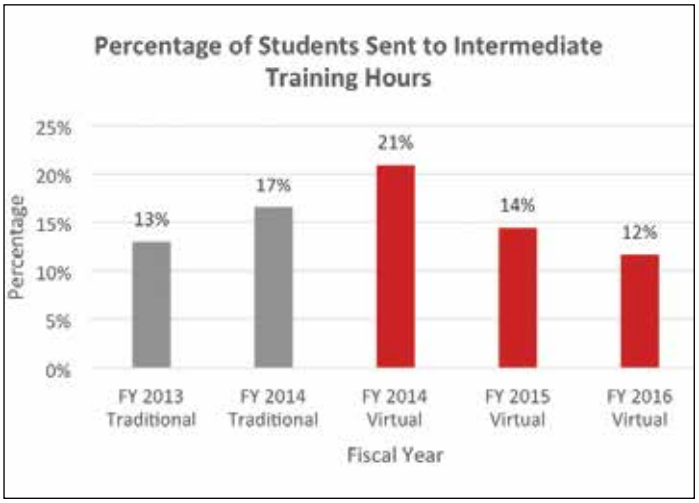
STUDENT QUALIFICATION SCORES:

Qualification scores were reviewed by fiscal year. It was found there was an initial decrease in qualification scores when the Virtual Firing Ranges were implemented in FY 2014; however, there was a rise in these scores in FY 2015 and FY 2016. In fact, the average qualification score was slightly higher for FY 2016 (virtual/live fire) than for students trained with traditional live fire. Since raw qualification scores were unavailable at the time of this analysis, it could not be determined if these differences in qualification scores were statistically significant. Previous work by FLETC and the RCMP found that while qualification scores were statistically similar, there was a trend for slightly lower performance using the virtual range (Hawthorne, Wollert, Burnett & Erdmier 2011, Krätzig, 2011). The current results suggest that through refinement of the training methodology, higher qualification scores may be possible.

STUDENTS SENT TO INTERMEDIATE TRAINING:

One possible explanation for higher qualification scores after the integration of the Virtual Firing Ranges could be contributed to instructors providing additional live fire training through intermediate after-hours sessions in efforts to





achieve this performance. The trends for assignment of additional training sessions were reviewed by fiscal year (see below). While there was a peak during the initial transition (21%), data for the most recent year shows there were actually fewer students sent to additional training (12%) than when live fire was used. Also, this data suggests additional live fire training is not required to achieve the same level of proficiency when virtual training is integrated into firearms instruction.

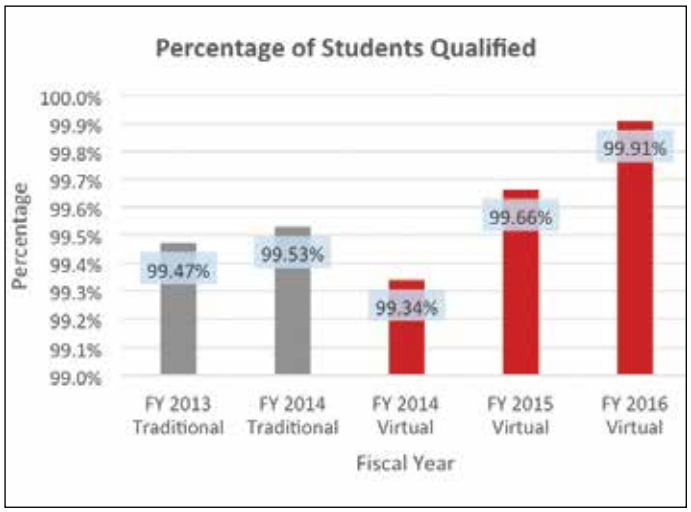
STUDENT QUALIFICATION RATE:

Overall, FLETC's firearms instructional staff and curriculum is extremely effective in training students on the fundamentals of marksmanship leading to qualification with their weapons. Less than 1% of students fail to qualify. When this qualification rate was assessed for each fiscal year, it was found there was actually a higher qualification rate for students trained with the virtual range in FY 2015 and FY 2016. While the qualification rates are objectively higher for the more current years, they are essentially equal. In fact, a Chi Square analysis, a test to see if these results are statically different across these years, cannot be performed because the number of failures is less than 5 students for several of these years (there must be at least 5 responses per cell to run this test).

OVERALL DATA RESULTS:

Previous evaluations found slightly lower but statically equivalent qualification scores when using a virtual range (Hawthorne, Wollert, Burnett & Erdmier 2011, Krätzig, 2011). This evaluation found that after an initial drop in performance, students training in the virtual environment for the most recent fiscal year had slightly higher qualification scores than traditional Basic Marksmanship Instruction training. This was the case with fewer students being assigned to receive extra intermediate training sessions and with a slightly higher qualification rate.

These results using a larger student sample than previous work confirm that firearms training, in which a virtual environment



is incorporated, can be equally as effective as traditional live fire training. While FLETC has not compared the retention of marksmanship skills between these methodologies, the RCMP has conducted this analysis (Krätzig, 2014). Krätzig found that there was no statistical difference in retention between those trained in a live fire or virtual environment in subsequent requalification and adding further support for the use of this methodology.

COST AVOIDANCE:
For fiscal year 2016, FLETC projects a total cost avoidance of $338,393.51 in terms of supply costs alone (ammunition, targets, target backers, weapon cleaning supplies, etc.) by using Virtual Firing Ranges. With larger student numbers and increases in the cost of ammunition, cost avoidance is projected to increase every year. When other costs for running a live fire range are also considered, such as range equipment, maintenance, and electricity (running ventilation systems), these savings may be even higher.

LESSONS LEARNED FROM IMPLEMENTATION:
As is common with new technologies or methodologies, change was an initial challenge. This was observed anecdotally, through increased assignments to after-hour training sessions, and overall lower qualification scores during the initial implementation.

Determining the right method of training with the new equipment and approach was demanding for the staff. With over 120 firearms instructors on staff, there has been a continuous process of refinement. Some of the initial challenges included familiarizing instructors with the advantages of the Virtual Firing Ranges, training staff on technical aspects of the system, obtaining all of the pistol models used by various agencies, and standardizing training sessions to best make use of this training methodology.

Training organizations wishing to implement virtual firing ranges for their agencies should be prepared for some initial stumbling blocks. However, after this learning curve, students may achieve even higher performance than with traditional live fire training.

FIREARMS TRAINING MOVING FORWARD:
A testament to FLETC firearms instructors' experience and capability is that as they become more familiar with using the simulators, they are developing better methods for maximizing their effectiveness. As part of the ongoing refinement process, FLETC created a new Firearms Technology and Innovation Branch to manage and maintain a directed focus on the Virtual Firing Ranges, as well as other virtual simulation initiatives and training such as Judgment Pistol Shooting.

Using simulation to model live fire ranges is just the tip of the iceberg for the potential of simulation to improve firearms proficiency. While most law enforcement officers routinely demonstrate their marksmanship during range requalification, accuracy during gun fights is exceptionally low (15-22%, Morrison & Vila, 1998). Simulation offers the potential to address the gaps to improve real world performance. For instance, training can safely be conducted with moving and realistic targets, from various shooting positions, and with realistic and higher stress scenarios that require decision making. Unlike live role player scenarios, simulation has the ability to accurately track student accuracy during more realistic scenarios. This exploration of the use of simulation to improve reaction times and accuracy during more realistic scenarios also extends beyond FLETC (Wright, 2013).

FLETC and its Partner Organizations are exploring ideas such as integrating driving simulation and use of force simulation, conducting evaluations of high definition immersive use of force simulators, integrating physical conditioning into firearms decision making tasks, and potentially integrating virtual reality into training. FLETC is committed to supporting ideas that will make students better prepared to protect our homeland, as well as generating cost savings for U.S. taxpayers.

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DAVID BAND has served as an engineering research psychologist at the FLETC since February of 2011. He is currently assigned to the Applied Research Branch within FLETC's Training Research and Innovation Directorate. Band received his bachelor's degree in Psychobiology from Binghamton University and a Master's of Science in Applied Psychology from Clemson University.

DOUG DRAGOTTA is the Chief over the Firearms Technology and Innovation Branch at the Glynco Federal Law Enforcement Training Center's Firearms Division. Doug began his law enforcement career in 1995 as an officer with the Secret Service Uniformed Division, where he served in various assignments. In 2007 he began his career with the FLETC and has served as an Instructor, Senior Instructor, and Branch Chief, in multiple training divisions. Doug holds a Bachelor of Science degree in Criminal Justice from Troy University.

ED SIZEMORE, M.A., M.S., CPP, Is a lead instructor in the FLETC's Firearms Division at Glynco, Georgia, where he has served for 18 years. With graduate degrees in security management and counseling as well as postgraduate work in homeland security, he has served in both Firearms Division and as a senior instructor in the former FLETC Management Institute. A retired Coast Guard officer and a former special agent of the Coast Guard Investigative Service, Sizemore is a true believer in providing quality professional law enforcement training to all of FLETC's students.

Virtual Firearms Training:
A Cross Organizational Effort

DANIEL BALASH
2016 RECIPIENT OF THE FEDERAL 100 AWARD

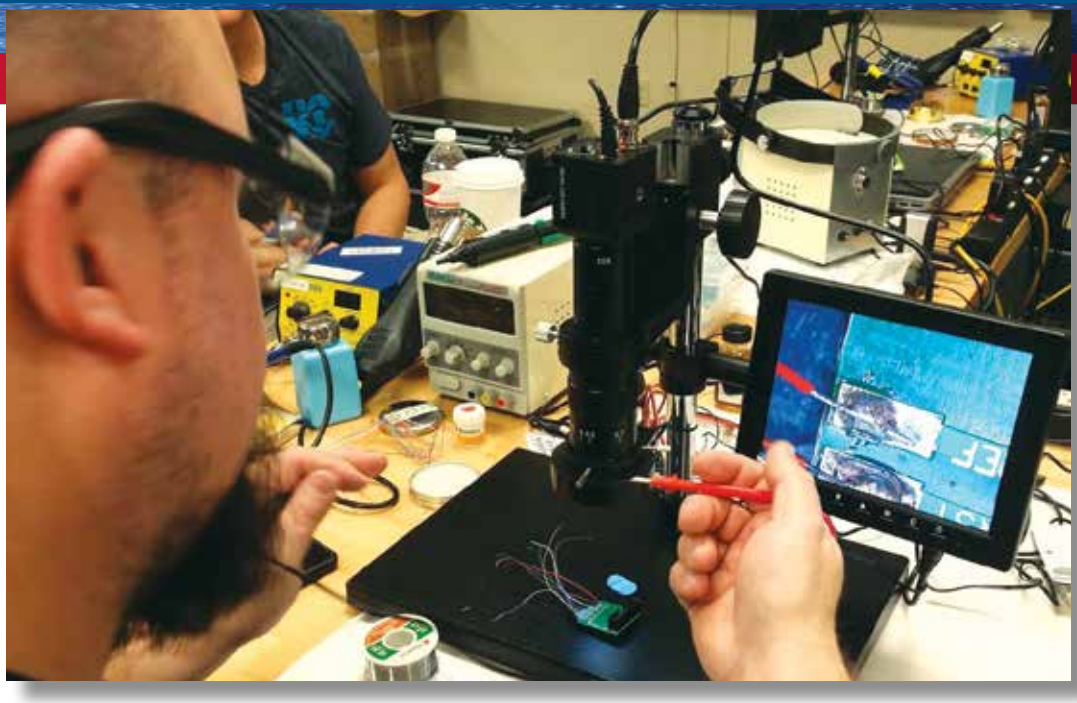
Bringing virtual firearms training to the Federal Law Enforcement Training Centers (FLETC) was a cross-organizational effort. In addition to the transformative efforts of FLETC's training staff, personnel from throughout the organization made significant contributions in bringing the benefits of this technology to FLETC and its students.

Daniel Balash, Information Technology Project Manager, led the integrated project team that developed, procured, installed, and tested the Virtual Firing Ranges at FLETC, an accomplishment that earned him the prestigious 2016 Federal 100 Award this past spring. The Fed 100 Awards recognize government and industry leaders who have gone above and beyond their daily responsibilities and have made a difference in the way technology is bought, managed, or used.

In his role as Project Manager, Balash was responsible for the cradle to grave development and implementation of the Virtual Firing Ranges into FLETC training, resulting in the revolution of firearms training at FLETC. Besides freeing up time on live-fire ranges and increasing students' opportunities to practice, the virtual ranges also cut ammunition usage, lower maintenance costs, and have a lesser impact on the environment.

Balash's team overcame decades of institutional cultural bias in favor of students training only with live-fire. His passion for technology and belief in this new learning methodology enabled him to become a passionate advocate for the virtual ranges. Balash conducted group and one-on-one capability demonstrations to create a trusting partnership between technology and instructional delivery. The resultant capability is now a fixture in FLETC's basic training, as students attending FLETC's three flagship basic training program received training on the Virtual Firing Ranges as part of their basic marksmanship curriculum. Thousands of students have now successfully completed basic marksmanship training using virtual firing ranges in combination with live fire.

While Balash received the well-deserved Fed 100 Award, he is quick to acknowledge that integrating virtual firearms into FLETC training was a true team effort. FLETC's experience with integrating virtual firearms training demonstrates the enormous power of collaboration among diverse professionals in using new technology to improve how we train law enforcement personnel.



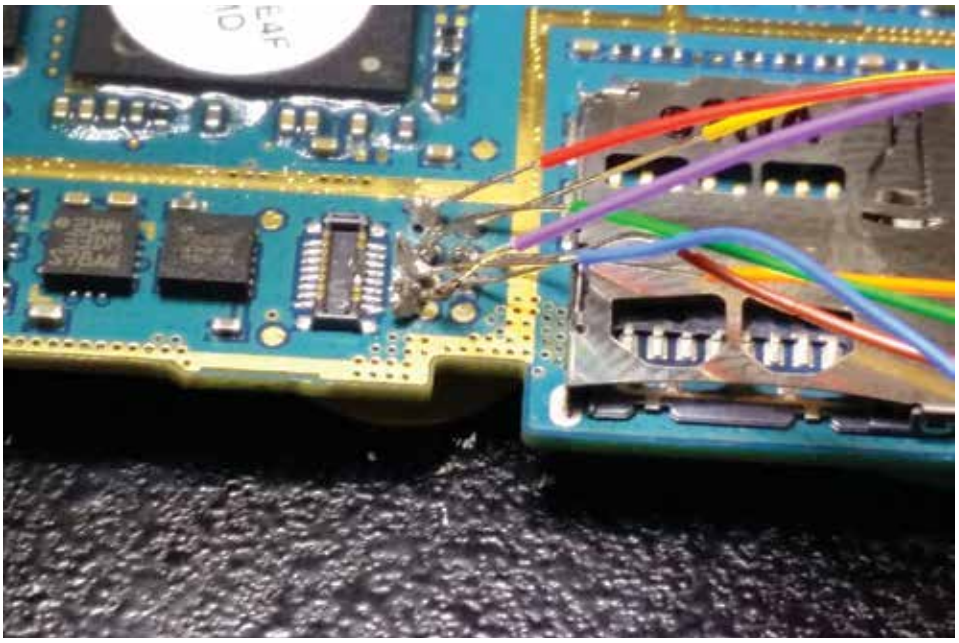
Student using JCSTP-issued tools to review in-class soldering techniques.

JTAG AND CHIP-OFF

two words you must know to solve modern crimes

BY PRESTON FARLEY AND TRACY GATWOOD

A convicted criminal, while serving time for his crimes, was suspected of continuing to run his criminal enterprise while in prison through the use of contraband cell phones. During the execution of a search warrant of his jail cell, the suspect, knowing his phone would be seized and potentially examined for incriminating evidence, broke the phone in half before officers could seize it. The phone was taken to a local cellular provider for assistance in recovering its contents, but company representatives stated they could not assist. A few years ago, this would have been the end of the story and the latest criminal misdeeds of this prisoner would be lost; however, this is no longer the case. A duo of related investigative tools has been developed and mastered by many law enforcement agencies over the past few years which allows them to potentially recover data from heavily damaged smart phones.

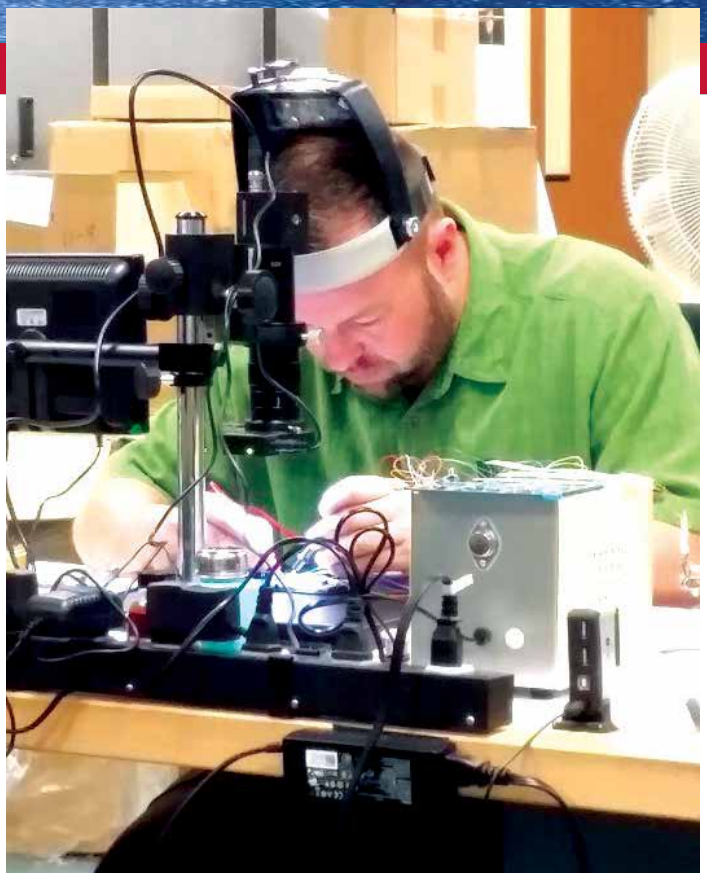


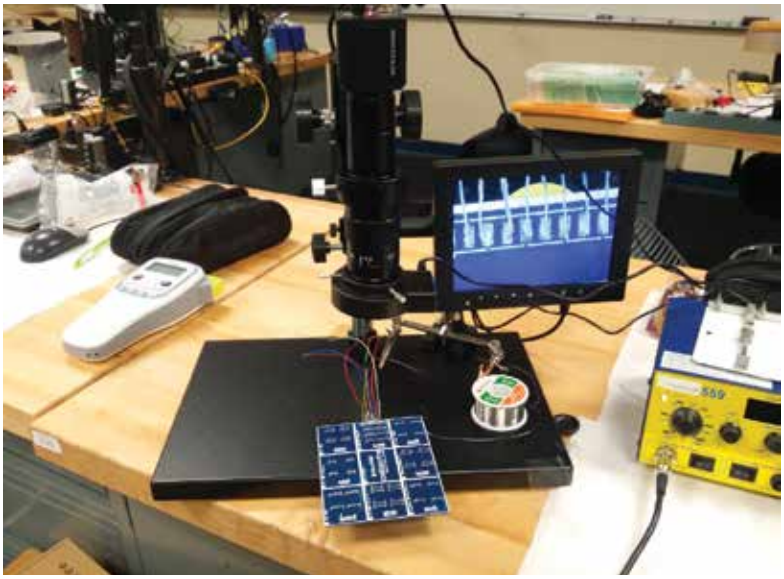
Above photo: Example of student's first soldering attempt using JTAG.
Right photo: How to identify relevant memory chips for chipoff analysis.

The first tool is JTAG, which is an acronym for the Joint Test Action Group, an electronics industry association formed to develop a method of verifying designs and testing printed circuit boards after they are manufactured. This is done by embedding each circuit board with hardware and software, which allows them to be checked for errors prior to being assembled into their final form, like a smartphone or GPS device. Access to the software is accomplished via on-chip test access ports (TAPs). These TAPs are various sizes, and locations depend upon the manufacturer's design. As a wonderful side effect, the JTAG system allows a trained investigator to solder wires to the TAPs, connect these wires to a harness, and the harness to a computer running a dedicated program that then "reads" all of the data from the storage chips on the circuit board. In plain terms, the investigator can obtain a physical image of the memory chips which can then be analyzed using traditional digital forensic techniques. This would include potential recovery of texts, emails, pictures, call records, and social media artifacts, both current and deleted.

Unfortunately, the physical destruction of a cell phone (as in the case above) renders JTAG moot as the system requires the circuit board to be intact and functional. This is where another new technology, Chip-off, comes into play. Chip-off is a term that literally means what is says, to remove a computer memory chip off of the circuit board. When JTAG is no longer an option, Chip-off becomes an option of last resort. Instead of using the circuit board of the device under investigation to power and obtain data from computer chips, the investigator removes the chip from the circuit board.

Removal of the chip is accomplished using specialized hardware that applies very high heat to both the top and bottom of the chip simultaneously to loosen the solder and epoxy, which holds the chip in place. Once removed, the chip must generally be cleaned and then placed in a die or adapter connected to a computer





Top photo: Student reviewing soldering job. Bottom photo: Review of student soldering practice board using equipment issued in JCSTP.

running specialized software to obtain a RAW or physical image of the memory contained within the chip. This image is then analyzed as outlined above using traditional digital forensic techniques. This description of the chip-off process is very simplistic as the actual process of safely removing the chip requires a number of safety procedures and specialized training and equipment to successfully and safely accomplish removal. For instance, a typical smartphone may contain six or more chips. These chips are cryptically numbered and must be identified to ensure the correct memory chip is removed. Once identified, the correct die must be located so that reading of the chip may be accomplished. Once that task is completed, the actual removal of the chip must occur. This is the most delicate step as too little heat and too much leverage on the chip to attempt to remove it could literally break the chip in two. Conversely, too much heat can bake the chip rendering it unusable and unreadable. The line between these two extremes is very limited and expertise in this endeavor can only come from experience removing numerous chips in a trial-and-error methodology. Fortunately, FLETC now has such a program for all law enforcement officers to become proficient at this relatively new forensic technique. It's called the JTAG Chip-Off for Smartphones Training Program.

Digital forensic investigators representing state, local, regional, tribal, military, and federal civilian law enforcement agencies graduated from the pilot JTAG Chip-Off training program in the Spring of 2016. The two-week course of instruction was expansive and intense with topics ranging from safety concerns due to the extreme temperatures involved in the chip-off process to special air-handling concerns due to heating the

epoxy and solder on the computer boards to remove the chips to a basic understanding of Python coding to obtain passwords of interest from the RAW images obtained from the smartphones themselves. The course was the first one ever coordinated by new FLETC instructor Tracy Gatwood, who has vast experience in both traditional digital forensics and mobile device forensics, which he honed after successfully graduating from FLETC's own Seized Computer Evidence Recovery Specialist Training Program in 2006. He was assisted by another FLETC new instructor, Teri Hamel, who recently left the field as a Department of Homeland Security, U.S. Immigration and Customs Enforcement, Homeland Security Investigations special agent.

The outcome of the prisoner/criminal who destroyed his cell phone in hopes of destroying evidence was not a good one. With the aid of advanced investigative skills provided by FLETC, one of the recent graduates of the JTAG Chip-Off training program was able read all of the active files on the cellphone he thought he destroyed. The data recovered revealed there were many files that most people consider "deleted." The effect of the course on the investigation was incredible. Not only was evidence of the primary suspect's involvement with a murder-for-hire plot confirmed, but three additional previously unknown co-conspirators were also implicated. The case was blown wide open and was able to be moved from a local level of prosecution to the federal level.

For more information on future JTAG Chip-Off for Smartphone Training Programs at FLETC, or other FLETC training programs, contact the author at preston.farley@dhs.gov or visit https://www.fletc.gov/training-catalog

TRACY GATWOOD is a senior instructor for the Cyber Division at the Federal Law Enforcement Training Centers (FLETC). He has been a full-time instructor since 2015 and became the program coordinator for the JTAG Chip-off for Smartphones Training Program (JCSTP) in 2015. This is the advanced mobile forensics class for all law enforcement agencies both federal and state offered by the FLETC. His law enforcement career includes 29 years in the Metropolitan Nashville Police Department. He spent several years in the Criminal Investigation Surveillance Unit, both as a detective and supervisor. During his service with the Metropolitan Nashville Police Department, he also oversaw the Cyber and Mobile Device investigations unit.

The New Smoking Gun of Technology in Training

In the digital age, software now provides the smoking gun link between training and technology

BY LAUREN WARE

The "smoking gun" analogy is often used to describe the indisputable physical evidence that proves, beyond a shadow of a doubt, the guilt of the accused. The fact that it is deliberately referred to as the "smoking" gun and not just a "gun" illustrates a critical but often overlooked element of physical evidence: context. The value of physical evidence to any criminal investigation is to a large extent contingent upon its context. The fact that item of evidence "A" exists isn't necessarily significant; instead, it is the fact that item of evidence "A" was recovered from a particular location, at a particular time, and in a particular context. In the case of the smoking gun, the gun was not necessarily valuable until it could be described as having been recently fired (hence the smoke). That additional detail is responsible for adding tremendous evidentiary value to an otherwise circumstantial object.

For this reason, crime scene investigation is a long and laborious process. Crime scene investigators might spend eight to 10 hours at a crime scene, but this is not because the evidence is so difficult to find. Instead, the majority of that time is spent preserving that most valuable of physical evidence traits: context. Crime scene investigators meticulously document scenes through written notes, sketches,

FOR THE FIRST TIME EVER, A CRIME SCENE DIAGRAM COULD BE LINKED WITH DIGITAL PHOTOGRAPHS, ELECTRONIC EVIDENCE TAGS, AND THE WRITTEN DOCUMENTATION ASSOCIATED WITH EACH ITEM OF EVIDENCE.

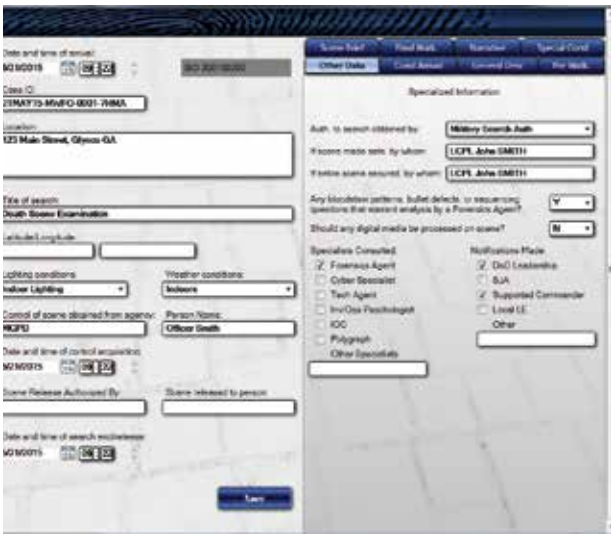
diagrams, photographs, video recordings, and recently even three-dimensional laser scanners. In essence, this documentation forever bonds the "smoke" to the "gun." While the requirement to preserve the contextual elements of evidence at crime scenes will likely never change, the manner in which it is collected and recorded is absolutely evolving with new technologies.

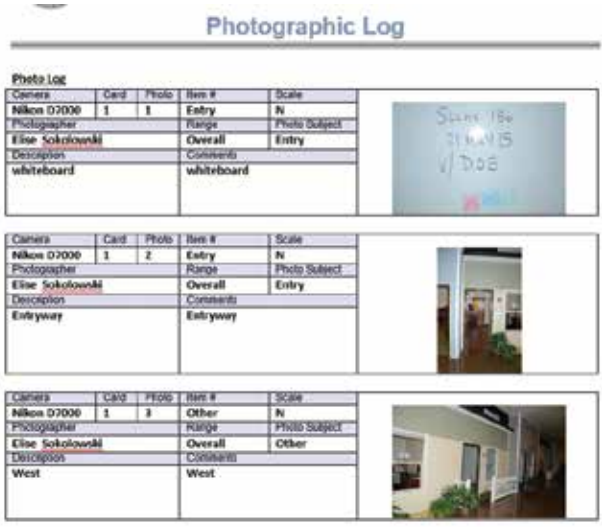
AN ELECTRONIC EVIDENCE COLLECTION MANAGEMENT SYSTEM

Most federal investigative organizations transitioned to electronic investigative databases long ago, and to date, countless case file systems have been created, improved, and become linked to still other databases, making instantaneous information sharing and report generation possible. Up until recently, though, hard-copy crime scene documentation had to be manually input into these systems. Evidence tags and forms handwritten at the scene had to be transcribed into investigative databases sometimes in the middle of the night following hours of crime scene processing. Hand-drawn sketches and measurements had to be transferred into computer assisted diagramming software in order to produce a professional product worthy of presentation at trial. The process of transitioning crime scene information to an electronic database was not only time-consuming, but also created an opportunity for transcription errors. In the unforgiving field of forensic evidence, one misplaced digit can cost an item of evidence its admissibility in court. Additionally, missed steps are often not identified until this mountain of information is being transferred to the database; at that point, it is no longer an option to go back to the scene and take that last measurement, or capture that one overlooked photograph.

In 2007, the Federal Bureau of Investigation (FBI) developed a software application known as the Evidence Collection Management (ECM) System. This application was designed for use by crime scene investigators to document the investigative work done at FBI crime scenes by organizing into a workflow the products from all the common roles involved in the processing of the scene. For the first time ever, a crime scene diagram could be linked with digital photographs, electronic evidence tags, and the written documentation associated with each item of evidence. Not only was time and energy saved by documenting these features electronically the first time, but also the software allowed investigators to observe the totality of their evidence's documentation in one, consolidated application. This made understanding and analysis of the crime scene much more readily accessible.

Through their partnerships with the FBI, the Department of Defense (DoD) Biometrics Program Managers identified a common use for the software, and following some modifications to bring the software in line with DoD requirements, they brought on-line their own version of the evidence collection system, which the DoD refers to as ECMX. This software provides prompts for specific descriptions, drop-down menus for required information, and link capabilities between the scene sketch, photographs, and evidence descriptions. There is also an output Word document that serves as a crime scene investigative report including evidence custody documents, receipts for items seized, and photography-logs. This software has the capability to operate on a standalone computer or on a network. The DoD intends to place ECMX on a mobile platform that operates on networked computers. Eventually, users will be able to connect to an internet hotspot and communicate between ECMX applications through a secure DoD server. This will allow for better on-scene management and near real time oversight by the crime scene lead. Because the software allows multiple agents performing various roles at a crime scene to simultaneously input data into a single report, missed steps can be more easily identified, and important relationships within the crime scene can be detected at an earlier time by managers or analysts in an entirely different location. The implications of this software would be exciting to any crime scene investigator; for that reason, FLETC's Military Criminal Investigative Organizations



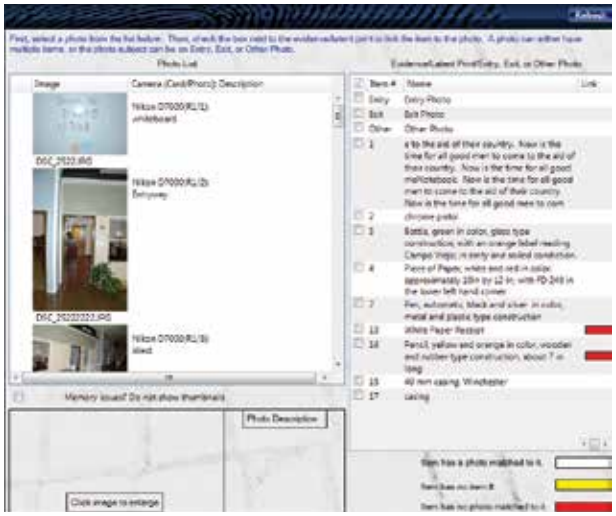


(MCIO) partners were eager to implement this software in their training programs. Their first stop was FLETC's Crime Scene Investigator Training Program.

THE CRIME SCENE INVESTIGATOR TRAINING PROGRAM

In January of 2014, the Forensics and Biometrics program managers from the Air Force Office of Special Investigations, the Army Criminal Investigation Command, and the Naval Criminal Investigative Service decided to overhaul the specialized training provided to select agents destined to serve as Forensic Science technicians and consultants for their agencies. Prior to this date, each of the three MCIOs sent their forensic agent selectees to nine different specialized training programs to obtain the advanced skills necessary to serve as forensic subject-matter-experts. This was an expensive and time-intensive process to certify their experts, taking sometimes two years to complete all the required training. Additionally, because each of the three agencies obtained their training from different entities, there was variation in their agents' methods and techniques. The MCIOs concluded, then, that a standardized, consolidated, and joint forensic technical school would be both a practical and economic solution to produce the forensic science experts critical to the success of their criminal investigative mission.

Over the course of 2014, the Biometrics program



Screen shots of ECMX software organizing the many components of crime scene processing procedures taught in the Crime Scene Investigators Training Program.

managers visited not only FLETC, but also numerous training academies to compare facilities, existing curriculum, the credentials of the instructional cadre, and importantly, the institutions' ability to respond swiftly and agilely to new training requests. The MCIO representatives unanimously selected FLETC's Forensics and Special Investigative Skills Branch to build this unprecedented training program, and in September of 2015, FLETC piloted the first iteration of the Crime Scene Investigator Training Program. This seven-week advanced forensic training program has set the standard for how federal law enforcement employs forensics at crime scenes and has effectively equipped the MCIOs' forensic science agents with the specialization and knowledge to consult on and lead the processing of the military's most complex crime scenes. As such, these leaders in their field need to be among the first in their agencies to learn and master new technologies, like the ECMX software.

IMPLEMENTATION OF THE ECMX

The great utility of the ECMX software is its ability to receive, organize, and relate information as it is immediately collected from a crime scene. It was therefore imperative that the students be able to undock their networked computers and take them into crime scene exercises at various training venues on FLETC. In anticipation of this training requirement, the forensics instructors acquired training network tablets for student use in the program, and executed several iterations of the training programs to ensure instructor proficiency with this learning tool. All the planning and advance troubleshooting paid off, as the ECMX software was successfully implemented in the Crime Scene Investigator Training Program in May of 2016. The instructional cadre of the training program embedded the software into their presentations, and used it as a framework to instruct students on the required crime scene documentation. Over the course of seven weeks, students process 12 crime scenes and utilize the ECMX software to track and catalogue their efforts. At the conclusion of the program, students receive a subpoena notifying them they will testify to a particular item of evidence they identified, processed, and collected at one of these 12 crime scenes. The ECMX software is used to generate a crime scene report that prosecuting and defense attorney role players use to question the students about their methods of collecting a particular item of evidence. Now, as students are learning the forensic techniques taught by FLETC, they simultaneously develop a proficiency documenting those techniques in the software they will encounter in the field. In this way, the cradle to grave application of this software envisioned for use in real world cases is successfully mirrored in its cradle to grave application throughout the training.

TECHNOLOGY IMPROVING PARTNERSHIPS . . . AND PARTNERSHIPS IMPROVING TECHNOLOGY

Among the many benefits of sharing technology from the field with those administering training is the mutual strengthening of both the training and technology products. The training improves because the students are able to use tools that reflect those which are actually used in the field, making the training environment more realistic and consequently more relevant. The technology also improves because, unlike the real world where mistakes can cost law enforcement a successful prosecution, instructors and students can test the technology in a "safe" environment. In training, risks can be taken, limits can be pushed, and "what if" scenarios are actually encouraged. FLETC has done precisely that with its implementation of ECMX; after just one iteration, instructors have provided invaluable feedback on what worked, what did not, and suggestions on how the technology can be changed to avoid issues in the field. It has also revolutionized advanced forensics training by putting the most cutting-edge technological developments in the hands of the FLETC student. Indeed, one could cite FLETC's implementation of the DoD's ECMX software as the "smoking gun" of a successful partnership between technology and training.

Instructional Preparation for the Virtual Classroom: U.S. AFOSI and On-line Instructor Diana Fleming, recording audio for lesson presentations for students enrolled in AFOSI's Basic Extension Program.

The Virtual Law Enforcement Classroom

BY DIANA FLEMING
AFOSI INSTRUCTOR

Twenty years ago, the term "Virtual Classroom" may very well have evoked images of a hypothetical alternate reality, or perhaps an exaggeration of the extent to which technology would envelop normal everyday lives. Today, however, virtual classrooms are at the very least a reality and most likely a necessity. Indeed, long established traditional colleges and universities are increasingly emphasizing in their advertisements the availability of online degree programs, blended learning environments, and distance education opportunities. This is due not only to the fact that technological advancements make distance learning possible, but also because the target student audience seeking higher education demand it; these students have grown up with these technologies and are used to absorbing information through these modalities, they are proficient with the technology, and they require it to accommodate their busy lifestyles. Of course, institutions of higher learning benefit from these endeavors as well. The virtual classroom offers the benefits of scheduling flexibility, an inexpensive physical infrastructure and training platform, and a much wider reach than the traditional classroom. It may come as no surprise that these features make it attractive not only for higher education institutions, but for law enforcement training and education as well.

Opponents of law enforcement training evolving into the virtual learning environment would argue that the practical

THE DEVELOPMENTAL STAGE WAS THE MOST CHALLENGING, AS CURRICULUM HAD TO BE DEVELOPED FOR FOUR DISTINCT BLOCKS, AND THIS CURRICULUM NEEDED TO BE ENGAGING IN A VIRTUAL ENVIRONMENT, AND INCLUDE STUDENT ACTIVITIES, LABS, AND FINAL EXAMINATIONS.

aspects of policing simply cannot be taught effectively in an online environment. There is indeed merit to this argument, as not all components of law enforcement training are suitable for distance learning. Physical techniques and tactics, firearms, and operational skills, all require some in-person instruction, performance, and evaluation. There are, however, other facets of law enforcement education that are appropriate for the distance learning environment. In order for this environment to be used appropriately, a normal Instructional Systems Design process must be followed, during which the learning objective is identified, the required level of proficiency determined, and then, only then, the most appropriate method of delivery selected. In fact, accomplished properly, the virtual classroom becomes just one more option for consideration next to lecture halls, mat rooms, and firearms ranges.

In 2011, the Air Force Office of Special Investigations (OSI) recognized a gap in training between the agency's basic and advanced skill training and requirements, which was not consistently addressed for every agent in on-the-job training. Following graduation, agents spend a year on "probation" during which they apply the skills they learn at FLETC in the context of a real world operational environment. This on-the-job-training varied according to the agent's duty station, the nuances of their particular mission and jurisdiction, and the unpredictability of both frequency and type of case work. The U.S. Air Force Special Investigations Academy staff realized that in order to deliver a more standardized training program to a student audience that was literally scattered across the globe, they would have to utilize a virtual classroom. Thus was born the Basic Extension Program (BEP), a first of its kind, online training program offered to OSI students beginning in 2012. As the staff who stood up the program can attest, the virtual law enforcement classroom did offer many benefits, but also presented some unique challenges.

INITIAL CHALLENGES

Like any good training program, the inception of the BEP followed the ADDIE-R process. The ADDIE model is the generic process traditionally used by instructional designers and training developers. The five phases—Analysis, Design, Development, Implementation, Evaluation and Revision — represent a dynamic, flexible guideline for building effective training. The OSI Academy staff analyzed the training gap, designed a program solution, developed curriculum, implemented the program, evaluated student performance, and revised the training based on feedback. The developmental stage was the most challenging, as curriculum had to be developed for four distinct blocks, and this curriculum needed to be engaging in a virtual environment, and include student activities, labs, and final examinations. Initially, the BEP required students to complete each distinct block in a certain sequence, with specific start and end dates, regardless of their duty station. First was recruitment of sources, then interviewing, and so on. Assignments involved a variety of activities, to include readings, meetings with entities, and review of case studies. All assignments and final examinations followed an essay format. One BEP instructor, Special Agent Hillary Zuege shared that one of the challenges was the "inherent stress upon the instructors to provide a great level of detail to an open-ended question. The desire to encompass all possible options made the feedback very lengthy."

In order to gauge the efficacy of the BEP, OSI Academy staff collected student and supervisor surveys from customers using this training in the field. This feedback proved invaluable, as it illustrated a strong need for an even more flexible learning environment. Responsive to this feedback, the staff revised the program to allow probationary agents to enroll in and accomplish any of the four blocks, and in any order they chose. They also were allowed to enroll in multiple courses at the same time. This enhanced not only the flexibility, but the buy-in from the customer as these changes empowered the students to schedule more optimal times to take a class and still balance work requirements and life obligations. As Zuege shared, before these changes were made "students were unable to engage as much as they wanted in the course material due to the effort required for the essay-style questions. Students were already trying to balance between work and home obligations, and BEP took up any time they had left. Several students stated the material was very interesting, but they weren't able to read all of it or apply critical thinking because of time constraints." OSI Academy staff expects that their revisions to the program will help alleviate this challenge and enable their students to engage more fully in the online learning process.

Results

Level II feedback on the BEP has produced some surprising and unexpected results. The staff at the academy suspected that their use of the virtual classroom would achieve greater reach and save their command money in the long run, but they never expected students to enjoy the training to the extent they did. Student feedback overwhelmingly valued the in-depth, personalized interaction with instructors on their assignments. The reason this may be surprising is that many perceive the online learning environment as impersonal, and cite the lack of face to face exchange as a shortcoming of that medium. However, one of the by-products of using an essay-style design of labs and examinations is the requirement to interact and communicate on an individual level. With more individual effort on the part of the student, the instructor is compelled to give each individual student personal attention and feedback on their submitted product, something that cannot always happen in a classroom environment. While several challenges remain concerning the logistics of supporting an online learning platform and continuing to design engaging curriculum, the OSI Academy has in a very short amount of time created subject matter experts in this arena. In fact, the BEP is so successful, it is the first and only online program pursuing Federal Law Enforcement Training Accreditation at this time.

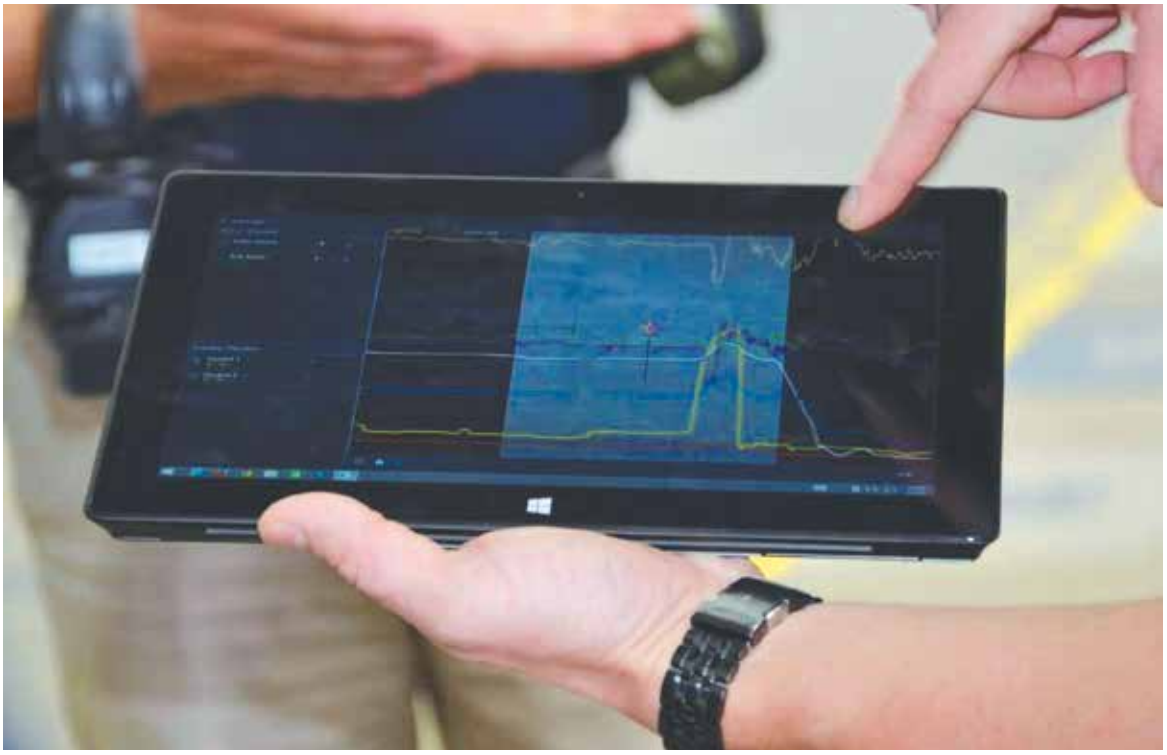
Virtual classrooms have indeed become a part the norm when it comes to education. The virtual classroom is not only here to stay, but is an expectation in the current age of global connectedness. Law enforcement should not shy away, but should embrace the virtual classroom for the benefits it can offer and capitalize on a platform that certainly allows for flexibility, lower training costs, and much wider audience reach.

SPECIAL AGENT DIANA M. FLEMING is assigned as an instructor in the Advanced Training Division, United States Air Force Special Investigations Academy (USAFSIA), Federal Law Enforcement Center (FLETC), Glynco, Georgia. In this position, she is responsible for instructing all forensics topics in four AFOSI basic and advanced in-residence courses to over four hundred and twenty students.

Fleming is the director for the online criminal investigation skills block of the basic extension program, which reaches two hundred probationary agents annually. She is responsible for designing curriculum and training agents to use all newly procured forensics equipment for Air Force Office of Special Investigations (AFOSI). Fleming interfaces with the AFOSI liaison at the United States Army Criminal Investigations Laboratory in Forest Park, Georgia, on training and research needs. She also oversees USAFSIA's execution of strategic engagements with international partner agencies.

Fleming informally mentors and encourages families, whose children are medically fragile, similar to her daughter, on the use of parenteral and enteral nutrition proving practical guidance and hope.

New Technology
and its Potential to Enhance Training



BY ALICIA GREGORY
SENIOR PUBLIC AFFAIRS SPECIALIST
PHOTOS BY HEATHER SANTOS

Most instructors strive to get into the mind of the student. Knowing what a student sees or feels during a practical exercise can allow for more specific and precise training and improved results, which is beneficial for both the instructor and the student.

The Federal Law Enforcement Training Centers is testing a new technology that can enhance the way firearms instructors teach. Rather than relying solely on direct observation of the shooter to diagnose a student's challenges in firing a weapon, instructors will have access to real-time sensor and video data that will allow them to more quickly pinpoint the issues and save valuable instructor and student time.

Top photo: A technician points out statistical information based on the MAT-MP testing. Above: A FLETC firearms instructor fires a weapon equipped with monitoring technology.

Rocco Portoghese, senior reseach and development engineer, NAWCTSD Orlando Rapid Design and Fabrication Lab, explains how the MAT-MP prototype works to FLETC staff.

The Naval Air Warfare Center Training Systems Division (NAWCTSD) developed a weapon-mounted sensor package that is capable of recording and analyzing shooter data, such as trigger pressure, trigger pull, cant angle, buttstock pressure, and steadiness. The instructor can also observe the student/shooter's point of view through a high-definition camera attached to the sighting system. The data and video are captured and transmitted in real time to the instructor's tablet or laptop computer and can be viewed live or played back later for evaluating marksmanship fundamentals.

Originally sponsored by the Navy's Office of Naval Research, the Modular Advanced Technologies Marksmanship Proficiency (MAT-MP) prototype is currently designed for use with rifles such as the M16/M4 platform. According to Tyson Griffin, Head of the NAWCTD's Advanced Modeling and Simulation Branch, the technology could be adapted for law enforcement training.

"The ultimate vision for law enforcement is an application for handguns," explained Griffin. "This will take additional engineering work in order to miniaturize components and instrumentation for a sidearm. That is the long-range vision . . . it would not only benefit FLETC, but also state and local law enforcement training academies."

Griffin's teams have partnered with FLETC on transferring and adapting Department of Defense technologies to law enforcement while working on FLETC's After-Action Review system; the Advanced Use of Force Training System at sites in Glynco, Georgia, and Artesia, New Mexico; courtroom upgrades in Glynco, Artesia, and Charleston, South Carolina; and the Scenario Planning and Effects Control System at Glynco.

Portoghese and FLETC FAD instructors identify and discuss improvement modifications for the MAT-MP. *Photo by Doug Dragotta, FLETC.*

The results from the MAT-MP firearms test are show to a FLETC instructor.

The potential application of MAT-MP for law enforcement was identified by Mr. Don Lapham, Office of Assistant Secretary of Defense for Homeland Defense and America's Security Affairs, whose job it is to find Department of Defense technologies with the potential to benefit first responders.

"The MAT-MP Project was first demonstrated to FLETC at the Interservice/Industry Training, Simulation and Education Conference in December 2014," said Dee Marshall, former program manager for FLETC's cooperative research and development

agreement program. Marshall worked closely with the NAWCTD engineers on a variety of projects during her tenure with the FLETC. According to Marshall, several representatives from FLETC, including FLETC Firearms Division Chief Scott Donovan, attended the conference where they were able to see the demonstrations and had an opportunity to talk directly with the engineers and Lapham on site. "MAT-MP was immediately endorsed as a potential technology that could significantly assist firearms instructors. A subsequent visit to Orlando involving firearms staff members confirmed our interest and the potential value of this technology."

FLETC Firearms Branch Chief and former FLETC representative at Team Orlando, Doug Dragotta, facilitated the relationship between the FLETC instructors and NAWCTD engineers to determine if this technology could work in practice.

The first test and evaluation was conducted in May 2015 using live fire in one of the FLETC ranges in Glynco, Georgia. "The overall objective for the initial testing was to evaluate whether this technology would be applicable and effective for use in our basic and advanced rifle training programs," explained Dragotta. The team also set out to define specific requirements for any customization needed to the current prototype. Several instructors participated in the process, providing subject matter expertise and feedback to the engineers and ultimately determining the sensor package could be used to assist with diagnosing student marksmanship deficiencies when using a rifle. The team of instructors would also like to see this technology adapted to a pistol where marksmanship deficiencies are more prevalent.

According to Rocco Portoghese, NAWCTSD's MAT-MP lead engineer, "The interest level and engagement of instructors was outstanding. They weren't just observing, they were asking questions to figure out how to make the best use of the technology. This is invaluable to the creation of new technologies." "In terms of the power of the government conducting this development, while for-profit companies have to ask themselves 'what can I sell?' here NAWCTSD and FLETC can specifically concentrate on what we can do for instructors and students," Griffin has noted. And it's not just NAWCTD giving technology to FLETC – each organization leverages each other's knowledge, skills, and abilities; NAWCTSD takes successes with FLETC and passes them onto the Fleet.

Portoghese recalled the same kind of engagement with previous projects with FLETC. "We've always had a high level of cooperation with the FLETC training community. The instructors and the Partner Organizations recognize that if they put the time in evaluating and helping to define technologies, it will give FLETC a better capability to train."

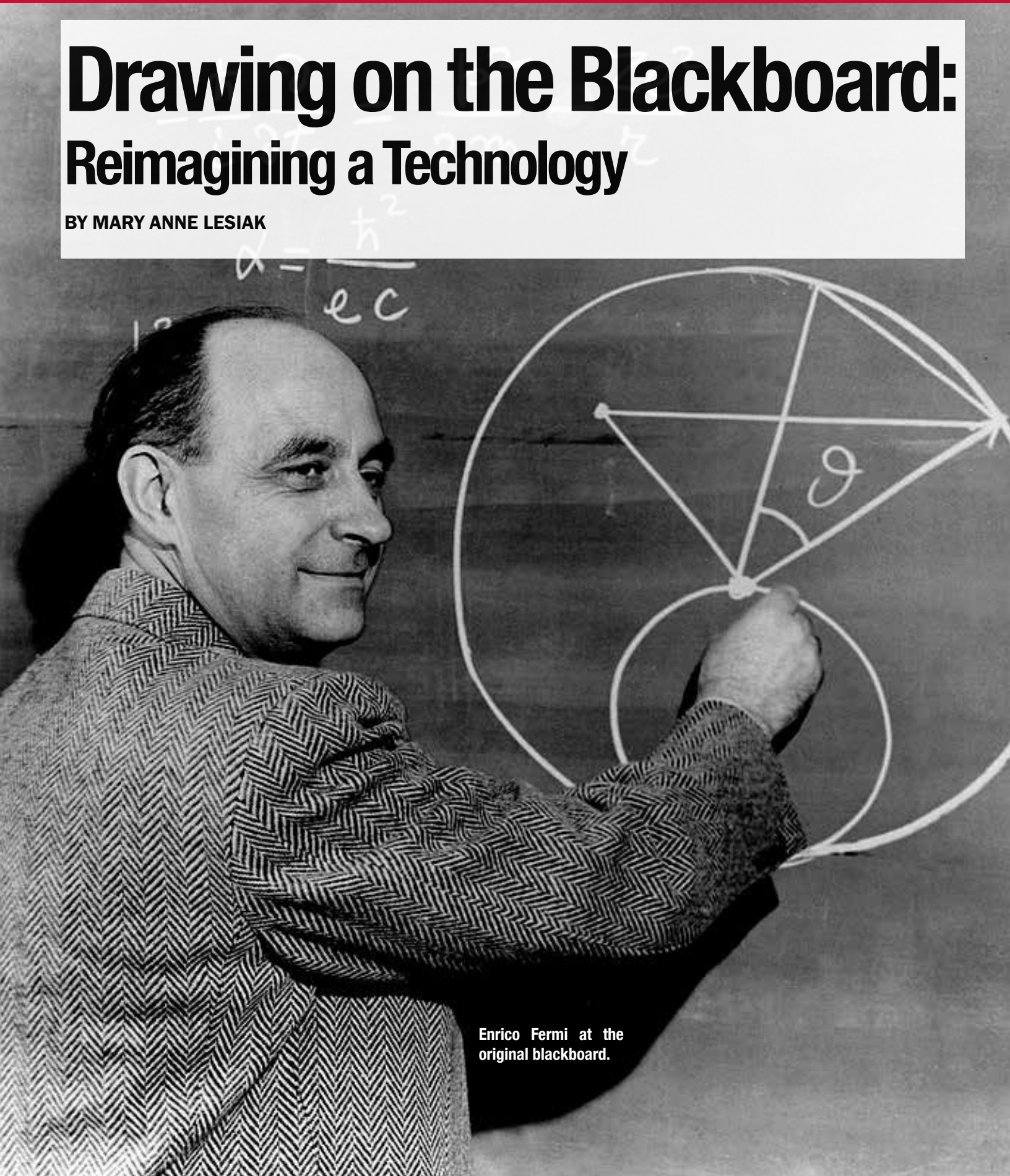
"The interactive relationship with FLETC instructors has made us better," added Griffin. He went on to discuss the importance of the technologists working with the instructional design specialists, research psychologists, and instructors to really explore how technology can help training. "From a partnership perspective, this will lead to a better product."

With promising results from initial testing, the team is looking forward to continuing with the development of the MAT-MP and integrating the technology into firearms training.

ALICIA GREGORY is a senior public affairs specialist in the FLETC Protocol and Communications Office. She arrived at FLETC in 2005, after serving as the Public Affairs Officer for the U.S. Army Corps of Engineers in Charleston, South Carolina. Gregory has more than 25 years working in the public affairs field and has an extensive background in internal communications, community relations, and media relations. She is a graduate of the Defense Information School in Fort Meade, Maryland. Gregory earned a Bachelor of Business Administration from South University.

Drawing on the Blackboard:
Reimagining a Technology

BY MARY ANNE LESIAK



Enrico Fermi at the original blackboard.

Senior Instructor Craig Cupp demonstrates the latest techniques in trace evidence location, recovery, and analysis.

Organizations bring on new technologies to advance strategies or solve problems that are generally well defined and articulated as part of the adoption process. In these lean economic times, neither public nor private organizations expend scarce resources without a clear understanding of exactly what they are getting and the benefits to the organization. During the adoption process, teams craft functional and technical requirement documents that spell out exactly what the technology needs to do, how it will operate, and what other systems it will communicate with. Products that provide the best match to these requirements within the allowable budget are selected and away we go – off to implementation!

Occasionally, entrepreneurial problem solvers see new technologies adopted and figure out how to use them in unexpected and enterprising ways. One such example is the Federal Law Enforcement Training Centers' Investigative Skills Branch Chief Bill Newbauer, who recognized that technology supporting FLETC's Online Campus could update and improve FLETC basic training program delivery.

Newbauer leads FLETC's Continuous Case Investigation training program – or CCI – which provides newly hired criminal investigators with an introduction to the criminal investigative process and the skills necessary to prepare and present a case to an Assistant United States Attorney as part of the Criminal Investigator Training Program. Through the 12-week CCI, students learn how to initiate criminal cases, the methods of conducting investigations, procedures for maintaining case files, and the finalization and judicial processing of cases. While CCI includes direct classroom instruction, the bulk of the learning takes place as the students work in teams running their own ongoing scenario-based cases.

Mimicking a real case, the ongoing training case requires finding, developing, organizing, and maintaining various pieces of documentation, information and evidence. These could include maps, forensic reports, photographs, interview memoranda, phone bills, credit card receipts, or numerous other types of documents depending on the case. As student teams develop their cases, they maintain their case files in traditional file folders. At the conclusion of the investigation, students have a large binder full of documentary evidence that must be re-created into a second binder and turned over to the defense attorney

for discovery during the mock trial.

Newbauer identified two major inefficiencies with the status quo. The daily production of paper documents to support scenarios – generally on a single, overworked, shared copier – required hours of instructor preparation time. "I couldn't bear watching them stand over the machine and spend hours making copies," said Newbauer. "It was just a terrible waste of time."

Additionally, many partner organizations for whom the students would eventually work cases had digitized their case management systems, making the paper system obsolete "We want to give our students the best training available. We were giving them the very best knowledge and skills, but in this one instance, our tool was out of date," stated Newbauer.

Senior Instructor Scott Wright debriefs students following the execution of a search warrant.

In support of FLETC's "paperless initiative," Newbauer began a search for a digital solution to replace the multiple volumes of paper produced during the ongoing criminal investigation. Eventually, Newbauer teamed up with FLETC's Instructor and Online Training Division.

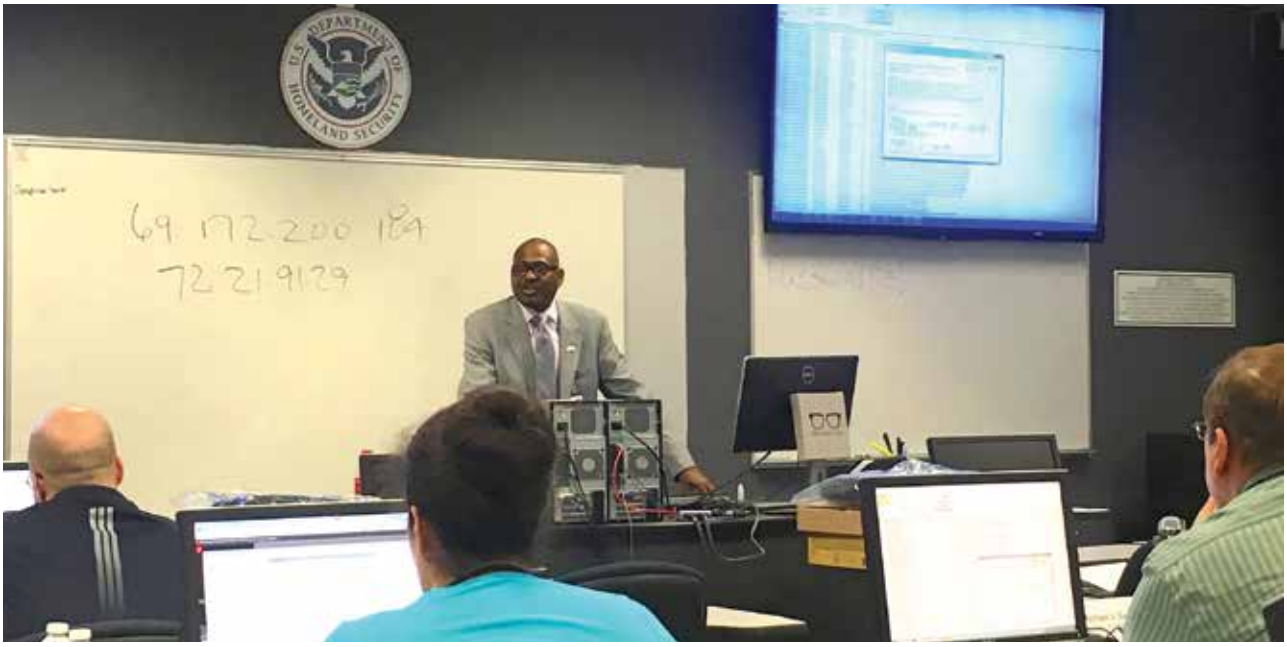
FLETC's Online Campus Team selected Blackboard® as its learning management system for its distance training and learning delivery capability. The primary function of the learning management system is to manage all facets of the online training process, including registration, program administration and delivery, instructor communication, trainee evaluation, and transcript management for an audience that may never step foot on a traditional FLETC training campus.

After a little background research into Blackboard and a few discussions with Instructor and Online Training Division Deputy Chief Joe Augeri, Newbauer believed that Blackboard could serve as a permanent online repository for all the materials and artifacts necessary for the CCI training program and the case management files for the ongoing cases. In addition to eliminating the frustrations, cost, and environmental impact of producing and managing paper, Blackboard would also give instructors and students collaboration and communication tools that could enhance learning and feedback around the investigative process. By integrating Blackboard, CCI would become FLETC's first hybrid learning program, enhancing traditional classroom instruction with newer online instruction, activities and resources.

Many obstacles were identified. Students and instructors would need tablets and Wi-Fi to access the system around the clock. Would FLETC have the data infrastructure to support this program? How do we grant internal students access to an online system built for external students? How would students get IT support from a system that closes its help desk at 5:00 p.m.? Contributors across the FLETC enterprise, with the support of Director Patrick and the FLETC Executive Team, continue to collaborate to solve these and a myriad of other challenges.

Augeri and his team managed the Blackboard CCI implementation. "We've been using Blackboard to work with the online students for a while now," said Augeri. "It is exciting to leverage the learning management system and wireless tools/technology to deliver realistic training that is indexed to the needs and requirements of the field."

Preparing traditional classroom instructors to maximize the impact of training using this new multi-modality platform is of critical importance.



Senior Instructor Greg King educates law enforcement students in the use of internet tools to optimize their investigations.

"People sometimes think training is training. Training and education online is different and requires additional skillsets. Students are generally familiar with this sort of technology before they get here. We need to make sure the instructors have equal or better familiarity," added Instructor and Online Training Division Senior Instructor Bobby McGettrick. In response to this challenge, the Instructor and Online Training Division created a series of web-based training modules constructed for someone completely unfamiliar with Blackboard. They cover everything from basic uploading lessons, to computations, to receiving survey results.

Newbauer realizes the project is moving forward; however, he initially underestimated its complexity. "It was easy to get started because I could see the vision. I could see how much better it could be for students and instructors, and I knew Blackboard could do it. What I didn't see was all the other progress – big and small – that have to occur in order to fully realize that vision. I'm so grateful for the expertise and teamwork from Joe Augeri, Bobby McGettrick, Pam Potaczek and Scott Wright, and our team of dedicated Continuous Case Investigation Coordinators. They are really working to make our vision a reality."

The use of Blackboard to support the CCI program goes beyond the intention of the system's original adopters, thereby extending its use in a way that better serves the entire enterprise, creating additional beneficiaries and leveraging its initial expenditure. When considering technology to solve an existing problem, it may make sense to reinvent something that exists within the organization rather than look outside.

MARY ANNE LESIAK is a program analyst in the Regional and International Training Directorate. Prior to joining FLETC in 2014, Mary Anne served in several roles at Apple Tree Institute for Education Innovation, including Chief of Staff, Chief of Strategic Initiatives and Director of Education. At Apple Tree Institute, a non-profit located in Washington, DC, she led the development, implementation and dissemination of research-based curricula, teacher training and evaluation tools designed to improve teaching and learning in under-resourced schools. Mary Anne has also served as an Educational Website Coordinator at the US Mint, a Program Analyst at the US Department of Education, and a teacher in the District of Columbia Public Schools. She earned a Master in Teaching from American University and a Bachelor of Arts in Government and Politics from the University of Maryland, College Park..

Working Together to PIONEER the Future of Law Enforcement Training

DHS Science & Technology Directorate partner with the FLETC Training Innovation Division

BY SHAWN BELTRAMO

We are fortunate to live in such an exciting time in the world! The Digital Revolution has led to unprecedented access to information and an incredible number of innovations. Smart phones, body worn cameras, unmanned aerial systems and all the other incredible technology highlighted in this edition of the FLETC Journal are great examples of how these new technologies are leading to amazing innovations in law enforcement and education. While all this technology can provide new and exciting solutions to a wide range of training challenges, the human element remains the most critical piece of any potential new innovation. Having an actual person in the loop to determine how and why this technology will be used is a critical step. Connecting the right people to the right technology at the right time is a major factor in determining if a new technological advancement will succeed or fail.

The Federal Law Enforcement Training Centers and the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) recently took a significant step forward to ensure the right people are part of the training innovation process by embedding an S&T employee at the FLETC-Glynco campus as part of the PIONEER program. The PIONEER – Partnering for Innovation and Operational Needs through Embedding for Effective Relationships – program was started in 2015 with the objective of bettering the understanding of the research and development process and gaining insights into components' operational needs, capability gaps, and working environment.

PIONEER embeds S&T members into the DHS components' environments, enabling access to current-state awareness of the components' most critical needs, and concurrently embeds DHS component personnel into the S&T research, development, test, and evaluation processes. Embedding component personnel into S&T will ensure a better understanding of what it takes to bring a potential technology from an idea to an operational product, as well as the importance of having a clear notion of operational requirements before S&T starts developing a technology.

Jim Grove was recently selected to be the first PIONEER liaison assigned to the FLETC and is embedded with the Training

Jim Grove, DHS Science and Technology Directorate liaison, demonstrates a virtual reality headset to a staff member in the FLETC Future Concepts Rooms.

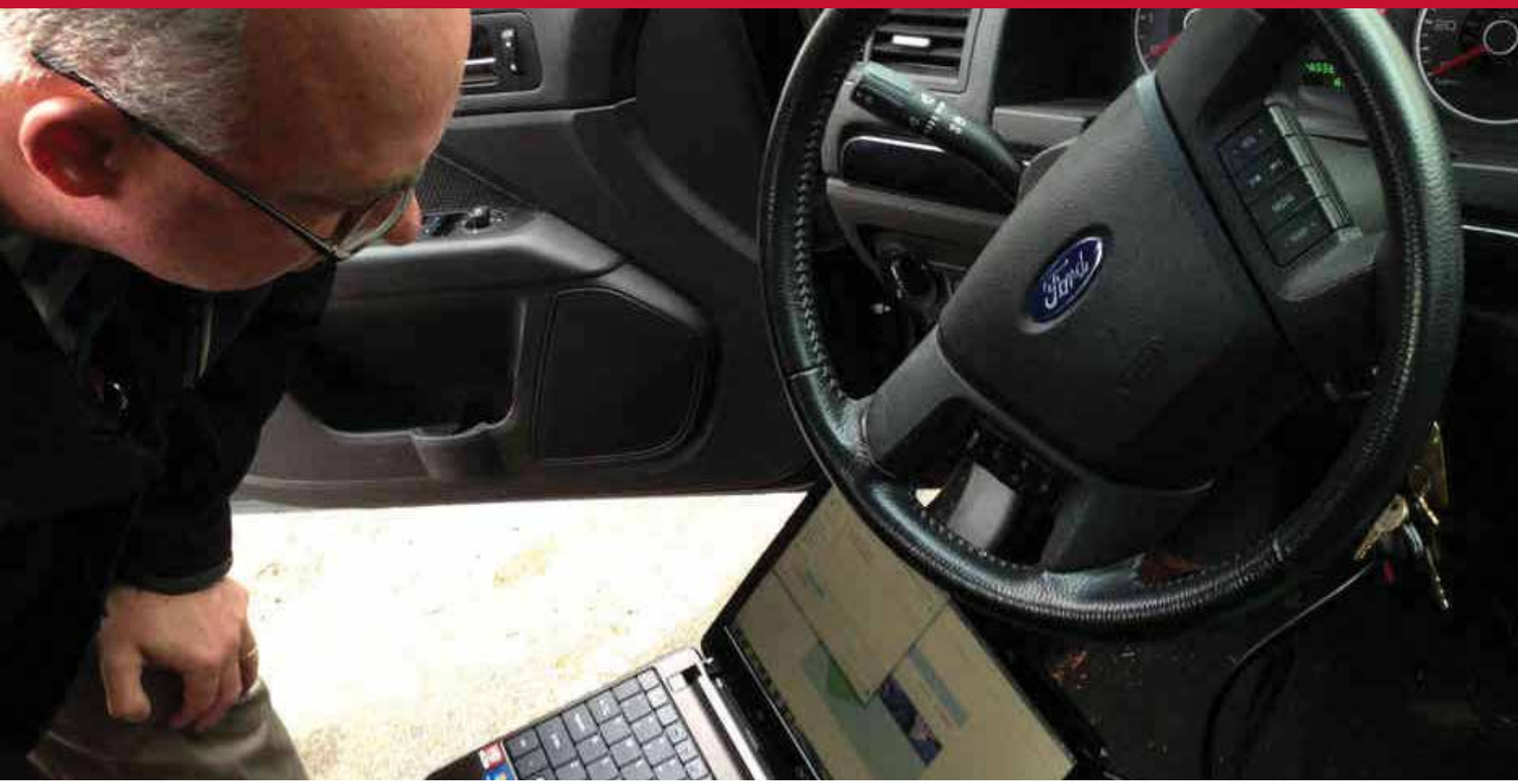
Innovation Division at FLETC-Glynco. The Training Innovation Division and S&T have a longstanding relationship of collaboration. Having an S&T liaison embedded at FLETC creates valuable opportunities to strengthen this relationship and leverage the capabilities of each organization. "S&T's expanded relationship with FLETC instructors and subject matter experts provides a great opportunity for our program managers to further develop operational requirements, test new technologies and applications, and make final adjustments before deploying them in an operational environment," said Grove.

S&T has access to a wide range of technical experts and resources to design and develop new innovations, while FLETC has many of the top experts in the law enforcement training field. By linking these subject matter experts with the technical experts, we greatly increase the overall quality of the innovations for both agencies. Additionally, by having access to the state-of-the-art training venues at FLETC, the program managers at S&T are able to test the newest technologies in realistic scenarios and compile critical feedback on their utility and performance.

"I am excited about this detail because it provides a window into how technology development impacts both training and doctrine and where new or enhanced technologies may increase student learning and skill proficiency," Grove said. "It also provides an opportunity to look beyond the DHS components to identify cross-cutting requirements, collaborate on emerging S&T projects, and work with the private sector to facilitate the development of innovative tools, technologies, and products."

Through the partnership, FLETC instructors and students are able to get a first look at some of the newest technology coming into the field and have an opportunity to provide their input toward the design and future implementation of these technologies. These combined efforts are helping to bring the latest technologies to the future of law enforcement training.

SHAWN BELTRAMO serves as the division chief for the Training Innovation Division for the Federal Law Enforcement Training Centers. He provides guidance and oversight to division's three branches; the Applied Research branch, the Outreach & Exploration branch and the Evaluation and Analysis branch. The Training Innovation Division's primary mission is to research, identify, channel, and validate new instructional methods and technologies into the curricula. Prior to this assignment, Beltramo served as a supervisory special agent with the Air Force Office of Special Investigations where he performed and oversaw a wide range of felony criminal investigations and counter-intelligence matters. He served over 22 years with the United States Air Force and performed duties in numerous stateside locations and eight foreign countries. These duties included working as a patrolman, dispatcher, investigator, recruiter and special agent. Beltramo received his bachelor's degree in Criminal Justice Administration from Columbia Southern University and his master's degree in Criminal Justice from American Military University.



Laptop is connected to vehicle infotainment system to obtain digital evidence.

Vehicle Embedded Forensics

BY PRESTON FARLEY

The call came in at 11:30 p.m.* A silent alarm had been triggered at a local electronics store. Patrol officers were dispatched immediately to the scene and arrived approximately 12 minutes later. The store had a broken glass door but no one was visible in the building. Smashed store displays littered the scene and high-end electronics were missing from many of them. It was the same "Modus Operandi" as other recent breaking and entering crimes recently investigated in the area. This time, however, a break in the case originated from a bystander, who provided police with a vehicle description and license plate number. Through diligent police work, a search warrant was issued for the vehicle owner's residence and vehicle. Unfortunately, no physical evidence of the crime was discovered at the home or in the vehicle; however, digital evidence recovered from the vehicle itself told a very interesting story.

Vehicle embedded forensics is a relatively new discipline driven by the automobile industry's introduction of electronic circuitry into our nation's vehicles. Much of the early investigative work in this field came from traffic accident analysts who learned you could obtain the state of various vehicle systems at the time of impact such as accelerator position, brake pedal position, speed, steering wheel direction, etc., from the "little black box" in most vehicles. While those items are still available in today's vehicle computers, there is a vastly larger

Photo of an actual "little black box".

dataset to pull from to generate leads or provide hard evidence in an investigation not necessarily related to an automobile accident.

In 1996 the OBD-II (Onboard Diagnostics 2) specification was made mandatory for all cars manufactured to be sold in the United States. This system was originally designed to provide vehicle repair technicians with self-diagnostic and reporting of problems with the vehicle. This system has been improved over its life and many capabilities have been added over the years that are not specifically related to vehicle maintenance. Some of the more well-known capabilities include Global Positioning Systems (GPS), Entertainment Systems, and Telecommunications via syncing with user smartphones. Some less well-known capabilities include monitoring vehicle idle times, speed, engine Revolutions Per Minute, fuel efficiency, and fuel levels. Some vehicle manufacturers also include things such as door lock status, when each door is opened and closed, and even mobile Wi-Fi hotspots, which may contain records of smartphones or computers that have been attached to it in the past, including the time/date and geographic location.

In the past five years, there has been a lot of research done on the embedded vehicle computer systems with an eye toward how law enforcement could leverage this information for criminal investigative purposes. Only a handful of companies currently provide support for this function; however, when this information is used, it can make a case. A major problem is that there is no industry standard for what information may be available via the embedded computer systems, nor is there a standard format for presentation of the information to law enforcement. This is in stark contrast to the Communications Assistance for Law Enforcement Act, which mandates that telecommunication companies must provide law enforcement with a standardized way to conduct telephone and internet intercepts. A second major hurdle is that simply accessing the information requires, in many cases, disassembling the vehicle to gain physical access to the electronic components. This necessitates that the investigators have prior training in the safe removal of vehicle components; know where the vehicle computer components are located, as each manufacturer places them in different places throughout the vehicle; and have the correct physical adapters and software to obtain and interpret the requisite information from each of these proprietary vehicle computer systems.

In addition to the artifacts already listed, there are many more potential evidentiary items that may be available to law enforcement. For instance, with some vehicles the owner can download their contacts into the vehicle's computer system. When calls are made or received, the vehicle will archive these call records. When texts are received, the vehicle will display the sender and the text itself, which is also retained in the vehicle's computer. GPS

Photo of an aftermarket car data recorder.

positions can be retained for very long periods of time indicating where and when a vehicle was at a specific geographic area. This list of artifacts is sure to grow as our smart phones become more capable, and these capabilities will spill over in the vehicle arena.

Armed with a forensic analysis report of the suspect's vehicle, investigators sat down with the suspect and began questioning his actions on the night of the aforementioned burglary. The suspect admitted to driving in the area and stopping "to think" when the witness reported his vehicle, but admitted nothing further. Investigators then revealed that they had obtained a detailed report from his vehicle's computer system. This report contained information that on the evening of the burglary, his vehicle stopped at the reported location and began idling at 11:28 p.m. Approximately 15 seconds later the front and rear passenger doors as well as the driver's side passenger door opened and closed within two seconds of each other. At 11:33 p.m., the trunk opened and the same three doors opened and closed, and immediately following the vehicle departed the scene. During that time, four texts were sent and received by another individual whose cell phone records indicated that he was in the exact same geographic area. Presented with this information, the suspect admitted his responsibility in the criminal act and revealed the names of the three accomplices, who then revealed the location of the remainder of the stolen goods that ended this quartet's criminal activity spree.

Currently, obtaining vehicle-based digital forensic training is still primarily in the purview of the civilian sector. As awareness of the capabilities of this new line of investigative activity develop, I would expect to see a request for law enforcement-centric agencies to take a larger role in this type of investigation; particularly when self-driving cars become the norm. Of course if you conduct an internet search today for "hack a moving car," you'll find plenty of examples of the "next thing" in vehicle forensics. If someone hacks the vehicle's guidance computer and causes a death or serious bodily injury today, who would you call to conduct that forensic examination?

**This report is based upon a composite of multiple reported crimes and is not necessarily intended to depict any specific persons or events.*

The inside view of the "black box".

Body Cameras in E

BY TIM MILLER

So far the debates about body cameras in cases of alleged excessive force have been about whether they get to the truth about what really happened. One argument is that the recording can refresh an officer's memory. Another is that the officer will simply shape his or her testimony around the recording. Enter the Fourth Amendment's reasonable officer standard. It considers the totality of the facts and circumstances from the perspective of a reasonable officer (which is obviously the reviewing court, reviewing everything through a hypothetical eye). But since the focus is on what a reasonable officer could believe, what really happened is not determinative. Here is how this came up:

Dispatch told me there was an officer down. When I arrived on scene a crowd of people ran by pointing wildly to where they had been. I walked on, looking for the injured officer and saw someone in a blue uniform lying on the ground. The officer appeared to be unconscious or worse. A man with a pistol in his hand was standing over the officer. He shouted and waived the gun around. I yelled, "Drop the gun!" but he continued to shout and point the gun - - first at the officer on the ground and then at me. I shot him.

That was only a scenario on a use of force simulator; but the instructor's feedback raised questions about how a court would consider the events, had they been real.

- **INSTRUCTOR:** What did you hear when the crowd ran by?
- **MILLER:** Nothing, really.
- **INSTRUCTOR:** You didn't hear the woman yell, "He's got a gun?"
- **MILLER:** No; I certainly didn't hear that.
- **INSTRUCTOR:** Ok; let's review. (Like a body camera, the instructor re-played the crowd running past me. Sure enough, a woman in the crowd shouted, "He's got a gun!")
- **MILLER:** I still don't remember; but no matter. I saw a gun and I shot to stop the threat posed by the man holding it. (I quoted the U.S. Court of Appeals for the Eleventh Circuit. An officer is not required to wait for an armed and dangerous felon to draw a bead on him, especially after orders to drop the gun have gone unheeded.)
- **INSTRUCTOR:** That wasn't a gun. (And sure enough, the re-play showed the man holding a hammer.)
- **MILLER:** Oh…

The Police Executive Research Forum reported that reviewing body camera footage may help get to the truth of what really happened. The review may jog the officer's memory. (But not in my case. I reviewed the tape and I still cannot recall a warning about a gun. And I still picture the man holding

xcessive Force Cases

a pistol instead of a hammer.) Other executives believe that the truth – and the officer's credibility – are better served if an officer is not permitted to review footage of an incident prior to making a statement. One said, "In terms of the officer's statement, what matters is the officer's perspective at the time of the event, not what is in the video." (Personally, I would love to be judged from my own perspective, but the plaintiff's attorney might object.)

Then comes the Supreme Court's analysis in *Graham v. Connor*, the seminal case for judging police officers accused of using excessive force to seize someone under the Fourth Amendment. The Court's instructions were to consider "… the totality of the facts and circumstances …" (not what I can remember) and to consider everything "from the perspective of a reasonable officer on the scene ..." (obviously not my own). Whether I can recall the statement about a gun should be no more determinative than … well, my personal motive for shooting the man. If motive was determinative, the fate of two officers – using the same force, and under the same circumstances – would depend on who had the better motive. If memory was determinative, their fate would depend on who had the better memory. The *Graham* analysis does not look into the subjective hearts and minds of the officers. It is an objective test that looks at everything through the lens of a reasonable officer.

The saying goes that hindsight is always 20/20, but after-the-fact assessments like "You should have …" or "I would have …" are forbidden. (Incidentally, they are also generally made after getting to the truth about what really happened.) There are no perfect answers under an objective test and looking for one goes against the grain of the *Graham* analysis. The camera stopped, so to speak, after I pulled the trigger. Now the reasonable officer looks backwards.

Hindsight is a rule of relevance, and while the Court does not give specific instructions about what is relevant and what is hindsight, in an analysis where the operative word has always been reasonableness, a fact should be relevant if it was reasonably known at the time. Stated differently: Looking backwards, could a reasonable officer in the shoes of the real one have seen or heard that fact, or at least believed it to be true? If a fact was reasonably known (or reasonably believed to be true based on other facts) it should be considered. Obviously, if the woman came up to me after the shooting and said "I thought he had a gun" her statement would be after-the-fact – gained in hindsight – and not relevant. But her warning was as clear as a bell on the replay. I did not hear her; but a reasonable officer could have. Her statement was reasonably known. The question now: Based on everything else that was reasonably known, could a reasonable officer believe that the man was holding a gun? If so,

the fact that it turned out to be a hammer should be hindsight.

Not hearing the woman's warning about a gun was probably due to a natural human reaction to stress that causes the sense of hearing to diminish. Stress, fatigue, and exertion – conditions well known to law enforcement officers – can greatly affect memory. In a survey of officers involved in shootings, 84 percent reported not hearing even the loudest of sounds. "If it hadn't been for the recoil, I wouldn't have known my gun was working," an officer reported. The same study reported that 79 percent of the officers experienced tunnel vision and almost half could not recall significant details about what they did.

Another study found inconsistencies between written use of force reports and body camera recordings. Eleven officers were asked to react to certain use of force scenarios, report what they saw, and then compare their written report to the footage on their body cameras. Every officer failed to report other potential weapons in the scenario, including a gun plainly visible on a table. Eight of the eleven officers failed to report a third person in the room. Two did not report uses of force.

There is probably nothing more subjective than memory, and memory is probably most vulnerable during a tense, uncertain, and rapidly evolving situation where an officer is trying to defend himself or others from a significant threat. Body cameras are just another piece of technology that gets some of the facts before the court. They are no different than the hundreds of millions of smart phones that make every citizen a reporter – and neither friend nor foe to anyone. They simply record facts. Officers can certainly add to the facts. Force science experts may add more by explaining why an officer did not hear something, or saw something that was not there. But in the end, the court through the reasonable officer decides if the plaintiff established that the force was constitutionally excessive.

Officers are more likely to be truthful if they are told the truth about how they are judged. And the truth is that the recording in an officer's brain will most likely be different than the electronic copy. Me? I thought the man was holding a gun. I would also like my attorney to argue that the woman's statement about a gun makes my belief more objectively reasonable, whether I heard it or not. Still, the reasonable officer may find both of us incredible (in a bad way). Then forget the gun. Could a reasonable officer believe that the man posed a significant threat while swinging the hammer? Sometimes what actually happened is reasonable.

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[1]*Graham v. Connor*, 490 U.S. 386, 396 (1989) citing *Tennessee v. Garner*, 471 U.S. 1, 8-9 (1968).

[2]"Officer down" is an alert that a police officer has been killed or wounded.

[3]Montoute v. Carr, 114 F.3d 181, 185 (11th Cir. 1997).

[4]See Miller Lindsay, and Jessica Toliver. Police Executive Research Forum (PERF). 2014. Implementing a Body-Worn Camera Program: Recommendations and Lessons Learned, Washington, D.C.: Office of Community Oriented Policing Services.

[6]An officer's evil intentions will not make a Fourth Amendment violation out of an objectively reasonable use of force; nor will an officer's good intentions make an unreasonable use of force constitutional. *Graham*, 490 U.S. at 397. The Court has repeatedly rejected attempts to bring the officer's subjective beliefs into a Fourth Amendment analysis. See also *Brendlin v. California*, 551 U.S. 249, 260 (2007). The Court has stated that probable cause to arrest depends on the facts known to the officer. *Devenpeck v. Alford*, 543 U.S. 146, 152 (2004). But there is a world of difference between the test for an arrest and objectively reasonable force to effect one. The officer has time to make a calculated decision before taking someone into custody. *Graham* at 397 (officers often have to make split second decisions about force).

[7]Artwoh, A. Perceptual and Memory Distortion during Officer-Involved Shootings. FBI Law Enforcement Bulletin, 71, 2002.

[8]Dawes, Heegard, Brave, Paetow, Weston, and Ho. Body-Worn Cameras Improve Law Enforcement Officer Report Writing Accuracy. Journal of Law Enforcement. 2015.

TIM MILLER is the subject matter expert for Use of Force for the FLETC Legal Division. Miller joined the U.S. Marine Corps in 1984, after taking the Illinois state bar exam. He served as a prosecutor, defense counsel, military judge, and staff judge advocate. Miller received a Bachelor of Science Degree and Juris Doctorate from Southern Illinois University at Carbondale, Illinois. He received his Master of Laws from the Army Judge Advocate General's School in Charlottesville, Virginia.

How might Body Worn Cameras Affect Training on FLETC….?

BY LAUREN WARE

The question of whether law enforcement officers should wear body worn cameras in the course of their duties has sparked impassioned dialogue regarding issues of privacy, government overreach, civil rights, officer safety, and economic resources. As government officials and American citizens debate the merit and feasibility of implementing body worn camera systems on our uniformed officers, FLETC is actively monitoring the implications of such a policy change on how we execute our training mission.

The staff of the Outreach and Exploration Branch of the FLETC Training Innovation Division have been out ahead of this emerging development, and are already coming up with strategies for FLETC to consider as it seeks to prepare students to do their jobs utilizing this new piece of technology.

At this stage, each option identified brings with it a litany of questions that must be addressed. For instance, can we achieve our training objectives by simply adding a block of instruction on the realities of body worn cameras? Would one scenario requiring the student to actually wear the camera suffice? What value could be gained by having students wear the cameras at all times during training? Much like we require students to wear a duty belt with an inert red gun to become accustomed to ever-present responsibility of a loaded firearm, would we not achieve a similar effect by strapping a recording device to the front of student uniforms? Does it matter whether the devices are "in role" or not? If their value is contingent upon actively recording video, is FLETC equipped with the capacity to store and analyze this footage? Is FLETC prepared to address the privacy implications of employees who are inevitably inadvertently recorded as the student navigates the FLETC campus? These are just some of the many questions FLETC is wrestling with as it anticipates implementation of this new technology.

Rather than just see another training requirement, FLETC is viewing body worn cameras as a training enhancement opportunity. If FLETC is eventually tasked with training students to comfortably operate with the body worn camera device, could not this new piece of technology be leveraged simultaneously to improve our training product? FLETC has long embraced the student-centered feedback model, and has utilized after action review videos to help demonstrate training concepts to students. Many times, during a scenario debrief, the student must acknowledge the disparity between what they perceived their actions to be and what their actions were in reality. Nothing is more effective than letting the student self-assess and learn from his or her own observations of his or her own conduct.

Recordings captured on body worn camera devices could potentially offer an up-close and personal view of student performance that would aid in feedback and evaluation. It may further reinforce concepts taught by the Behavioral Science Division concerning the impact of stress and the narrowing or exclusion of sensory information during a law enforcement encounter. Just as described in the previous article by Tim Miller, it is very eye-opening for a student to hear something on a recording that they didn't hear during the real-time scenario.

While it is unclear how long the debate over law enforcement's use of body worn cameras will go on, FLETC will continue to track the storms of change, and prepare to answer that call with fast, focused, and flexible training.

FAST FACTS

FLETC Domestic Training Sites:

- Artesia, New Mexico
- Charleston, South Carolina
- Cheltenham, Maryland
- Glynco, Georgia
- LA Port, California

Export Locations:

State and Local Law Enforcement

- Nationwide

International Law Enforcement Academies:

Academic, Operational and Program Support

- Bangkok, Thailand
- Budapest, Hungary
- Gaborone, Botswana
- San Salvador, El Salvador
- Roswell, New Mexico

International Training and Capacity Building Programs:

- Delivered Worldwide

Consolidation: Consolidation of law enforcement training permits the Federal Government to emphasize training excellence and cost-effectiveness. Professional instruction and practical application provide students with the skills and knowledge to meet the demanding challenges of a federal law enforcement career. They not only learn the responsibilities of a law enforcement officer, but through interaction with students from many other agencies, also become acquainted with the missions and duties of their colleagues. This interaction provides the foundation for a more cooperative federal law enforcement effort.

Integrated Instructional Staff: FLETC has assembled the finest professionals to serve on its faculty and staff. Approximately 50 percent of the instructors are permanent FLETC employees. The remaining instructional staff are federal officers and investigators on assignment from their parent organizations or recently retired from the field. The mix provides a balance of instructional experience and fresh insight.

A Historical Perspective

U.S. Immigration Service Border Patrol inspectors, Camp Chigas, El Paso, TX in 1927.

Today U.S. Customs and Border Patrol agents employ off-road vehicles and helicopters.

Customs inspectors at the Detriot-Windsor Ferry station in 1898.

U.S. Customs Rainbow Bridge Port of Entry, Buffalo, NY. *Photos courtesy: U.S Customs & Border Protection.*

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FLETC Journal

Federal Law Enforcement Training Centers
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ADVANCED TECHNOLOGY
Simulation and Operations in Law Enforcement Training

VIRTUAL FIREARMS RANGES
The Advantages Over Live Fire Training

WHAT'S IN THE BLACK BOX?
Vehicle Embedded Forensics

TWO WORDS YOU MUST KNOW
To Solve Modern Crime

Foreword

VALERIE ATKINS
Assistant Director
FLETC

THE RAPID EXPANSION of technology in our world has both helped and challenged law enforcement and law enforcement training. Those same technologies that capture data, allow instant messaging, and work to make everyday tasks more predictable, has fast forwarded organized criminal activity that requires law enforcement to quickly counter with investigative techniques using the same data. Five different 'takes' on technology are covered in this issue that explores the implication of both fighting crime and committing crime, as well as a look at technologies that facilitate better training for the sworn guardians of our communities and our nation.

- Technologies developed just for training such as the MAT-MP and FLETC's simulated ranges for firearms training are specifically designed to help instructors and students train more effectively and efficiently. Such technologies are important investments for training and must be carefully evaluated.

- Technologies currently in use by the public makes our lives easier, and then gets repurposed by criminal elements to aid and abet criminal activity.

- The use of technologies by investigators creates vulnerabilities for case investigators that can potentially leave their records vulnerable to compromise. Trainers must understand both the value of appropriately applied technologies, and how to protect data from criminal intrusion.

- Technological applications are costly to purchase, maintain, and secure. Trainers and law enforcement officials are dealing with financial challenges associated with the implementation and utilization of technology and its impact on modern day policing.

- Finally, emerging technology that is reshaping our world is also changing the landscape for law enforcement. Unmanned aerial systems not only aide law enforcement but can present challenges to law enforcement when used to further criminal acts. Tools like body worn cameras are a new frontier that will undoubtedly require significant judicial reviews to sort out the myriad of challenges that seem inevitable. Trainers must be ready to adapt to the next new thing. Looking ahead, we should be able to see some innovations coming. Driverless cars, biometric identifications, smart guns, and the 'internet of things' will impact law enforcement and will need to be addressed by law enforcement trainers. We must be ready.

As you read this issue, consider that law enforcement and law enforcement training have no option but to rapidly adapt and expand capabilities to counter emerging threats, and conduct investigations using new technologies. By proactively working on all fronts of the technological landscape, we will be poised to address such new innovations. One thing's for sure. Law enforcement is certainly going to get more interesting!

this issue

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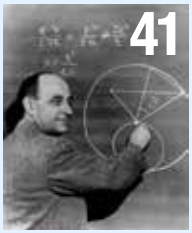
Two Words You Must Know to Solve Modern Crimes



THE FLETC JOURNAL EDITORIAL TEAM from left to right, front row: Lauren Ware, Michael S. Milner, Michael Hullihan, Susan Thornton. Back row: Tim Miller, Preston Farley, John Stamp, Jen Tocco.

FLETC Journal

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The content of this publication is written in accordance with the guidelines of the Associated Press (AP) style. Articles, photographs, and other contributions are welcomed from the law enforcement training community and academia. Publication depends on general topical interest as judged by the editorial team.

The FLETC Journal's mission is to explore and disseminate information about law enforcement concepts, research initiatives, programs, and trends that impact or will potentially affect law enforcement training.

Reflections on Leadership

WAYNE ANDERSON
Site Director
FLETC Charleston

COUNTLESS BOOKS and articles have been and continue to be written in an effort to capture the very essence of what makes a truly great leader. I too have spent a considerable amount of time in study of this topic. Regardless of the amount of reading and reflection, I find myself circling back time and again to what really amounts to five dimensions of leadership: you must have a vision as to where you plan to take your organization, a strategy as to how you plan to get there, good structure or management, a sound process for your decision making, and finally, you must be a leader with great integrity.

For those like myself who are captivated by presidential politics, I would highly recommend the book The President as Leader by Michael Siegel. Siegel's core thesis is that effective presidents stay focused on a clear vision. They succeed by surrounding themselves with talented people, not necessarily friends, and give them the autonomy to do their jobs. They encourage conflict and at times differences of opinion as a positive force prior to decision making. They must be willing to make clear and strong decisions and never fear making modifications along the way, and accept it as a natural consequence of the process. Without giving too much away, let me just share that Siegel walks the reader through a historical review of how, when measured against the aforementioned criteria, at least two of the recent five Presidents received high marks in two or more categories, while two struggled in almost all categories. Let's pull out "good structure or management" as just one example. It has been reported by several sources that President Jimmy Carter would, in spite of hovering over a desk full of papers dealing with one world crisis after the other, fret over tedium like scheduling the White House tennis courts. In contrast, Ronald Reagan would abstain from the fine details of governance and would entrust them to his team to carry out vigorously. He shared his vision with each of them and then simply got out of their way.

While Siegel's book looks at leadership from the highest levels of government, the same tenants of great leadership are applicable to each of our own pursuits. The most challenging aspect of my leadership tenure at the Federal Law Enforcement Training Centers came after accepting the position of Site Director for the Office of Charleston Operations. I pursued the opportunity with the vision of transforming a dated and dilapidated facility into a modern, walking campus that would support the FLETC mission of not only training those who protect our homeland, but to be the best in the world at doing so. Not to say that I did not have many days where I asked myself just what I had gotten into. Successes began to follow, however, after sharing that vision and proffering a strategy as the road map to get us there.

We started by meeting with a landscape architect and putting the vision on paper as to how we planned to reshape and refurbish our campus. While funding would certainly not allow us to execute the entire plan in whole, we began to look at what was most pressing and take a phased approach. After eight years on the job here in Charleston, that original architectural rendering still hangs in my conference room to ensure we keep our eye on the prize.

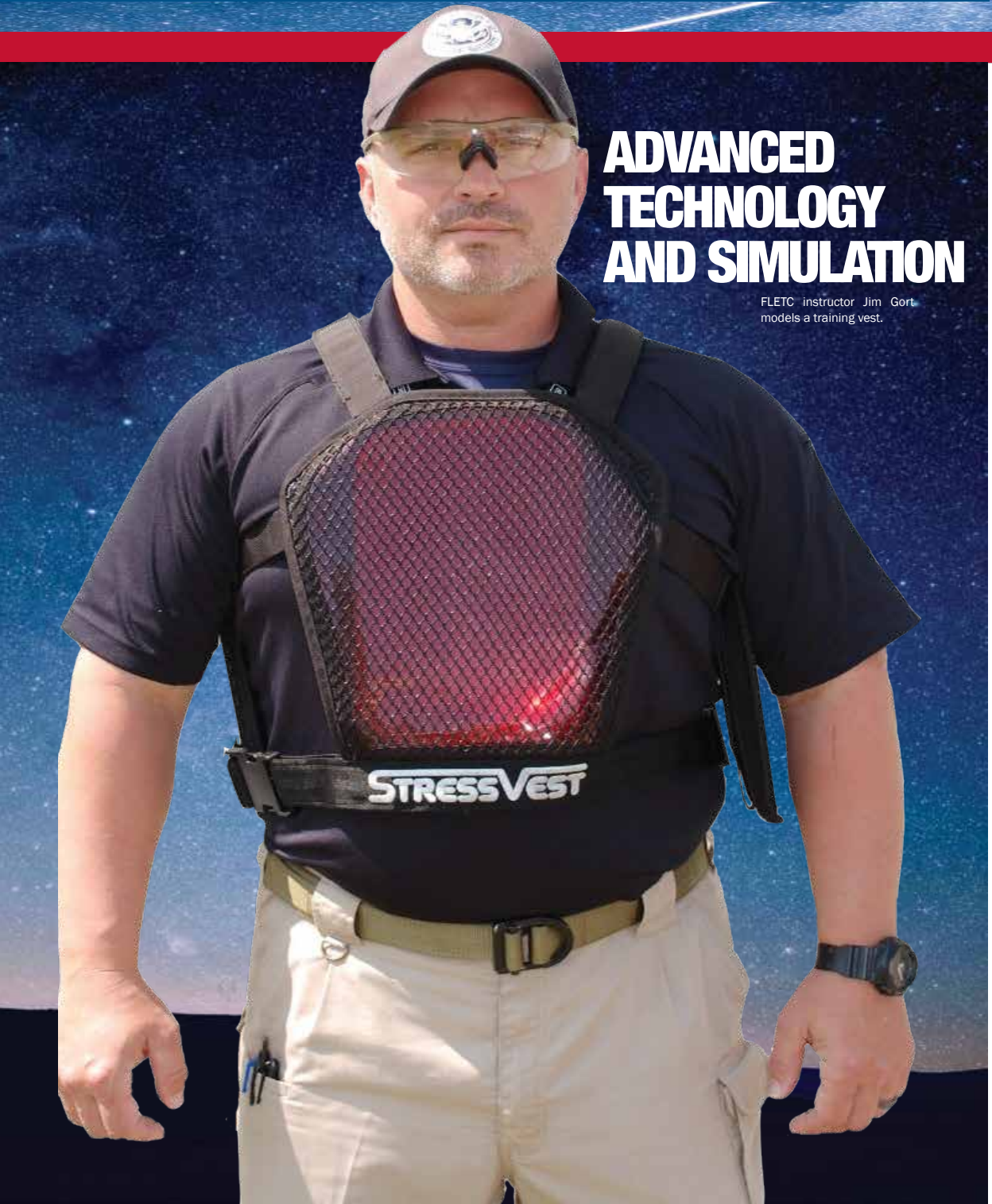
Fortunately, my tenure with FLETC Charleston has allowed me to establish my own leadership team. None of the many accomplishments at the Charleston campus would have been possible without a solid team of professionals in place that fully supports the vision. It is a team of true professionals that I have faith and confidence in to lead others. That trust allows me to keep the focus on the vision, share it with others, and try not to stand in their way. More simply put, I don't need to schedule the tennis courts, but I need to know how many I have, if I need more, and if so where I plan to put them!

Today we have demolished over 17 structures, and are eyeing the fourth phase of the overall campus plan. While I anticipated having completed the job at that stage, modifications are inherent within the process. To that end, we recently completed a business case to support building an additional new dormitory and are now in negotiations for additional property transfers with the South Carolina State Port Authority.

Lastly, if I could single out one other dimension of leadership that is vital to success at any organization, it would be integrity. I think it can be summed up best by the words of Billy Graham speaking to a group of leaders about the need for integrity. Graham defined it as "being the same person on the inside as you claim to be on the outside." He went on to say that leaders need "the ability to separate the trivial from the important. It's essential for daily tasks and direction in life. Until priorities are straight, everything else will be out of order."

L. WAYNE ANDERSON came to FLETC in 2002 as a detailed special agent with U.S. Secret Service. Prior to FLETC, he was assigned to Secret Service's NYC Field Office where he was serving on 9/11 and was awarded the Medal of Valor for assisting with evacuations of the World Trade Center. In January 2008, Anderson was selected as site director for FLETC Charleston and was most recently selected as the FLETC Leader of the Year for 2015.

ADVANCED TECHNOLOGY AND SIMULATION



FLETC instructor Jim Gort models a training vest.

Using Advanced Technology and Simulation to Enhance Law Enforcement Training

BY KIERAN MORIARTY

Advanced technology and simulation have been used across a spectrum of disciplines to make training more realistic and cost effective and to improve the overall efficiency. Technology and simulation feed into the never ending quest of training organizations to maximize training dollars, decrease down time, and improve the overall realism of training. The earliest uses of technology and simulation included using blank rounds and inert explosives and using video cameras and pre-positioned closed circuit television (CCTV) in order to observe and critique training scenarios. As technology improved, computerized judgment shooting was introduced, and ultimately non-lethal marking cartridges and driving simulators added more realism into training than ever before. The recent technology boom over the last decade has led to an upsurge in available technology that can benefit learning and improve safety and efficiency.

The FLETC-Charleston Training Division and FLETC's Training Innovation Division are working to continue this trend of improving training efficiency and realism using technology and simulation. This partnership provides an ideal environment for testing these concepts to determine if they meet the high standards needed before introducing them into the training environment. Training Innovation Division Chief Shawn Beltramo explained, "With so many new technologies coming out, it's critical to have seasoned professionals like the FLETC-Charleston Training Division staff thoroughly test these items to see how they hold up to the rigors of law enforcement training. Many innovative technologies, while promising, are just not able to deliver the high level of performance we need for our training community. Doing small scale testing with these concepts really helps us determine what will and will not work in our training." Chief Beltramo added, "Being able to leverage the expertise and knowledge of our instructors is the single most important part of training innovation and working with the staff at Charleston dramatically increases our ability to find the best in training innovation technologies." Through close collaboration, the FLETC-Charleston Training Division and the Training Innovation Division recognized the following training concepts that are being examined for possible inclusion into future training including.

WEARABLE CAMERAS/TECHNOLOGY - In today's world where almost everyone has cameras on their phones, a law enforcement officer can be recorded at a moment's notice, sometimes without even being aware of it. Law enforcement officers need to be comfortable being recorded and critiqued. This is the reality of the world we live in and our training should closely replicate the real world. The GoPro Camera System, which is currently being used at FLETC-Charleston in the Active Shooter Threat Training Program, allows the instructor to mount a camera to the student's

helmet, record the scenario being executed, and debrief the student on-the-spot via a handheld tablet. As the student progresses through the scenario, the camera captures the entire scenario through the eyes of the student. The student can explain his or her actions based on what they observed. The instructor is able to provide feedback from the student's perspective, which would not be possible using a wall-mounted camera, since that shows an entirely different point of view. The ability for the instructor and the student to review the video from the same exact vantage point is extremely beneficial in the training environment.

Go Pro action camera system with helmet mount, instructor remote and tablet.

EVALUATION TABLETS – Students in the Seaport Security Anti-terrorism Training Program traditionally used a manual process to perform enhanced risk and vulnerability assessments. Students assess three key resources on a seaport and take into account all hazards such as manmade intentional, manmade accidental, and environmental. Once the students complete their assessments, they create a briefing via PowerPoint to show their assessment results and mitigation strategies.

Collaboration with the Training Innovation Division and the Department of Homeland Security Science and Technology Directorate resulted in the development of a program to automate the enhanced risk and vulnerability assessments that students conduct in the training program. The new tablets will have a program installed that calculates assessment values. Student teams will conduct pre- and post-assessments on the tablet, eliminating the need for 90 sheets of paper and students having to transfer their assessment information from hard copy to an excel spreadsheet installed on a laptop computer. The tablet also has a camera and computer software installed, which eliminates the need to issue a separate camera and notepad. Students will also be able to access the internet from the tablet to research additional information and create their presentations.

Tablet and holder used for Seaport Security assessments.

SS Cape Chalmers engine room.

SIMULATED ENGINE NOISE – Many of the maritime training programs conducted at FLETC-Charleston utilize the SS Cape Chalmers. The Cape Chalmers is a 494-foot break bulk freighter permanently moored along pier Q at FLETC-Charleston. Since the Cape Chalmers is not an active vessel, the engines are inoperable. As one can imagine, the noise generated from functional engines would prevent routine communication between team members as they are clearing the engine room and other spaces below deck. The lack of noise on the Cape Chalmers creates an unrealistic environment as students resort to traditional methods for communicating such as voice and radio. Since the officers may not be able to communicate via voice and radio in a real world scenario, the staff believed that we were missing the mark with a valuable teaching point. Staff at FLETC-Charleston contacted the Training Innovation Division and requested support in finding a viable solution for this problem. The Training Innovation Division staff identified a cost effective system that will provide the students with a more realistic training environment when operating in the engine room. Through a series of amplifiers and speakers, the instructor will be able to activate simulated engine noise and other alarm sounds when the students enter the engine room area. The simulated noise will expose students to communication challenges normally encountered while boarding an underway vessel.

ELECTRIC SHOCK TRAINING VEST – Conventional force on force training includes simulated projectiles such as marking cartridges, paintball, and airsoft. The FLETC-Charleston Firearms and Physical Techniques staff are currently testing a non-projectile, non-lethal force on force firearms training system that utilizes laser technology to deliver an electric shock. The electric shock is delivered to the student wearing the vest when the suspect registers a center mass hit. The shock is delivered to the abdomen for several seconds. So far, the noted benefits of laser technology include the requirement of only minimal safety equipment due to the system's use of a laser as opposed to firing a projectile. This system eliminates the recurring cost for marking cartridges and paintball rounds. Another benefit is the ability to move from scenario to scenario much more quickly since the students and role players are not wearing an abundance of safety equipment. The testing so far shows that using the electric training vest appears to offer the same level of realism and stress as when using non-lethal projectiles. Staff at FLETC-Charleston is still in the testing phase and will continue to monitor the system for durability, accuracy, and overall effectiveness. The final testing results will be documented and provided to the Training Innovation Division.

KIERAN MORIARTY currently serves as the chief of the Charleston Training Division for the Federal Law Enforcement Training Centers in Charleston, South Carolina. He is responsible for the development and delivery of training curricula at the Charleston Training Delivery site. Moriarty served as a FLETC instructor, senior instructor and branch chief in FLETC's Physical Techniques Division and a branch chief and division chief in the FLETC's Training Management Division (TMD).

The Security Implications Associated with New Technologies

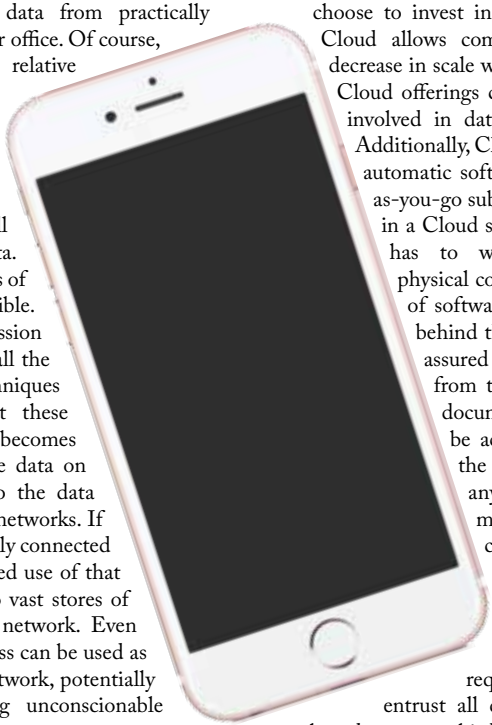
BY LAUREN WARE AND ROB PEIFER

We have all seen countless commercials advertising the latest wonder drug. Ridiculously happy people appear on screen, apparently without a care in the world, as a spokesperson lists the many benefits of the latest and greatest miracle pill. After what seems like an eternity listening to what this pill can add to your life, a short novel is speedily recited in the last fifteen seconds of the commercial that lists the many side effects of that new drug. Sometimes, the physiological costs of taking the new drug sound worse than the original condition requiring treatment. While this illustration may seem dramatic, there are similar considerations associated with the application of new technologies.

The selling point of almost all new technological developments are convenience and instant gratification. The more popular technologies tend to be physically smaller, wireless, and more mobile as a result. Similarly, the systems they operate on are increasingly becoming cloud-based, creating immediate access to vast quantities of data and enabling users to share information almost instantaneously across the globe. While these new technologies can be tremendously helpful to an organization, the "side effects" or accompanied vulnerabilities, must be addressed. Otherwise, what we gain in ease and speed of access we could potentially lose in security.

MOBILE DEVICES

The beauty of mobile devices is obviously that the user can access electronic data from practically anywhere outside the home or office. Of course, once that device leaves the relative safety of the home or office, it becomes vulnerable to inadvertent loss or theft and consequently unauthorized access. In that case, someone else may obtain access to all that device's electronic data. Passwords, and other methods of access control, are not infallible. When an attacker has possession of your hardware, they have all the time in the world to apply techniques that attempt to circumvent these controls. The concern then becomes not only the integrity of the data on that specific device, but also the data available through connected networks. If a mobile device is automatically connected to a network, the unauthorized use of that device can be a gateway into vast stores of data available through that network. Even worse, this unauthorized access can be used as a tool to attack the entire network, potentially compromising or destroying unconscionable amounts of critical data.



Mobile devices also present a security concern as updates and patches are often unable to be pushed to devices when not connected directly to the network. When computers were anchored to desks and reliant on wired connection, these patches and security software updates could be easily disseminated to all devices. This process was accomplished during non-duty hours to minimize interruption to the users and to ensure they were operating off of the most current versions of needed software. When mobile devices are physically removed from their network docking stations, they can miss the updates to the applications needed to run securely and effectively.

More and more software manufacturers and global companies are transitioning to Cloud-based systems. This is because "the Cloud" offers a number of benefits that are appealing to large organizations. To begin, the Cloud offers greater bandwidth than most companies choose to invest in initially; the use of the Cloud allows companies to increase and decrease in scale with much more flexibility. Cloud offerings can also handle the work involved in data back-up and recovery. Additionally, Cloud offerings can provide automatic software updates and a pay-as-you-go subscription to the software; in a Cloud system, the user no longer has to worry about purchasing physical copies of the latest editions of software. Updates are handled behind the scenes, so users can be assured they are always operating from the latest version. Finally, documents saved in a Cloud can be accessed by anyone (given the right permissions), from anywhere in the world. This makes collaboration on a common project much more efficient. Of course, with these conveniences come vulnerabilities.

Use of the Cloud requires a data owner to entrust all data and the security of that data to a third party; this presents an unknown level of risk to the data owner. Under these

NEW RECORDING SYSTEMS. Body-worn cameras and unmanned aerial systems with small video cameras are two of the most recent and controversial items currently being explored by law enforcement.

circumstances, the data owner does not have direct control to ensure only authorized users access to the data. They may have no direct control over who audits or monitors the system, or a mechanism to directly ensure their data is encrypted properly. By forfeiting direct oversight of the security controls applied to their system and data, the user accepts the risk that the Cloud owner's security procedures may not be as robust as required.

Another concern is the accessibility of Cloud-stored data over the web. Any time there is greater access for authorized users, there is greater access for unauthorized users. There have been several high profile data breaches over the past several years, in part because the data was stored in a Cloud.

RECORDING SYSTEMS

Law enforcement and those who train law enforcement officers have been eyeing several forms of technology that involve recording systems. Body-worn cameras and unmanned aerial systems are two of the most recent and controversial items currently being explored. The obvious advantage of these systems is they capture video of areas and events that wouldn't otherwise be seen by a third party. This translates into more information, which on the surface, seems overwhelmingly positive; however, there are many unanswered questions and considerations that must be addressed before these forms of technology can be responsibly implemented.

In addition to the obvious privacy concerns, these recording systems come with a number of security challenges and vulnerabilities. The point of digital video recording is to retain video for some length of time; whether policy dictates the recording be saved for 24 hours or 24 years, there is still the need to store what can become significant amounts of data. Not only will the department retaining the data need to worry about temporary storage, they also will have to account for backing up that data. In the event specific footage must be retained long-term, they must provide sufficient storage, back up data, and protect it from destruction or compromise. Whatever this process ultimately becomes, it must also be designed with consideration that this digital recording is evidence and must be obtained, preserved, secured, and processed in a manner so it is admissible in court. Once again, the administrative and logistical burden this process may place on a department or agency must be considered.

Another concern is that recording devices are essentially small computers, and therefore possess all the same vulnerabilities and must be patched with updates and malware. And, just as with computers, these devices can be hacked. Additionally, in the case of unmanned aerial systems, this technology is operated remotely and physically distant from the law enforcement officer. This leaves the system rather defenseless and susceptible to being destroyed or intercepted. In the wrong hands, law enforcement could forfeit not only the video footage obtained, but also intelligence regarding its technical and tactical operating capabilities.

SECURITY RISK MITIGATION

The use of technology can never be wholly without risk. Instead, agencies seeking to use new technologies must

weigh those risks against the potential benefits, and take appropriate steps to mitigate as many risks as possible. When vulnerabilities are sufficiently addressed, the benefit of the technology can outweigh the risk to the agency and the agency can implement the technology responsibly.

First and foremost, agencies must mandate a specific set of cyber security policies. Users must be trained on what vulnerabilities exist with the new technology. Awareness of vulnerabilities and their impact to the operational security of the agency is critical if users are to reliably comply with mitigation efforts. This is accomplished by requiring users to acknowledge and sign an agreement stating they will take the necessary steps to comply with the relevant security policy.

Mobile devices require regularly scheduled connection to agency networks to ensure the onboard firmware or software is properly patched and updated. While this may seem to inconvenience the user, it is absolutely critical to ensure the technology and the data stored are protected. Additional basic security measures would be to limit the number of individuals with access to the technology, protect that access with two-factor authentication or complex passwords, and encrypt all associated data. Again, this may require some additional steps on the part of the user, such as establishing and remembering unique and complicated passwords and changing those passwords or pins frequently.

Agencies should carefully evaluate potential new technologies using a Cloud. They should consider the sensitivity of the data they intend to store on the Cloud, and whether the convenience of the Cloud outweighs the possible increased likelihood of the breach of the involved data.

Agencies should also ensure that the Cloud provider ultimately selected will comply with required data protection standards. Depending on the provider, the agency may be able to specify that its security personnel retain some level of visibility over its data, and perhaps even assurance of periodic system and security auditing. This additional service could increase the cost, but is a small price to pay when considering the value of the protected data.

Moore's Law implies that the growth of digital electronics and consequent technology doubles every 18 months, and indeed this rate has been demonstrated since 1975 to approximately 2012. While many argue an inevitable deceleration of technological advancement is occurring, few would dispute that law enforcement will encounter and incorporate new technologies for many years to come. It is therefore incumbent upon the agency to consider the security implications of these technologies during its evaluation. Fortunately, unlike the unavoidable negative side effects of ever-emerging pharmaceuticals, the vulnerabilities that come with new technologies can be mitigated by responsible identification of and diligent adherence to security policy and procedures.

LAUREN WARE serves as the chief of the Forensics and Special Investigative Skills Branch at the Federal Law Enforcement Training Centers. In this position, she leads a staff of 18 professional forensic instructors who are responsible for researching, designing, and delivering the most current, relevant, and accurate forensics and specialized investigative techniques available to federal law enforcement officers. Ware maintains professional affiliation with the American Academy of Forensic Sciences and serves as the Vice Chair of the Peace Corps Sexual Assault Advisory Council. She is an advocate for community service, working on the Feds Feeds Families Food Drive, the annual CASA program, and provides presentations to local school children in an effort to inspire them to pursue careers in science. Ware was awarded the 2014 FLETC's leadership award and is the recipient of the Women in Federal Law Enforcement's 2016 Outstanding Law Enforcement Employee Award.

ROBERT PEIFER is an information system security officer in the Cyber Security Division at the Federal Law Enforcement Training Centers. He began his career in information technology working for private industry in the 1990's. He came to the FLETC in 2003 as a government contractor and transitioned to federal service in 2009.

Unmanned Aerial Vehicles

Uses for Law Enforcement

BY JOHN STAMP

In 2011 six cows strayed from a neighboring property on to the farm of Rodney Brossart. A dispute between the farmer and Brossart ensued after Brossart argued that the cattle became his once they crossed onto his property. A deputy from the Nelson County Sheriff's Office and an inspector from the North Dakota Stockmen's Association went to Brossart's farm to handle the dispute. When asked about the cattle, Brossart stated he wanted to finish his work on the farm before dealing with the livestock. The deputy and inspector insisted on settling the matter. Brossart responded by brandishing a rifle and threatening the officers. The situation escalated, resulting in a sixteen hour standoff between Brossart and law enforcement. In an attempt to arrest Brossart, the Grand Forks Police Department SWAT team requested the use of an unmanned aerial vehicle (UAV) to pinpoint Brossart's location. A UAV from U.S. Customs and Border Protection was used to locate Brossart and lead the Grand Forks SWAT team to his location. Brossart was arrested without incident.

The Federal Aviation Administration (FAA) reports that there are approximately 2.5 million drones or UAVs in use in the United States as of March 2016. By 2020, the FAA expects the number of drones used by Americans to rise to approximately 7 million. The use of UAVs in society is becoming commonplace and will be an

FLETC has been researching a variety of potential platforms for future program development.

cameras and other equipment carried on the UAV can be used for remote examination of a suspicious device without having to place police personnel in danger. UAVs have been used to map and document fatal traffic investigations, and the U.S. Border Patrol has incorporated drones along the nation's borders to police for illegal border crossings. In 2009, Persistence Surveillance Systems of Dayton, Ohio, partnered with the city of Ciudad, Mexico, to study the effectiveness of drones as a police aid. During the study local law enforcement used UAVs to conduct aerial surveillance. At the end of the study images captured via UAV detailed 34 murders as they occurred in real time, including a cartel-sponsored killing within the city. Further video analysis taken during this time captured images of the murderer, the getaway vehicle, and multiple accomplices.

Currently, the most popular design in UAVs is the quadcopter, a small robot suspended under four, six, or eight rotors. Most UAVs can be augmented by a number of sensing packages from the standard still and video camera to forward looking

accepted facet of society very soon. As with all emerging technology, law enforcement agencies are adopting UAVs to enhance their respective missions.

Local, state, and federal agencies have begun using UAVs on various missions, including surveillance operations, crime scene analysis, explosive ordinance disposal, search and rescue, and SWAT operations. The Federal Bureau of Investigation stated in response to a query from Senator Rand Paul that UAVs have been used in surveillance operations both in criminal and national security investigations since 2006. The San Jose Police Department in California has added a UAV to its inventory for use by the bomb squad. The rationale is that the

infrared, radar, and mapping equipment. In the future developers believe UAV's will take on a more biomorphic design and miniaturization. This will mean that what was once a loud and obvious aerial platform roughly the size of a pizza delivery box will shrink to the size of a dragon fly or a mosquito and thereby will be able to deploy largely unseen.

In 2012, the FAA established regulations governing the use of UAVs by both the public and commercial entities. Essentially the same general rules apply to UAVs as apply to manned aerial platforms. The FAA requires that in order to operate a UAV commercially the aircraft must be registered and authorized to fly either by certificate or exemption. The UAV is required to have a valid registration number and can be flown only by a certified pilot. UAVs cannot be flown within five miles of an airport and operators are required to abide by temporary or permanent flight restrictions. The FAA periodically releases updates on UAV operation rules and regulations via its website: https://faa.gov/uas.

The International Association of Chiefs of Police Aviation Committee issued guidance on the use of UAVs in 2012 as well. The model policy offers protocols governing such procedures as image/media retention, operational procedures, system requirements, and community engagement.

FLETC has initiated a feasibility study regarding the development of a UAV training program. The study consists of not only the examination of aerial platforms for their use, but also how best to implement a potential program. FLETC will disseminate an assessment to its 93 federal partner agencies to determine which missions the partners believe UAVs can best serve or enhance. Once FLETC determines the platform and demand, it can develop and implement a training program. Another major point in the feasibility study for UAVs is where a potential training program could be best implemented. Given FAA regulations, UAVs cannot be flown within five miles of an airport without authorization or exemption, and UAVs can only be flown by certified pilots. Two of FLETC's training sites are within this restriction, and developers are seeking FLETC personnel who are both certified instructors and pilots. FLETC has identified several potential aerial platforms and a number of potential certified pilot instructors. FLETC is also awaiting pending FAA guidance on UAVs before it further pursues potential training related to this technology.

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Drones:

Your Agency's New Best Friend or Worst Enemy?

FLETC Assistant Director Dominick Braccio and Physical Techniques Instructor Paul Sanchez demonstrate the launch of a hand-held Unmanned Aerial Vehicle at FLETC Artesia.

BY PRESTON FARLEY

The concept of an Unmanned Aerial Vehicle (UAV), also known as the drone, has been theorized since the late 1800s. Initial development and utilization of early prototypes began in the early 1900s in military usage, which historically has driven many of mankind's innovations over the millennia. The United States developed and used remote controlled full-sized aircraft in both World Wars. The U.S. Air Force used UAVs extensively throughout the Vietnam War for dangerous reconnaissance missions. The Israeli military developed and deployed the first modern UAV in 1973 during the Yom Kippur War. It had all of the hallmarks of the modern UAV including data-link systems, endurance-loitering, and live video-streaming. These same capabilities, along with miniaturization, ease of use, reduced infrastructure requirements and, most of all, dramatic decrease in costs have allowed the formerly nation-state-only tool to be used by all segments of society including law enforcement today.

The first robots used extensively by civilian law enforcement in the United States were probably bomb handlers due to the very risky nature of that activity. Use of these machines saved and continues to save people from danger or even death. So too with the UAV. Due to its myriad functions and capabilities, it can now perform tasks that are deemed dangerous for officers to perform. UAVs are uniquely suited for surveillance, patrol, videography and photography, and some more advanced functionality discussed below. As UAVs

UAVs in a public space allows unique capabilities to law enforcement.

have matured, they have been created in a vast array of sizes and forms, from the size of a housefly to that of the U.S. Air Force Reaper with a wingspan of 84 feet! UAVs are available in both fixed and rotary wing configurations, which provide differing functionality depending upon their intended use.

A logical primary use scenario for UAVs is as a surveillance tool. As UAVs have the ability to fly over terrain and buildings, they have a natural bird's-eye view. This view can be augmented for specific missions like low-light or for viewing heat signatures in a smoke or fog-filled environment. The camera resolution of these devices can be 1080p or greater, depending upon operational need. Some stated use scenarios by a California law enforcement agency include tactical intelligence gathering in SWAT scenarios, crime scene photography, search and rescue in rough terrain, and finally, traffic control observation. Depending upon need, some of the UAVs available today are capable of sustained 12 hour flights. One new use for camera-toting UAVs is that of mapping. One company sells a "swarm" of smaller UAVs, which are optimized to go to a predefined geographic area, deploy, and then create three-dimensional maps of the target area including to-scale elevation with a precision to five centimeters. These UAVs have a 10-mile range. The major advantage of UAVs over conventional aircraft is that of cost; UAVs are much cheaper to purchase, maintain, and actually fly.

NEFARIOUS USE THAT AFFECTS LAW ENFORCEMENT: There have been numerous reports in the media over the past few years regarding how both ignorance and malevolence have revealed the downside to UAV deployment. Initial reports were of UAVs being operated by people to observe others in places that were heretofore considered private. Specifically, many people have reported being spied upon on while on their own property, or in places previously considered private, like clothing-optional beaches. One United States Senator reported that she awoke in her second-floor bedroom, looked out her windows, and observed a UAV looking in the window at her! Another misuse of UAVs has occurred in aircraft flight zones. It seems that there are weekly reports of near-misses of UAVs and aircraft in and around airports. In fact, a mid-air strike occurred in April 2016

Assistant Director Dominick Braccio examines a UAV remote control with Instructor Paul Sanchez and Branch Chief John Newman. Below photo: A UAV with remote control.

between a UAV and a British Airways 727, which was carrying 132 passengers and five crewmembers. Fortunately, the UAV hit the nosecone of the aircraft and not an engine intake as that would have probably destroyed the engine. Another use of the UAV for nefarious purposes has been discovered at numerous prisons both inside and out of the United States. Confederates of prisoners are attempting to bring contraband into prisons via UAVs. A high profile attempt failed at a South Carolina maximum security prison when the UAV crashed in the brush just outside the walls of the prison. One of the operators of the UAV was apprehended near the scene, but a second eluded police. The current extreme example of UAV's potential for abuse was revealed in a recent viral video showing an amateur UAV enthusiast attaching a running chainsaw to one. He then actually cut limbs off of a tree before embarking upon decapitating unsuspecting snowmen with the airborne chainsaw. And then there's the remotely controlled UAV with a pistol attached, which allows the operator to get very close to his target and then fire the weapon with a high degree of accuracy. The potential for this tool to be abused is limited only by a criminal's imagination.

ANTI-UAV TECHNOLOGY: As the public and other political entities around the globe have deployed UAVs, the need to possess counter-UAV capabilities has emerged. Some major military arms suppliers have begun to market various anti-UAV systems with different approaches for different goals. Some low-tech solutions have also been developed, which are proving very effective. The first problem with counter-UAV solutions is that of observation and discovery. By their very nature UAVs are difficult to observe. They are small and quiet and can move from hiding place to hiding place with a skilled operator, which makes detecting them quite a challenge. Fortunately, there are solutions already on the market. As almost all UAVs contain a functional digital camera, there are already well established technologies in place that can detect these cameras and track them. One company sells a solution that looks in a 360 degree arc for the UAV camera signatures and upon locating one alerts the user. It will then track the camera as long as it is within the device's field-of-view. Once identification of the UAV occurs, the problem of "what next" occurs. A European company has created a man-portable device

which allows the operator to lock on to the UAV and essentially overpower the UAV operator's controls and force the UAV to land where it can then be secured by authorities. An American company built a second system, which takes a more aggressive stance by allowing the user to send a huge blast of energy to the UAV thereby "killing" it in midair. A Dutch firm developed a decidedly low-tech anti-UAV tool, which has adapted the ancient art of falconry to teach the raptors to identify and attack UAVs!

As the public continues to embrace UAV technology, your agency will be impacted by it. For many agencies, the use of UAVs can enhance your current work practices, often lowering costs. It may also give smaller agencies a path to provide previously cost prohibitive services like search and rescue. Again, as with any tool, the criminal element will also adapt to the new technology and leverage its use in nefarious schemes. At this stage of development and deployment, remaining UAV-ignorant is no longer an option. Forewarned is forearmed. UAVs are both your best friend AND worst enemy.

PRESTON L. FARLEY is a senior instructor for the Cyber Division at FLETC, where he has been an instructor since 2004. In 2006, he became the program coordinator for the Seized Computer Evidence Recovery Specialist Training Program, which is the introductory digital forensic analysis class open to all law enforcement officers/agents at both the local and federal level. His law enforcement career includes 20 years as a United States military member in both the active duty U.S. Air Force and the active duty U.S. Army culminating in nearly a decade of investigative experience with the United States Army Criminal Investigation Division Command as a special agent and cyber agent.

Virtual Firearms Ranges

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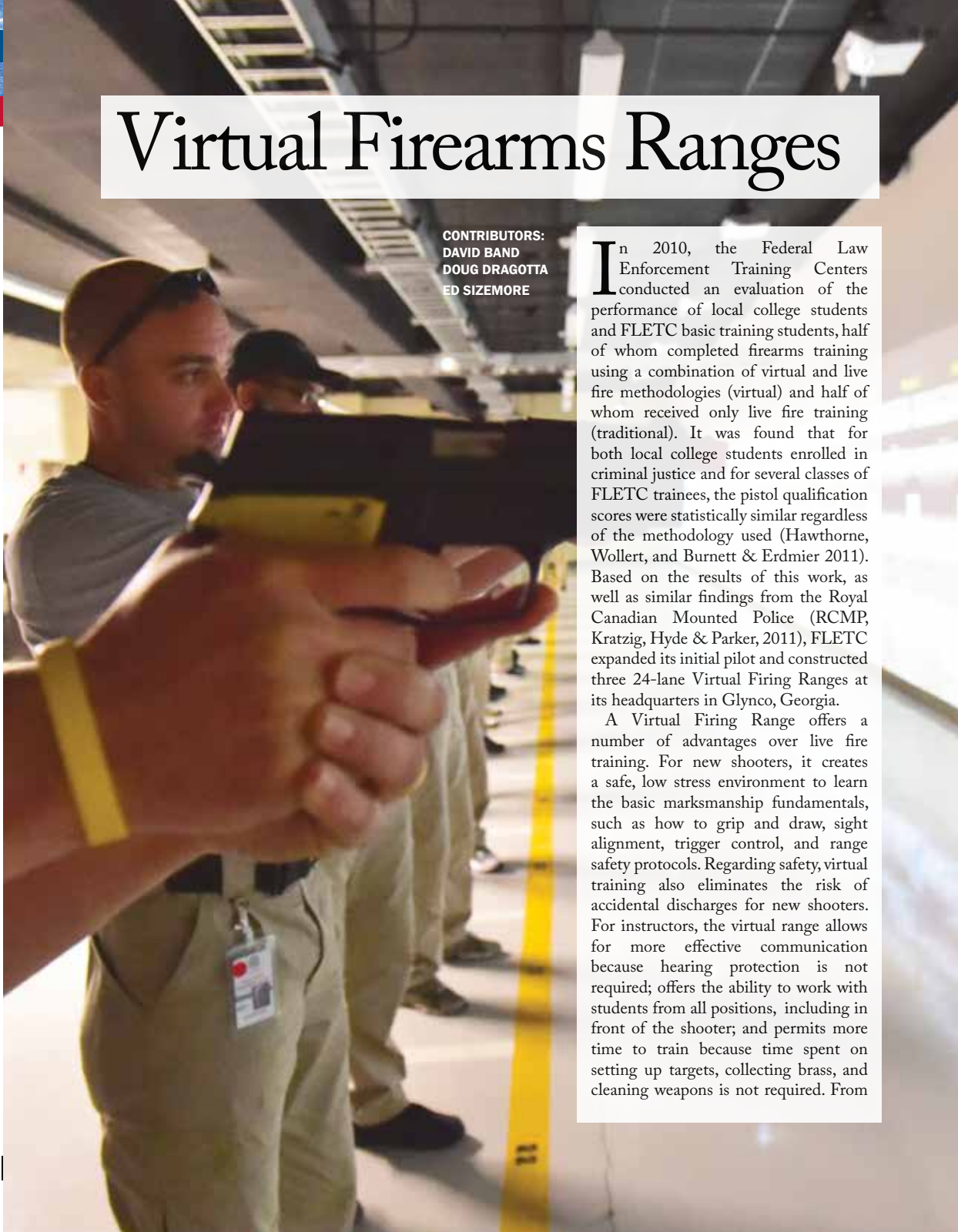


In 2010, the Federal Law Enforcement Training Centers conducted an evaluation of the performance of local college students and FLETC basic training students, half of whom completed firearms training using a combination of virtual and live fire methodologies (virtual) and half of whom received only live fire training (traditional). It was found that for both local college students enrolled in criminal justice and for several classes of FLETC trainees, the pistol qualification scores were statistically similar regardless of the methodology used (Hawthorne, Wollert, and Burnett & Erdmier 2011). Based on the results of this work, as well as similar findings from the Royal Canadian Mounted Police (RCMP, Kratzig, Hyde & Parker, 2011), FLETC expanded its initial pilot and constructed three 24-lane Virtual Firing Ranges at its headquarters in Glynco, Georgia.

A Virtual Firing Range offers a number of advantages over live fire training. For new shooters, it creates a safe, low stress environment to learn the basic marksmanship fundamentals, such as how to grip and draw, sight alignment, trigger control, and range safety protocols. Regarding safety, virtual training also eliminates the risk of accidental discharges for new shooters. For instructors, the virtual range allows for more effective communication because hearing protection is not required; offers the ability to work with students from all positions, including in front of the shooter; and permits more time to train because time spent on setting up targets, collecting brass, and cleaning weapons is not required. From

Left: Student examines his score from the Virtual Firing Range at FLETC Glynco. Below, right: Firearms Instructor Ed Sizemore assists student.

the institutional perspective, sessions used with this technology save money, maximize space, and expand student throughput. Training in a virtual environment also enables students to use an unlimited number of virtual bullets, thus increasing the capacity to dramatically augment student trigger pulls.

In late 2013, an initial class piloted the substitution of the live fire training with the new virtual firing ranges for four two-hour sessions of Basic Marksmanship Instruction for a single class. In 2014, FLETC integrated this methodology into its basic training programs – the Criminal Investigator Training Program (CITP), the Uniformed Police Training Program (UPTP), and the Land Management Police Training Program (LMTP). In 2014 and 2015, FLETC also constructed virtual ranges at its Artesia, New Mexico, and Charleston, South Carolina, locations. Since the implementation of virtual firearms training, there is now a larger sample of qualification data than in previous comparisons of these methodologies. This article provides a review of the qualification data for FLETC law enforcement students who completed training before and after this change in methodology.

OVERVIEW OF MARKSMANSHIP TRAINING AT FLETC

FLETC BASIC MARKSMANSHIP INSTRUCTION consists of four two-hour sessions on the Virtual Firing Ranges. Those who train on the virtual firing ranges use firearms that have been modified with a laser insert, "firing" on simulated live fire ranges with images of paper targets projected in front of students. The instruction with this methodology is intended to be similar to the instruction on traditional live fire ranges.

Following this basic exposure to marksmanship skills, training continues with eight to eleven two-hour live fire sessions, depending on the training program, that culminate with the Semi-Automatic Pistol Course (SPC) qualification course of fire.

The SPC consists of 60 rounds fired from a variety of positions and distances. This is broken down into a "front half" (distances of 3 to 7 yards) and "back half" (distances from 10 to 25 yards). Students can earn a maximum of 5 points for each round on target for a total of 150 points per half, or 300 points in total. Rounds on the target silhouette are assigned points that range from 5 points (center target) to one point (outer areas of the silhouette), with rounds not striking the silhouette receiving no points. The majority of partner agencies that train at FLETC have set a score of 210 (70%) as the minimum qualification score while a few have opted for 240 (80%).

FINDINGS FROM THE INSTITUTIONAL USE OF THE VIRTUAL FIRING RANGES

STUDENT POPULATION:

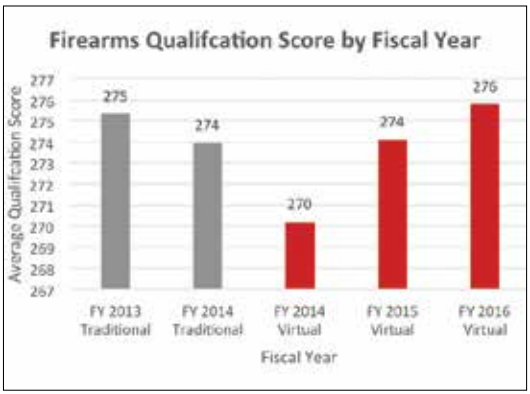
Data from 5,718 students from 159 classes (76 CITP, 63 UPTP and 20 LMTP) who underwent SPC qualification from Fiscal Year (FY) 2013 through the second quarter of FY 2016 were included in this analysis. Of the 5,718 students, 1,592 received traditional live-fire training and 4,126 received the blended environment of virtual and live fire training. This is a much larger sample than previous evaluations from FLETC and the RCMP (115-256 students). Data on these classes were gathered from end of class reports. These reports include summaries from each class, including average qualification score, number of students attending intermediate sessions, and number of students who successfully qualified, but do not include each students' raw scores.

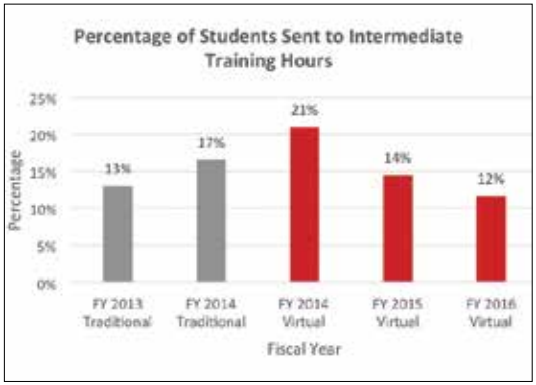
STUDENT QUALIFICATION SCORES:

Qualification scores were reviewed by fiscal year. It was found there was an initial decrease in qualification scores when the Virtual Firing Ranges were implemented in FY 2014; however, there was a rise in these scores in FY 2015 and FY 2016. In fact, the average qualification score was slightly higher for FY 2016 (virtual/live fire) than for students trained with traditional live fire. Since raw qualification scores were unavailable at the time of this analysis, it could not be determined if these differences in qualification scores were statistically significant. Previous work by FLETC and the RCMP found that while qualification scores were statistically similar, there was a trend for slightly lower performance using the virtual range (Hawthorne, Wollert, Burnett & Erdmier 2011, Krätzig, 2011). The current results suggest that through refinement of the training methodology, higher qualification scores may be possible.

STUDENTS SENT TO INTERMEDIATE TRAINING:

One possible explanation for higher qualification scores after the integration of the Virtual Firing Ranges could be contributed to instructors providing additional live fire training through intermediate after-hours sessions in efforts to





achieve this performance. The trends for assignment of additional training sessions were reviewed by fiscal year (see below). While there was a peak during the initial transition (21%), data for the most recent year shows there were actually fewer students sent to additional training (12%) than when live fire was used. Also, this data suggests additional live fire training is not required to achieve the same level of proficiency when virtual training is integrated into firearms instruction.

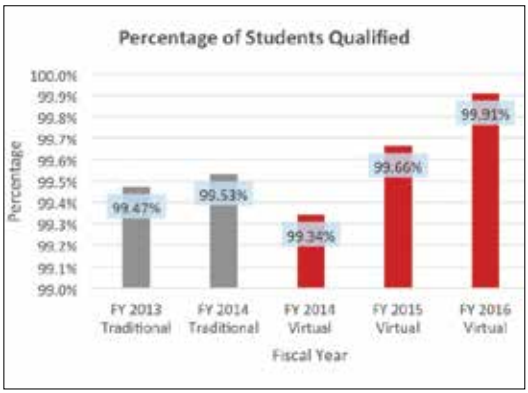
STUDENT QUALIFICATION RATE:

Overall, FLETC's firearms instructional staff and curriculum is extremely effective in training students on the fundamentals of marksmanship leading to qualification with their weapons. Less than 1% of students fail to qualify. When this qualification rate was assessed for each fiscal year, it was found there was actually a higher qualification rate for students trained with the virtual range in FY 2015 and FY 2016. While the qualification rates are objectively higher for the more current years, they are essentially equal. In fact, a Chi Square analysis, a test to see if these results are statically different across these years, cannot be performed because the number of failures is less than 5 students for several of these years (there must be at least 5 responses per cell to run this test).

OVERALL DATA RESULTS:

Previous evaluations found slightly lower but statically equivalent qualification scores when using a virtual range (Hawthorne, Wollert, Burnett & Erdmier 2011, Krätzig, 2011). This evaluation found that after an initial drop in performance, students training in the virtual environment for the most recent fiscal year had slightly higher qualification scores than traditional Basic Marksmanship Instruction training. This was the case with fewer students being assigned to receive extra intermediate training sessions and with a slightly higher qualification rate.

These results using a larger student sample than previous work confirm that firearms training, in which a virtual environment



is incorporated, can be equally as effective as traditional live fire training. While FLETC has not compared the retention of marksmanship skills between these methodologies, the RCMP has conducted this analysis (Krätzig, 2014). Krätzig found that there was no statistical difference in retention between those trained in a live fire or virtual environment in subsequent requalification and adding further support for the use of this methodology.

COST AVOIDANCE:
For fiscal year 2016, FLETC projects a total cost avoidance of $338,393.51 in terms of supply costs alone (ammunition, targets, target backers, weapon cleaning supplies, etc.) by using Virtual Firing Ranges. With larger student numbers and increases in the cost of ammunition, cost avoidance is projected to increase every year. When other costs for running a live fire range are also considered, such as range equipment, maintenance, and electricity (running ventilation systems), these savings may be even higher.

LESSONS LEARNED FROM IMPLEMENTATION:
As is common with new technologies or methodologies, change was an initial challenge. This was observed anecdotally, through increased assignments to after-hour training sessions, and overall lower qualification scores during the initial implementation.

Determining the right method of training with the new equipment and approach was demanding for the staff. With over 120 firearms instructors on staff, there has been a continuous process of refinement. Some of the initial challenges included familiarizing instructors with the advantages of the Virtual Firing Ranges, training staff on technical aspects of the system, obtaining all of the pistol models used by various agencies, and standardizing training sessions to best make use of this training methodology.

Training organizations wishing to implement virtual firing ranges for their agencies should be prepared for some initial stumbling blocks. However, after this learning curve, students may achieve even higher performance than with traditional live fire training.

FIREARMS TRAINING MOVING FORWARD:
A testament to FLETC firearms instructors' experience and capability is that as they become more familiar with using the simulators, they are developing better methods for maximizing their effectiveness. As part of the ongoing refinement process, FLETC created a new Firearms Technology and Innovation Branch to manage and maintain a directed focus on the Virtual Firing Ranges, as well as other virtual simulation initiatives and training such as Judgment Pistol Shooting.

Using simulation to model live fire ranges is just the tip of the iceberg for the potential of simulation to improve firearms proficiency. While most law enforcement officers routinely demonstrate their marksmanship during range requalification, accuracy during gun fights is exceptionally low (15-22%, Morrison & Vila, 1998). Simulation offers the potential to address the gaps to improve real world performance. For instance, training can safely be conducted with moving and realistic targets, from various shooting positions, and with realistic and higher stress scenarios that require decision making. Unlike live role player scenarios, simulation has the ability to accurately track student accuracy during more realistic scenarios. This exploration of the use of simulation to improve reaction times and accuracy during more realistic scenarios also extends beyond FLETC (Wright, 2013).

FLETC and its Partner Organizations are exploring ideas such as integrating driving simulation and use of force simulation, conducting evaluations of high definition immersive use of force simulators, integrating physical conditioning into firearms decision making tasks, and potentially integrating virtual reality into training. FLETC is committed to supporting ideas that will make students better prepared to protect our homeland, as well as generating cost savings for U.S. taxpayers.

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DAVID BAND has served as an engineering research psychologist at the FLETC since February of 2011. He is currently assigned to the Applied Research Branch within FLETC's Training Research and Innovation Directorate. Band received his bachelor's degree in Psychobiology from Binghamton University and a Master's of Science in Applied Psychology from Clemson University.

DOUG DRAGOTTA is the Chief over the Firearms Technology and Innovation Branch at the Glynco Federal Law Enforcement Training Center's Firearms Division. Doug began his law enforcement career in 1995 as an officer with the Secret Service Uniformed Division, where he served in various assignments. In 2007 he began his career with the FLETC and has served as an Instructor, Senior Instructor, and Branch Chief, in multiple training divisions. Doug holds a Bachelor of Science degree in Criminal Justice from Troy University.

ED SIZEMORE, M.A., M.S., CPP, Is a lead instructor in the FLETC's Firearms Division at Glynco, Georgia, where he has served for 18 years. With graduate degrees in security management and counseling as well as postgraduate work in homeland security, he has served in both Firearms Division and as a senior instructor in the former FLETC Management Institute. A retired Coast Guard officer and a former special agent of the Coast Guard Investigative Service, Sizemore is a true believer in providing quality professional law enforcement training to all of FLETC's students.

Virtual Firearms Training:
A Cross Organizational Effort

DANIEL BALASH
2016 RECIPIENT OF THE FEDERAL 100 AWARD

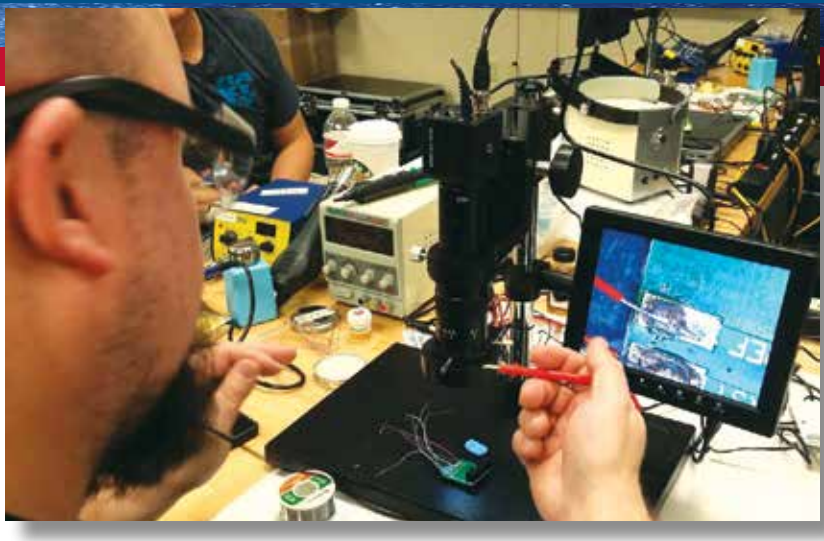
Bringing virtual firearms training to the Federal Law Enforcement Training Centers (FLETC) was a cross-organizational effort. In addition to the transformative efforts of FLETC's training staff, personnel from throughout the organization made significant contributions in bringing the benefits of this technology to FLETC and its students.

Daniel Balash, Information Technology Project Manager, led the integrated project team that developed, procured, installed, and tested the Virtual Firing Ranges at FLETC, an accomplishment that earned him the prestigious 2016 Federal 100 Award this past spring. The Fed 100 Awards recognize government and industry leaders who have gone above and beyond their daily responsibilities and have made a difference in the way technology is bought, managed, or used.

In his role as Project Manager, Balash was responsible for the cradle to grave development and implementation of the Virtual Firing Ranges into FLETC training, resulting in the revolution of firearms training at FLETC. Besides freeing up time on live-fire ranges and increasing students' opportunities to practice, the virtual ranges also cut ammunition usage, lower maintenance costs, and have a lesser impact on the environment.

Balash's team overcame decades of institutional cultural bias in favor of students training only with live-fire. His passion for technology and belief in this new learning methodology enabled him to become a passionate advocate for the virtual ranges. Balash conducted group and one-on-one capability demonstrations to create a trusting partnership between technology and instructional delivery. The resultant capability is now a fixture in FLETC's basic training, as students attending FLETC's three flagship basic training program received training on the Virtual Firing Ranges as part of their basic marksmanship curriculum. Thousands of students have now successfully completed basic marksmanship training using virtual firing ranges in combination with live fire.

While Balash received the well-deserved Fed 100 Award, he is quick to acknowledge that integrating virtual firearms into FLETC training was a true team effort. FLETC's experience with integrating virtual firearms training demonstrates the enormous power of collaboration among diverse professionals in using new technology to improve how we train law enforcement personnel.



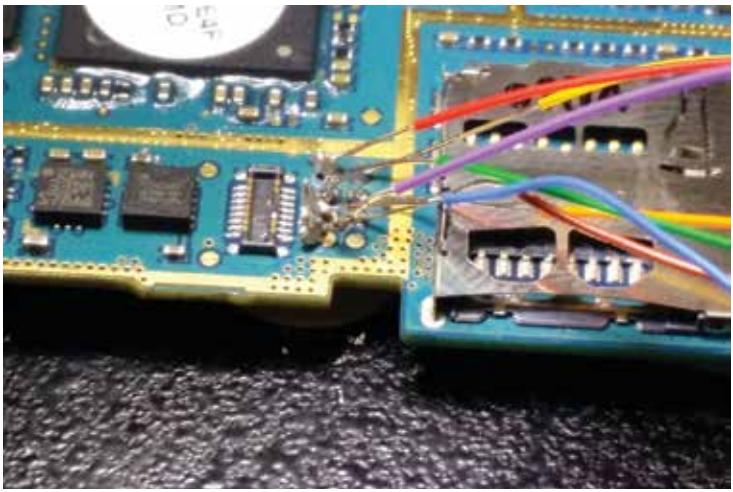
Student using JCSTP-issued tools to review in-class soldering techniques.

JTAG AND CHIP-OFF

two words you must know to solve modern crimes

BY PRESTON FARLEY AND TRACY GATWOOD

A convicted criminal, while serving time for his crimes, was suspected of continuing to run his criminal enterprise while in prison through the use of contraband cell phones. During the execution of a search warrant of his jail cell, the suspect, knowing his phone would be seized and potentially examined for incriminating evidence, broke the phone in half before officers could seize it. The phone was taken to a local cellular provider for assistance in recovering its contents, but company representatives stated they could not assist. A few years ago, this would have been the end of the story and the latest criminal misdeeds of this prisoner would be lost; however, this is no longer the case. A duo of related investigative tools has been developed and mastered by many law enforcement agencies over the past few years which allows them to potentially recover data from heavily damaged smart phones.

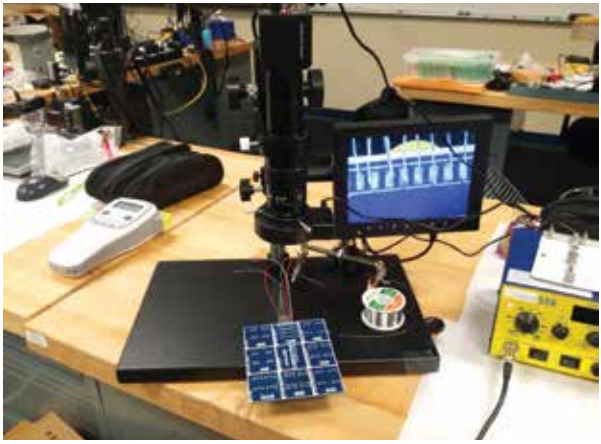


Above photo: Example of student's first soldering attempt using JTAG.
Right photo: How to identify relevant memory chips for chipoff analysis.

The first tool is JTAG, which is an acronym for the Joint Test Action Group, an electronics industry association formed to develop a method of verifying designs and testing printed circuit boards after they are manufactured. This is done by embedding each circuit board with hardware and software, which allows them to be checked for errors prior to being assembled into their final form, like a smartphone or GPS device. Access to the software is accomplished via on-chip test access ports (TAPs). These TAPs are various sizes, and locations depend upon the manufacturer's design. As a wonderful side effect, the JTAG system allows a trained investigator to solder wires to the TAPs, connect these wires to a harness, and the harness to a computer running a dedicated program that then "reads" all of the data from the storage chips on the circuit board. In plain terms, the investigator can obtain a physical image of the memory chips which can then be analyzed using traditional digital forensic techniques. This would include potential recovery of texts, emails, pictures, call records, and social media artifacts, both current and deleted.

Unfortunately, the physical destruction of a cell phone (as in the case above) renders JTAG moot as the system requires the circuit board to be intact and functional. This is where another new technology, Chip-off, comes into play. Chip-off is a term that literally means what is says, to remove a computer memory chip off of the circuit board. When JTAG is no longer an option, Chip-off becomes an option of last resort. Instead of using the circuit board of the device under investigation to power and obtain data from computer chips, the investigator removes the chip from the circuit board.

Removal of the chip is accomplished using specialized hardware that applies very high heat to both the top and bottom of the chip simultaneously to loosen the solder and epoxy, which holds the chip in place. Once removed, the chip must generally be cleaned and then placed in a die or adapter connected to a computer



Top photo: Student reviewing soldering job. Bottom photo: Review of student soldering practice board using equipment issued in JCSTP.

running specialized software to obtain a RAW or physical image of the memory contained within the chip. This image is then analyzed as outlined above using traditional digital forensic techniques. This description of the chip-off process is very simplistic as the actual process of safely removing the chip requires a number of safety procedures and specialized training and equipment to successfully and safely accomplish removal. For instance, a typical smartphone may contain six or more chips. These chips are cryptically numbered and must be identified to ensure the correct memory chip is removed. Once identified, the correct die must be located so that reading of the chip may be accomplished. Once that task is completed, the actual removal of the chip must occur. This is the most delicate step as too little heat and too much leverage on the chip to attempt to remove it could literally break the chip in two. Conversely, too much heat can bake the chip rendering it unusable and unreadable. The line between these two extremes is very limited and expertise in this endeavor can only come from experience removing numerous chips in a trial-and-error methodology. Fortunately, FLETC now has such a program for all law enforcement officers to become proficient at this relatively new forensic technique. It's called the JTAG Chip-Off for Smartphones Training Program.

Digital forensic investigators representing state, local, regional, tribal, military, and federal civilian law enforcement agencies graduated from the pilot JTAG Chip-Off training program in the Spring of 2016. The two-week course of instruction was expansive and intense with topics ranging from safety concerns due to the extreme temperatures involved in the chip-off process to special air-handling concerns due to heating the

epoxy and solder on the computer boards to remove the chips to a basic understanding of Python coding to obtain passwords of interest from the RAW images obtained from the smartphones themselves. The course was the first one ever coordinated by new FLETC instructor Tracy Gatwood, who has vast experience in both traditional digital forensics and mobile device forensics, which he honed after successfully graduating from FLETC's own Seized Computer Evidence Recovery Specialist Training Program in 2006. He was assisted by another FLETC new instructor, Teri Hamel, who recently left the field as a Department of Homeland Security, U.S. Immigration and Customs Enforcement, Homeland Security Investigations special agent.

The outcome of the prisoner/criminal who destroyed his cell phone in hopes of destroying evidence was not a good one. With the aid of advanced investigative skills provided by FLETC, one of the recent graduates of the JTAG Chip-Off training program was able read all of the active files on the cellphone he thought he destroyed. The data recovered revealed there were many files that most people consider "deleted." The effect of the course on the investigation was incredible. Not only was evidence of the primary suspect's involvement with a murder-for-hire plot confirmed, but three additional previously unknown co-conspirators were also implicated. The case was blown wide open and was able to be moved from a local level of prosecution to the federal level.

For more information on future JTAG Chip-Off for Smartphone Training Programs at FLETC, or other FLETC training programs, contact the author at preston.farley@dhs.gov or visit https://www.fletc.gov/training-catalog

TRACY GATWOOD is a senior instructor for the Cyber Division at the Federal Law Enforcement Training Centers (FLETC). He has been a full-time instructor since 2015 and became the program coordinator for the JTAG Chip-off for Smartphones Training Program (JCSTP) in 2015. This is the advanced mobile forensics class for all law enforcement agencies both federal and state offered by the FLETC. His law enforcement career includes 29 years in the Metropolitan Nashville Police Department. He spent several years in the Criminal Investigation Surveillance Unit, both as a detective and supervisor. During his service with the Metropolitan Nashville Police Department, he also oversaw the Cyber and Mobile Device investigations unit.

The New Smoking Gun of Technology in Training

In the digital age, software now provides the smoking gun link between training and technology

BY LAUREN WARE

The "smoking gun" analogy is often used to describe the indisputable physical evidence that proves, beyond a shadow of a doubt, the guilt of the accused. The fact that it is deliberately referred to as the "smoking" gun and not just a "gun" illustrates a critical but often overlooked element of physical evidence: context. The value of physical evidence to any criminal investigation is to a large extent contingent upon its context. The fact that item of evidence "A" exists isn't necessarily significant; instead, it is the fact that item of evidence "A" was recovered from a particular location, at a particular time, and in a particular context. In the case of the smoking gun, the gun was not necessarily valuable until it could be described as having been recently fired (hence the smoke). That additional detail is responsible for adding tremendous evidentiary value to an otherwise circumstantial object.

For this reason, crime scene investigation is a long and laborious process. Crime scene investigators might spend eight to 10 hours at a crime scene, but this is not because the evidence is so difficult to find. Instead, the majority of that time is spent preserving that most valuable of physical evidence traits: context. Crime scene investigators meticulously document scenes through written notes, sketches,

FOR THE FIRST TIME EVER, A CRIME SCENE DIAGRAM COULD BE LINKED WITH DIGITAL PHOTOGRAPHS, ELECTRONIC EVIDENCE TAGS, AND THE WRITTEN DOCUMENTATION ASSOCIATED WITH EACH ITEM OF EVIDENCE.

diagrams, photographs, video recordings, and recently even three-dimensional laser scanners. In essence, this documentation forever bonds the "smoke" to the "gun." While the requirement to preserve the contextual elements of evidence at crime scenes will likely never change, the manner in which it is collected and recorded is absolutely evolving with new technologies.

AN ELECTRONIC EVIDENCE COLLECTION MANAGEMENT SYSTEM

Most federal investigative organizations transitioned to electronic investigative databases long ago, and to date, countless case file systems have been created, improved, and become linked to still other databases, making instantaneous information sharing and report generation possible. Up until recently, though, hard-copy crime scene documentation had to be manually input into these systems. Evidence tags and forms handwritten at the scene had to be transcribed into investigative databases sometimes in the middle of the night following hours of crime scene processing. Hand-drawn sketches and measurements had to be transferred into computer assisted diagramming software in order to produce a professional product worthy of presentation at trial. The process of transitioning crime scene information to an electronic database was not only time-consuming, but also created an opportunity for transcription errors. In the unforgiving field of forensic evidence, one misplaced digit can cost an item of evidence its admissibility in court. Additionally, missed steps are often not identified until this mountain of information is being transferred to the database; at that point, it is no longer an option to go back to the scene and take that last measurement, or capture that one overlooked photograph.

In 2007, the Federal Bureau of Investigation (FBI) developed a software application known as the Evidence Collection Management (ECM) System. This application was designed for use by crime scene investigators to document the investigative work done at FBI crime scenes by organizing into a workflow the products from all the common roles involved in the processing of the scene. For the first time ever, a crime scene diagram could be linked with digital photographs, electronic evidence tags, and the written documentation associated with each item of evidence. Not only was time and energy saved by documenting these features electronically the first time, but also the software allowed investigators to observe the totality of their evidence's documentation in one, consolidated application. This made understanding and analysis of the crime scene much more readily accessible.

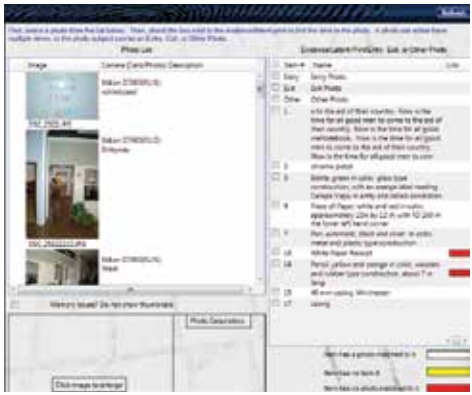
Through their partnerships with the FBI, the Department of Defense (DoD) Biometrics Program Managers identified a common use for the software, and following some modifications to bring the software in line with DoD requirements, they brought on-line their own version of the evidence collection system, which the DoD refers to as ECMX. This software provides prompts for specific descriptions, drop-down menus for required information, and link capabilities between the scene sketch, photographs, and evidence descriptions. There is also an output Word document that serves as a crime scene investigative report including evidence custody documents, receipts for items seized, and photography-logs. This software has the capability to operate on a standalone computer or on a network. The DoD intends to place ECMX on a mobile platform that operates on networked computers. Eventually, users will be able to connect to an internet hotspot and communicate between ECMX applications through a secure DoD server. This will allow for better on-scene management and near real time oversight by the crime scene lead. Because the software allows multiple agents performing various roles at a crime scene to simultaneously input data into a single report, missed steps can be more easily identified, and important relationships within the crime scene can be detected at an earlier time by managers or analysts in an entirely different location. The implications of this software would be exciting to any crime scene investigator; for that reason, FLETC's Military Criminal Investigative Organizations

(MCIO) partners were eager to implement this software in their training programs. Their first stop was FLETC's Crime Scene Investigator Training Program.

THE CRIME SCENE INVESTIGATOR TRAINING PROGRAM

In January of 2014, the Forensics and Biometrics program managers from the Air Force Office of Special Investigations, the Army Criminal Investigation Command, and the Naval Criminal Investigative Service decided to overhaul the specialized training provided to select agents destined to serve as Forensic Science technicians and consultants for their agencies. Prior to this date, each of the three MCIOs sent their forensic agent selectees to nine different specialized training programs to obtain the advanced skills necessary to serve as forensic subject-matter-experts. This was an expensive and time-intensive process to certify their experts, taking sometimes two years to complete all the required training. Additionally, because each of the three agencies obtained their training from different entities, there was variation in their agents' methods and techniques. The MCIOs concluded, then, that a standardized, consolidated, and joint forensic technical school would be both a practical and economic solution to produce the forensic science experts critical to the success of their criminal investigative mission.

Over the course of 2014, the Biometrics program



Screen shots of ECMX software organizing the many components of crime scene processing procedures taught in the Crime Scene Investigators Training Program.

managers visited not only FLETC, but also numerous training academies to compare facilities, existing curriculum, the credentials of the instructional cadre, and importantly, the institutions' ability to respond swiftly and agilely to new training requests. The MCIO representatives unanimously selected FLETC's Forensics and Special Investigative Skills Branch to build this unprecedented training program, and in September of 2015, FLETC piloted the first iteration of the Crime Scene Investigator Training Program. This seven-week advanced forensic training program has set the standard for how federal law enforcement employs forensics at crime scenes and has effectively equipped the MCIOs' forensic science agents with the specialization and knowledge to consult on and lead the processing of the military's most complex crime scenes. As such, these leaders in their field need to be among the first in their agencies to learn and master new technologies, like the ECMX software.

IMPLEMENTATION OF THE ECMX

The great utility of the ECMX software is its ability to receive, organize, and relate information as it is immediately collected from a crime scene. It was therefore imperative that the students be able to undock their networked computers and take them into crime scene exercises at various training venues on FLETC. In anticipation of this training requirement, the forensics instructors acquired training network tablets for student use in the program, and executed several iterations of the training programs to ensure instructor proficiency with this learning tool. All the planning and advance troubleshooting paid off, as the ECMX software was successfully implemented in the Crime Scene Investigator Training Program in May of 2016. The instructional cadre of the training program embedded the software into their presentations, and used it as a framework to instruct students on the required crime scene documentation. Over the course of seven weeks, students process 12 crime scenes and utilize the ECMX software to track and catalogue their efforts. At the conclusion of the program, students receive a subpoena notifying them they will testify to a particular item of evidence they identified, processed, and collected at one of these 12 crime scenes. The ECMX software is used to generate a crime scene report that prosecuting and defense attorney role players use to question the students about their methods of collecting a particular item of evidence. Now, as students are learning the forensic techniques taught by FLETC, they simultaneously develop a proficiency documenting those techniques in the software they will encounter in the field. In this way, the cradle to grave application of this software envisioned for use in real world cases is successfully mirrored in its cradle to grave application throughout the training.

TECHNOLOGY IMPROVING PARTNERSHIPS . . . AND PARTNERSHIPS IMPROVING TECHNOLOGY

Among the many benefits of sharing technology from the field with those administering training is the mutual strengthening of both the training and technology products. The training improves because the students are able to use tools that reflect those which are actually used in the field, making the training environment more realistic and consequently more relevant. The technology also improves because, unlike the real world where mistakes can cost law enforcement a successful prosecution, instructors and students can test the technology in a "safe" environment. In training, risks can be taken, limits can be pushed, and "what if" scenarios are actually encouraged. FLETC has done precisely that with its implementation of ECMX; after just one iteration, instructors have provided invaluable feedback on what worked, what did not, and suggestions on how the technology can be changed to avoid issues in the field. It has also revolutionized advanced forensics training by putting the most cutting-edge technological developments in the hands of the FLETC student. Indeed, one could cite FLETC's implementation of the DoD's ECMX software as the "smoking gun" of a successful partnership between technology and training.

Instructional Preparation for the Virtual Classroom: U.S. AFOSI and On-line Instructor Diana Fleming, recording audio for lesson presentations for students enrolled in AFOSI's Basic Extension Program.

The Virtual Law Enforcement Classroom

BY DIANA FLEMING
AFOSI INSTRUCTOR

Twenty years ago, the term "Virtual Classroom" may very well have evoked images of a hypothetical alternate reality, or perhaps an exaggeration of the extent to which technology would envelop normal everyday lives. Today, however, virtual classrooms are at the very least a reality and most likely a necessity. Indeed, long established traditional colleges and universities are increasingly emphasizing in their advertisements the availability of online degree programs, blended learning environments, and distance education opportunities. This is due not only to the fact that technological advancements make distance learning possible, but also because the target student audience seeking higher education demand it; these students have grown up with these technologies and are used to absorbing information through these modalities, they are proficient with the technology, and they require it to accommodate their busy lifestyles. Of course, institutions of higher learning benefit from these endeavors as well. The virtual classroom offers the benefits of scheduling flexibility, an inexpensive physical infrastructure and training platform, and a much wider reach than the traditional classroom. It may come as no surprise that these features make it attractive not only for higher education institutions, but for law enforcement training and education as well.

Opponents of law enforcement training evolving into the virtual learning environment would argue that the practical

THE DEVELOPMENTAL STAGE WAS THE MOST CHALLENGING, AS CURRICULUM HAD TO BE DEVELOPED FOR FOUR DISTINCT BLOCKS, AND THIS CURRICULUM NEEDED TO BE ENGAGING IN A VIRTUAL ENVIRONMENT, AND INCLUDE STUDENT ACTIVITIES, LABS, AND FINAL EXAMINATIONS.

aspects of policing simply cannot be taught effectively in an online environment. There is indeed merit to this argument, as not all components of law enforcement training are suitable for distance learning. Physical techniques and tactics, firearms, and operational skills, all require some in-person instruction, performance, and evaluation. There are, however, other facets of law enforcement education that are appropriate for the distance learning environment. In order for this environment to be used appropriately, a normal Instructional Systems Design process must be followed, during which the learning objective is identified, the required level of proficiency determined, and then, only then, the most appropriate method of delivery selected. In fact, accomplished properly, the virtual classroom becomes just one more option for consideration next to lecture halls, mat rooms, and firearms ranges.

In 2011, the Air Force Office of Special Investigations (OSI) recognized a gap in training between the agency's basic and advanced skill training and requirements, which was not consistently addressed for every agent in on-the-job training. Following graduation, agents spend a year on "probation" during which they apply the skills they learn at FLETC in the context of a real world operational environment. This on-the-job-training varied according to the agent's duty station, the nuances of their particular mission and jurisdiction, and the unpredictability of both frequency and type of case work. The U.S. Air Force Special Investigations Academy staff realized that in order to deliver a more standardized training program to a student audience that was literally scattered across the globe, they would have to utilize a virtual classroom. Thus was born the Basic Extension Program (BEP), a first of its kind, online training program offered to OSI students beginning in 2012. As the staff who stood up the program can attest, the virtual law enforcement classroom did offer many benefits, but also presented some unique challenges.

INITIAL CHALLENGES

Like any good training program, the inception of the BEP followed the ADDIE-R process. The ADDIE model is the generic process traditionally used by instructional designers and training developers. The five phases—Analysis, Design, Development, Implementation, Evaluation and Revision — represent a dynamic, flexible guideline for building effective training. The OSI Academy staff analyzed the training gap, designed a program solution, developed curriculum, implemented the program, evaluated student performance, and revised the training based on feedback. The developmental stage was the most challenging, as curriculum had to be developed for four distinct blocks, and this curriculum needed to be engaging in a virtual environment, and include student activities, labs, and final examinations. Initially, the BEP required students to complete each distinct block in a certain sequence, with specific start and end dates, regardless of their duty station. First was recruitment of sources, then interviewing, and so on. Assignments involved a variety of activities, to include readings, meetings with entities, and review of case studies. All assignments and final examinations followed an essay format. One BEP instructor, Special Agent Hillary Zuege shared that one of the challenges was the "inherent stress upon the instructors to provide a great level of detail to an open-ended question. The desire to encompass all possible options made the feedback very lengthy."

In order to gauge the efficacy of the BEP, OSI Academy staff collected student and supervisor surveys from customers using this training in the field. This feedback proved invaluable, as it illustrated a strong need for an even more flexible learning environment. Responsive to this feedback, the staff revised the program to allow probationary agents to enroll in and accomplish any of the four blocks, and in any order they chose. They also were allowed to enroll in multiple courses at the same time. This enhanced not only the flexibility, but the buy-in from the customer as these changes empowered the students to schedule more optimal times to take a class and still balance work requirements and life obligations. As Zuege shared, before these changes were made "students were unable to engage as much as they wanted in the course material due to the effort required for the essay-style questions. Students were already trying to balance between work and home obligations, and BEP took up any time they had left. Several students stated the material was very interesting, but they weren't able to read all of it or apply critical thinking because of time constraints." OSI Academy staff expects that their revisions to the program will help alleviate this challenge and enable their students to engage more fully in the online learning process.

Results

Level II feedback on the BEP has produced some surprising and unexpected results. The staff at the academy suspected that their use of the virtual classroom would achieve greater reach and save their command money in the long run, but they never expected students to enjoy the training to the extent they did. Student feedback overwhelmingly valued the in-depth, personalized interaction with instructors on their assignments. The reason this may be surprising is that many perceive the online learning environment as impersonal, and cite the lack of face to face exchange as a shortcoming of that medium. However, one of the by-products of using an essay-style design of labs and examinations is the requirement to interact and communicate on an individual level. With more individual effort on the part of the student, the instructor is compelled to give each individual student personal attention and feedback on their submitted product, something that cannot always happen in a classroom environment. While several challenges remain concerning the logistics of supporting an online learning platform and continuing to design engaging curriculum, the OSI Academy has in a very short amount of time created subject matter experts in this arena. In fact, the BEP is so successful, it is the first and only online program pursuing Federal Law Enforcement Training Accreditation at this time.

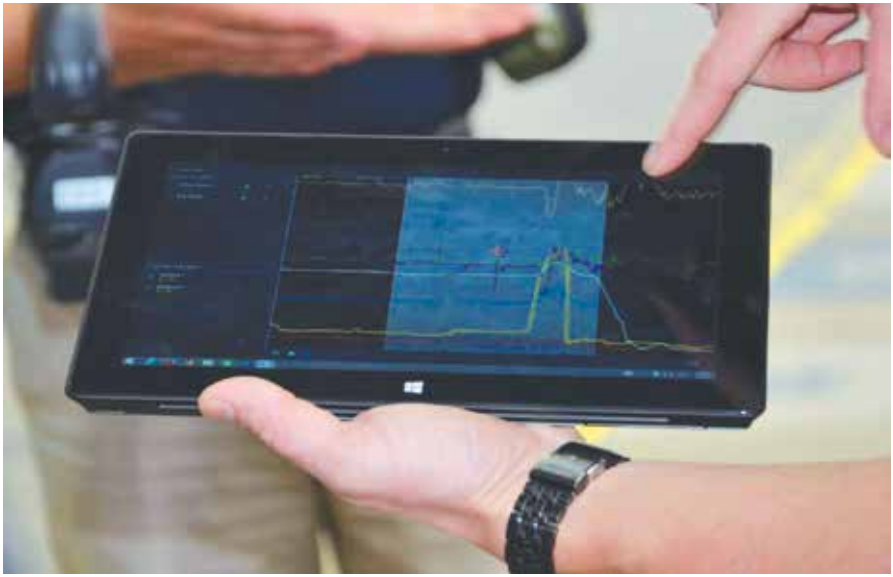
Virtual classrooms have indeed become a part the norm when it comes to education. The virtual classroom is not only here to stay, but is an expectation in the current age of global connectedness. Law enforcement should not shy away, but should embrace the virtual classroom for the benefits it can offer and capitalize on a platform that certainly allows for flexibility, lower training costs, and much wider audience reach.

SPECIAL AGENT DIANA M. FLEMING is assigned as an instructor in the Advanced Training Division, United States Air Force Special Investigations Academy (USAFSIA), Federal Law Enforcement Center (FLETC), Glynco, Georgia. In this position, she is responsible for instructing all forensics topics in four AFOSI basic and advanced in-residence courses to over four hundred and twenty students.

Fleming is the director for the online criminal investigation skills block of the basic extension program, which reaches two hundred probationary agents annually. She is responsible for designing curriculum and training agents to use all newly procured forensics equipment for Air Force Office of Special Investigations (AFOSI). Fleming interfaces with the AFOSI liaison at the United States Army Criminal Investigations Laboratory in Forest Park, Georgia, on training and research needs. She also oversees USAFSIA's execution of strategic engagements with international partner agencies.

Fleming informally mentors and encourages families, whose children are medically fragile, similar to her daughter, on the use of parenteral and enteral nutrition proving practical guidance and hope.

New Technology
and its Potential to Enhance Training



BY ALICIA GREGORY
SENIOR PUBLIC AFFAIRS SPECIALIST
PHOTOS BY HEATHER SANTOS

Most instructors strive to get into the mind of the student. Knowing what a student sees or feels during a practical exercise can allow for more specific and precise training and improved results, which is beneficial for both the instructor and the student.

The Federal Law Enforcement Training Centers is testing a new technology that can enhance the way firearms instructors teach. Rather than relying solely on direct observation of the shooter to diagnose a student's challenges in firing a weapon, instructors will have access to real-time sensor and video data that will allow them to more quickly pinpoint the issues and save valuable instructor and student time.

Top photo: A technician points out statistical information based on the MAT-MP testing. Above: A FLETC firearms instructor fires a weapon equipped with monitoring technology.

Rocco Portoghese, senior reseach and development engineer, NAWCTSD Orlando Rapid Design and Fabrication Lab, explains how the MAT-MP prototype works to FLETC staff.

The Naval Air Warfare Center Training Systems Division (NAWCTSD) developed a weapon-mounted sensor package that is capable of recording and analyzing shooter data, such as trigger pressure, trigger pull, cant angle, buttstock pressure, and steadiness. The instructor can also observe the student/shooter's point of view through a high-definition camera attached to the sighting system. The data and video are captured and transmitted in real time to the instructor's tablet or laptop computer and can be viewed live or played back later for evaluating marksmanship fundamentals.

Originally sponsored by the Navy's Office of Naval Research, the Modular Advanced Technologies Marksmanship Proficiency (MAT-MP) prototype is currently designed for use with rifles such as the M16/M4 platform. According to Tyson Griffin, Head of the NAWCTD's Advanced Modeling and Simulation Branch, the technology could be adapted for law enforcement training.

"The ultimate vision for law enforcement is an application for handguns," explained Griffin. "This will take additional engineering work in order to miniaturize components and instrumentation for a sidearm. That is the long-range vision . . . it would not only benefit FLETC, but also state and local law enforcement training academies."

Griffin's teams have partnered with FLETC on transferring and adapting Department of Defense technologies to law enforcement while working on FLETC's After-Action Review system; the Advanced Use of Force Training System at sites in Glynco, Georgia, and Artesia, New Mexico; courtroom upgrades in Glynco, Artesia, and Charleston, South Carolina; and the Scenario Planning and Effects Control System at Glynco.

Portoghese and FLETC FAD instructors identify and discuss improvement modifications for the MAT-MP. *Photo by Doug Dragotta, FLETC.*

The results from the MAT-MP firearms test are show to a FLETC instructor.

The potential application of MAT-MP for law enforcement was identified by Mr. Don Lapham, Office of Assistant Secretary of Defense for Homeland Defense and America's Security Affairs, whose job it is to find Department of Defense technologies with the potential to benefit first responders.

"The MAT-MP Project was first demonstrated to FLETC at the Interservice/Industry Training, Simulation and Education Conference in December 2014," said Dee Marshall, former program manager for FLETC's cooperative research and development

agreement program. Marshall worked closely with the NAWCTD engineers on a variety of projects during her tenure with the FLETC. According to Marshall, several representatives from FLETC, including FLETC Firearms Division Chief Scott Donovan, attended the conference where they were able to see the demonstrations and had an opportunity to talk directly with the engineers and Lapham on site. "MAT-MP was immediately endorsed as a potential technology that could significantly assist firearms instructors. A subsequent visit to Orlando involving firearms staff members confirmed our interest and the potential value of this technology."

FLETC Firearms Branch Chief and former FLETC representative at Team Orlando, Doug Dragotta, facilitated the relationship between the FLETC instructors and NAWCTD engineers to determine if this technology could work in practice.

The first test and evaluation was conducted in May 2015 using live fire in one of the FLETC ranges in Glynco, Georgia. "The overall objective for the initial testing was to evaluate whether this technology would be applicable and effective for use in our basic and advanced rifle training programs," explained Dragotta. The team also set out to define specific requirements for any customization needed to the current prototype. Several instructors participated in the process, providing subject matter expertise and feedback to the engineers and ultimately determining the sensor package could be used to assist with diagnosing student marksmanship deficiencies when using a rifle. The team of instructors would also like to see this technology adapted to a pistol where marksmanship deficiencies are more prevalent.

According to Rocco Portoghese, NAWCTSD's MAT-MP lead engineer, "The interest level and engagement of instructors was outstanding. They weren't just observing, they were asking questions to figure out how to make the best use of the technology. This is invaluable to the creation of new technologies." "In terms of the power of the government conducting this development, while for-profit companies have to ask themselves 'what can I sell?' here NAWCTSD and FLETC can specifically concentrate on what we can do for instructors and students," Griffin has noted. And it's not just NAWCTD giving technology to FLETC – each organization leverages each other's knowledge, skills, and abilities; NAWCTSD takes successes with FLETC and passes them onto the Fleet.

Portoghese recalled the same kind of engagement with previous projects with FLETC. "We've always had a high level of cooperation with the FLETC training community. The instructors and the Partner Organizations recognize that if they put the time in evaluating and helping to define technologies, it will give FLETC a better capability to train."

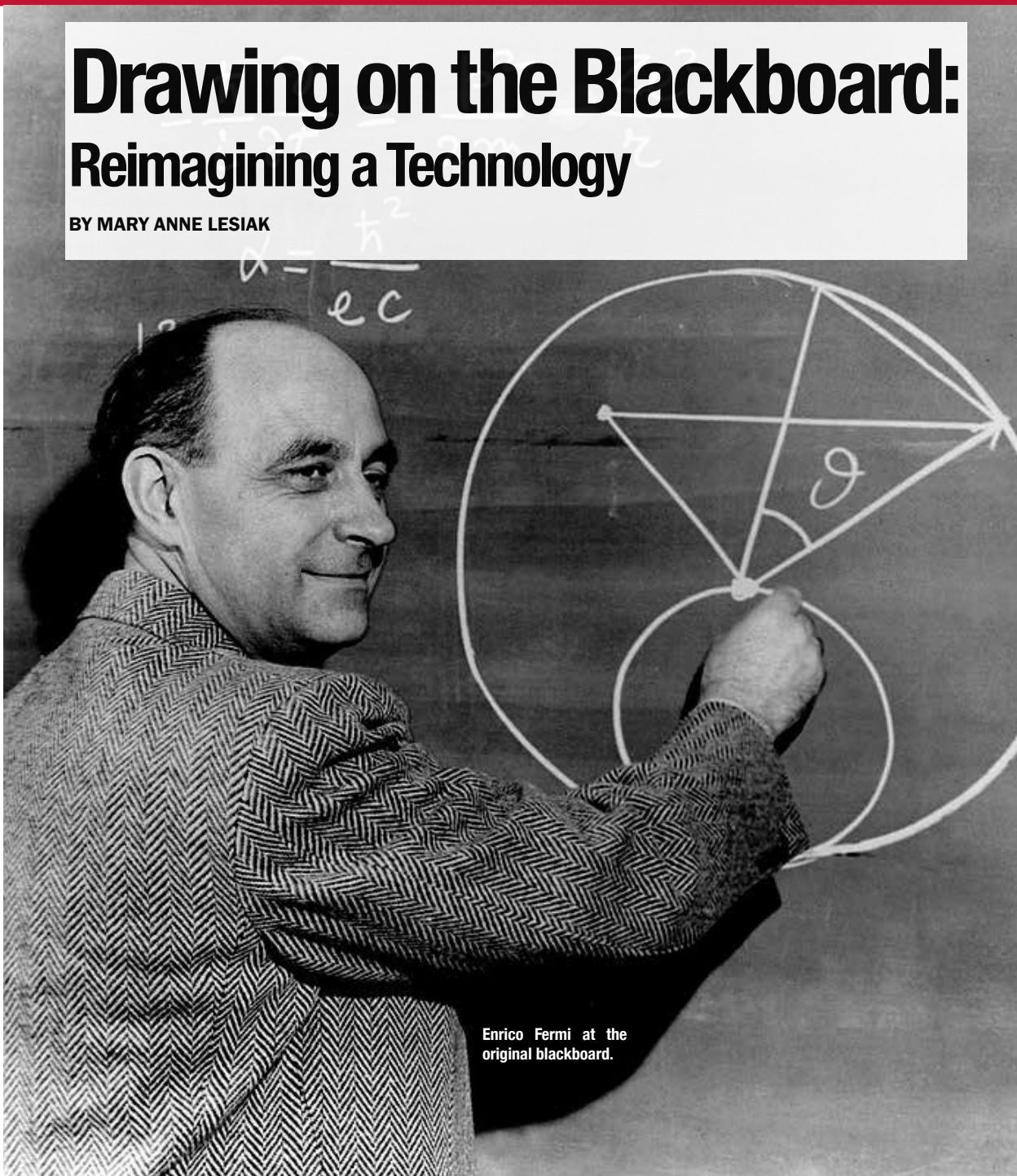
"The interactive relationship with FLETC instructors has made us better," added Griffin. He went on to discuss the importance of the technologists working with the instructional design specialists, research psychologists, and instructors to really explore how technology can help training. "From a partnership perspective, this will lead to a better product."

With promising results from initial testing, the team is looking forward to continuing with the development of the MAT-MP and integrating the technology into firearms training.

ALICIA GREGORY is a senior public affairs specialist in the FLETC Protocol and Communications Office. She arrived at FLETC in 2005, after serving as the Public Affairs Officer for the U.S. Army Corps of Engineers in Charleston, South Carolina. Gregory has more than 25 years working in the public affairs field and has an extensive background in internal communications, community relations, and media relations. She is a graduate of the Defense Information School in Fort Meade, Maryland. Gregory earned a Bachelor of Business Administration from South University.

Drawing on the Blackboard:
Reimagining a Technology

BY MARY ANNE LESIAK



Enrico Fermi at the original blackboard.

Senior Instructor Craig Cupp demonstrates the latest techniques in trace evidence location, recovery, and analysis.

Organizations bring on new technologies to advance strategies or solve problems that are generally well defined and articulated as part of the adoption process. In these lean economic times, neither public nor private organizations expend scarce resources without a clear understanding of exactly what they are getting and the benefits to the organization. During the adoption process, teams craft functional and technical requirement documents that spell out exactly what the technology needs to do, how it will operate, and what other systems it will communicate with. Products that provide the best match to these requirements within the allowable budget are selected and away we go – off to implementation!

Occasionally, entrepreneurial problem solvers see new technologies adopted and figure out how to use them in unexpected and enterprising ways. One such example is the Federal Law Enforcement Training Centers' Investigative Skills Branch Chief Bill Newbauer, who recognized that technology supporting FLETC's Online Campus could update and improve FLETC basic training program delivery.

Newbauer leads FLETC's Continuous Case Investigation training program – or CCI – which provides newly hired criminal investigators with an introduction to the criminal investigative process and the skills necessary to prepare and present a case to an Assistant United States Attorney as part of the Criminal Investigator Training Program. Through the 12-week CCI, students learn how to initiate criminal cases, the methods of conducting investigations, procedures for maintaining case files, and the finalization and judicial processing of cases. While CCI includes direct classroom instruction, the bulk of the learning takes place as the students work in teams running their own ongoing scenario-based cases.

Mimicking a real case, the ongoing training case requires finding, developing, organizing, and maintaining various pieces of documentation, information and evidence. These could include maps, forensic reports, photographs, interview memoranda, phone bills, credit card receipts, or numerous other types of documents depending on the case. As student teams develop their cases, they maintain their case files in traditional file folders. At the conclusion of the investigation, students have a large binder full of documentary evidence that must be re-created into a second binder and turned over to the defense attorney

for discovery during the mock trial.

Newbauer identified two major inefficiencies with the status quo. The daily production of paper documents to support scenarios – generally on a single, overworked, shared copier – required hours of instructor preparation time. "I couldn't bear watching them stand over the machine and spend hours making copies," said Newbauer. "It was just a terrible waste of time."

Additionally, many partner organizations for whom the students would eventually work cases had digitized their case management systems, making the paper system obsolete "We want to give our students the best training available. We were giving them the very best knowledge and skills, but in this one instance, our tool was out of date," stated Newbauer.

Senior Instructor Scott Wright debriefs students following the execution of a search warrant.

In support of FLETC's "paperless initiative," Newbauer began a search for a digital solution to replace the multiple volumes of paper produced during the ongoing criminal investigation. Eventually, Newbauer teamed up with FLETC's Instructor and Online Training Division.

FLETC's Online Campus Team selected Blackboard® as its learning management system for its distance training and learning delivery capability. The primary function of the learning management system is to manage all facets of the online training process, including registration, program administration and delivery, instructor communication, trainee evaluation, and transcript management for an audience that may never step foot on a traditional FLETC training campus.

After a little background research into Blackboard and a few discussions with Instructor and Online Training Division Deputy Chief Joe Augeri, Newbauer believed that Blackboard could serve as a permanent online repository for all the materials and artifacts necessary for the CCI training program and the case management files for the ongoing cases. In addition to eliminating the frustrations, cost, and environmental impact of producing and managing paper, Blackboard would also give instructors and students collaboration and communication tools that could enhance learning and feedback around the investigative process. By integrating Blackboard, CCI would become FLETC's first hybrid learning program, enhancing traditional classroom instruction with newer online instruction, activities and resources.

Many obstacles were identified. Students and instructors would need tablets and Wi-Fi to access the system around the clock. Would FLETC have the data infrastructure to support this program? How do we grant internal students access to an online system built for external students? How would students get IT support from a system that closes its help desk at 5:00 p.m.? Contributors across the FLETC enterprise, with the support of Director Patrick and the FLETC Executive Team, continue to collaborate to solve these and a myriad of other challenges.

Augeri and his team managed the Blackboard CCI implementation. "We've been using Blackboard to work with the online students for a while now," said Augeri. "It is exciting to leverage the learning management system and wireless tools/technology to deliver realistic training that is indexed to the needs and requirements of the field."

Preparing traditional classroom instructors to maximize the impact of training using this new multi-modality platform is of critical importance.

Senior Instructor Greg King educates law enforcement students in the use of internet tools to optimize their investigations.

"People sometimes think training is training. Training and education online is different and requires additional skillsets. Students are generally familiar with this sort of technology before they get here. We need to make sure the instructors have equal or better familiarity," added Instructor and Online Training Division Senior Instructor Bobby McGettrick. In response to this challenge, the Instructor and Online Training Division created a series of web-based training modules constructed for someone completely unfamiliar with Blackboard. They cover everything from basic uploading lessons, to computations, to receiving survey results.

Newbauer realizes the project is moving forward; however, he initially underestimated its complexity. "It was easy to get started because I could see the vision. I could see how much better it could be for students and instructors, and I knew Blackboard could do it. What I didn't see was all the other progress – big and small – that have to occur in order to fully realize that vision. I'm so grateful for the expertise and teamwork from Joe Augeri, Bobby McGettrick, Pam Potaczek and Scott Wright, and our team of dedicated Continuous Case Investigation Coordinators. They are really working to make our vision a reality."

The use of Blackboard to support the CCI program goes beyond the intention of the system's original adopters, thereby extending its use in a way that better serves the entire enterprise, creating additional beneficiaries and leveraging its initial expenditure. When considering technology to solve an existing problem, it may make sense to reinvent something that exists within the organization rather than look outside.

MARY ANNE LESIAK is a program analyst in the Regional and International Training Directorate. Prior to joining FLETC in 2014, Mary Anne served in several roles at Apple Tree Institute for Education Innovation, including Chief of Staff, Chief of Strategic Initiatives and Director of Education. At Apple Tree Institute, a non-profit located in Washington, DC, she led the development, implementation and dissemination of research-based curricula, teacher training and evaluation tools designed to improve teaching and learning in under-resourced schools. Mary Anne has also served as an Educational Website Coordinator at the US Mint, a Program Analyst at the US Department of Education, and a teacher in the District of Columbia Public Schools. She earned a Master in Teaching from American University and a Bachelor of Arts in Government and Politics from the University of Maryland, College Park..

Working Together to PIONEER the Future of Law Enforcement Training

DHS Science & Technology Directorate partner with the FLETC Training Innovation Division

BY SHAWN BELTRAMO

We are fortunate to live in such an exciting time in the world! The Digital Revolution has led to unprecedented access to information and an incredible number of innovations. Smart phones, body worn cameras, unmanned aerial systems and all the other incredible technology highlighted in this edition of the FLETC Journal are great examples of how these new technologies are leading to amazing innovations in law enforcement and education. While all this technology can provide new and exciting solutions to a wide range of training challenges, the human element remains the most critical piece of any potential new innovation. Having an actual person in the loop to determine how and why this technology will be used is a critical step. Connecting the right people to the right technology at the right time is a major factor in determining if a new technological advancement will succeed or fail.

The Federal Law Enforcement Training Centers and the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) recently took a significant step forward to ensure the right people are part of the training innovation process by embedding an S&T employee at the FLETC-Glynco campus as part of the PIONEER program. The PIONEER – Partnering for Innovation and Operational Needs through Embedding for Effective Relationships – program was started in 2015 with the objective of bettering the understanding of the research and development process and gaining insights into components' operational needs, capability gaps, and working environment.

PIONEER embeds S&T members into the DHS components' environments, enabling access to current-state awareness of the components' most critical needs, and concurrently embeds DHS component personnel into the S&T research, development, test, and evaluation processes. Embedding component personnel into S&T will ensure a better understanding of what it takes to bring a potential technology from an idea to an operational product, as well as the importance of having a clear notion of operational requirements before S&T starts developing a technology.

Jim Grove was recently selected to be the first PIONEER liaison assigned to the FLETC and is embedded with the Training

Jim Grove, DHS Science and Technology Directorate liaison, demonstrates a virtual reality headset to a staff member in the FLETC Future Concepts Rooms.

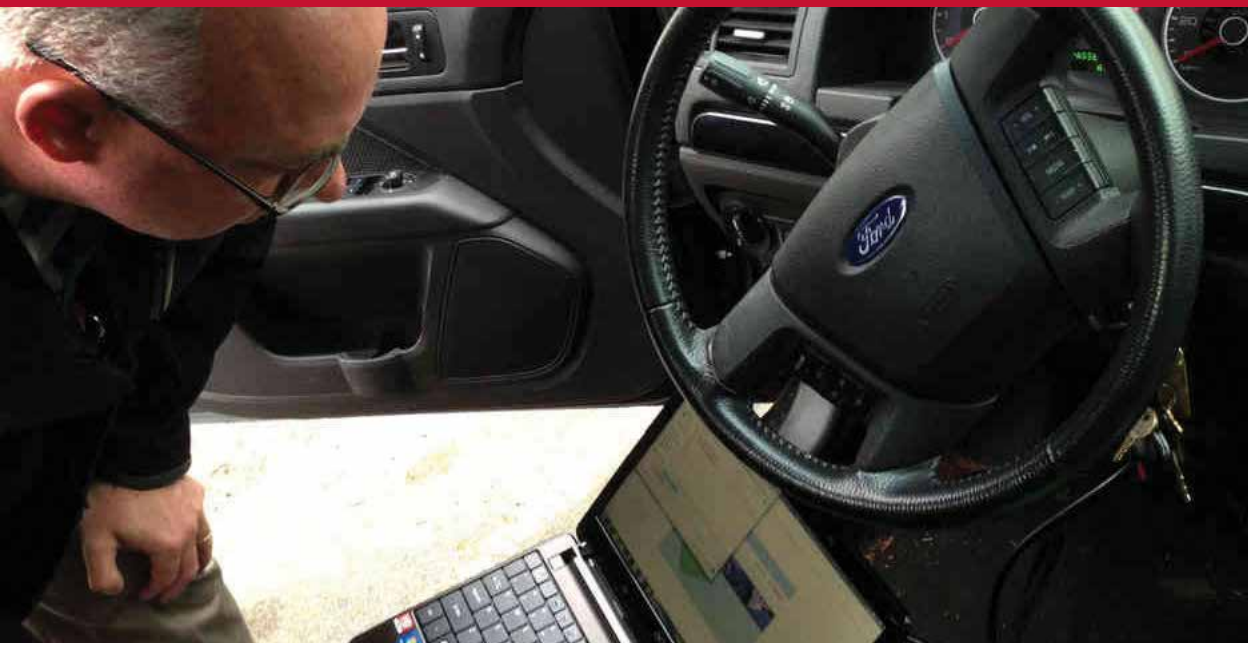
Innovation Division at FLETC-Glynco. The Training Innovation Division and S&T have a longstanding relationship of collaboration. Having an S&T liaison embedded at FLETC creates valuable opportunities to strengthen this relationship and leverage the capabilities of each organization. "S&T's expanded relationship with FLETC instructors and subject matter experts provides a great opportunity for our program managers to further develop operational requirements, test new technologies and applications, and make final adjustments before deploying them in an operational environment," said Grove.

S&T has access to a wide range of technical experts and resources to design and develop new innovations, while FLETC has many of the top experts in the law enforcement training field. By linking these subject matter experts with the technical experts, we greatly increase the overall quality of the innovations for both agencies. Additionally, by having access to the state-of-the-art training venues at FLETC, the program managers at S&T are able to test the newest technologies in realistic scenarios and compile critical feedback on their utility and performance.

"I am excited about this detail because it provides a window into how technology development impacts both training and doctrine and where new or enhanced technologies may increase student learning and skill proficiency," Grove said. "It also provides an opportunity to look beyond the DHS components to identify cross-cutting requirements, collaborate on emerging S&T projects, and work with the private sector to facilitate the development of innovative tools, technologies, and products."

Through the partnership, FLETC instructors and students are able to get a first look at some of the newest technology coming into the field and have an opportunity to provide their input toward the design and future implementation of these technologies. These combined efforts are helping to bring the latest technologies to the future of law enforcement training.

SHAWN BELTRAMO serves as the division chief for the Training Innovation Division for the Federal Law Enforcement Training Centers. He provides guidance and oversight to division's three branches; the Applied Research branch, the Outreach & Exploration branch and the Evaluation and Analysis branch. The Training Innovation Division's primary mission is to research, identify, channel, and validate new instructional methods and technologies into the curricula. Prior to this assignment, Beltramo served as a supervisory special agent with the Air Force Office of Special Investigations where he performed and oversaw a wide range of felony criminal investigations and counter-intelligence matters. He served over 22 years with the United States Air Force and performed duties in numerous stateside locations and eight foreign countries. These duties included working as a patrolman, dispatcher, investigator, recruiter and special agent. Beltramo received his bachelor's degree in Criminal Justice Administration from Columbia Southern University and his master's degree in Criminal Justice from American Military University.



Laptop is connected to vehicle infotainment system to obtain digital evidence.

Vehicle Embedded Forensics

BY PRESTON FARLEY

The call came in at 11:30 p.m.* A silent alarm had been triggered at a local electronics store. Patrol officers were dispatched immediately to the scene and arrived approximately 12 minutes later. The store had a broken glass door but no one was visible in the building. Smashed store displays littered the scene and high-end electronics were missing from many of them. It was the same "Modus Operandi" as other recent breaking and entering crimes recently investigated in the area. This time, however, a break in the case originated from a bystander, who provided police with a vehicle description and license plate number. Through diligent police work, a search warrant was issued for the vehicle owner's residence and vehicle. Unfortunately, no physical evidence of the crime was discovered at the home or in the vehicle; however, digital evidence recovered from the vehicle itself told a very interesting story.

Vehicle embedded forensics is a relatively new discipline driven by the automobile industry's introduction of electronic circuitry into our nation's vehicles. Much of the early investigative work in this field came from traffic accident analysts who learned you could obtain the state of various vehicle systems at the time of impact such as accelerator position, brake pedal position, speed, steering wheel direction, etc., from the "little black box" in most vehicles. While those items are still available in today's vehicle computers, there is a vastly larger

Photo of an actual "little black box".

dataset to pull from to generate leads or provide hard evidence in an investigation not necessarily related to an automobile accident.

In 1996 the OBD-II (Onboard Diagnostics 2) specification was made mandatory for all cars manufactured to be sold in the United States. This system was originally designed to provide vehicle repair technicians with self-diagnostic and reporting of problems with the vehicle. This system has been improved over its life and many capabilities have been added over the years that are not specifically related to vehicle maintenance. Some of the more well-known capabilities include Global Positioning Systems (GPS), Entertainment Systems, and Telecommunications via syncing with user smartphones. Some less well-known capabilities include monitoring vehicle idle times, speed, engine Revolutions Per Minute, fuel efficiency, and fuel levels. Some vehicle manufacturers also include things such as door lock status, when each door is opened and closed, and even mobile Wi-Fi hotspots, which may contain records of smartphones or computers that have been attached to it in the past, including the time/date and geographic location.

In the past five years, there has been a lot of research done on the embedded vehicle computer systems with an eye toward how law enforcement could leverage this information for criminal investigative purposes. Only a handful of companies currently provide support for this function; however, when this information is used, it can make a case. A major problem is that there is no industry standard for what information may be available via the embedded computer systems, nor is there a standard format for presentation of the information to law enforcement. This is in stark contrast to the Communications Assistance for Law Enforcement Act, which mandates that telecommunication companies must provide law enforcement with a standardized way to conduct telephone and internet intercepts. A second major hurdle is that simply accessing the information requires, in many cases, disassembling the vehicle to gain physical access to the electronic components. This necessitates that the investigators have prior training in the safe removal of vehicle components; know where the vehicle computer components are located, as each manufacturer places them in different places throughout the vehicle; and have the correct physical adapters and software to obtain and interpret the requisite information from each of these proprietary vehicle computer systems.

In addition to the artifacts already listed, there are many more potential evidentiary items that may be available to law enforcement. For instance, with some vehicles the owner can download their contacts into the vehicle's computer system. When calls are made or received, the vehicle will archive these call records. When texts are received, the vehicle will display the sender and the text itself, which is also retained in the vehicle's computer. GPS

Photo of an aftermarket car data recorder.

positions can be retained for very long periods of time indicating where and when a vehicle was at a specific geographic area. This list of artifacts is sure to grow as our smart phones become more capable, and these capabilities will spill over in the vehicle arena.

Armed with a forensic analysis report of the suspect's vehicle, investigators sat down with the suspect and began questioning his actions on the night of the aforementioned burglary. The suspect admitted to driving in the area and stopping "to think" when the witness reported his vehicle, but admitted nothing further. Investigators then revealed that they had obtained a detailed report from his vehicle's computer system. This report contained information that on the evening of the burglary, his vehicle stopped at the reported location and began idling at 11:28 p.m. Approximately 15 seconds later the front and rear passenger doors as well as the driver's side passenger door opened and closed within two seconds of each other. At 11:33 p.m., the trunk opened and the same three doors opened and closed, and immediately following the vehicle departed the scene. During that time, four texts were sent and received by another individual whose cell phone records indicated that he was in the exact same geographic area. Presented with this information, the suspect admitted his responsibility in the criminal act and revealed the names of the three accomplices, who then revealed the location of the remainder of the stolen goods that ended this quartet's criminal activity spree.

Currently, obtaining vehicle-based digital forensic training is still primarily in the purview of the civilian sector. As awareness of the capabilities of this new line of investigative activity develop, I would expect to see a request for law enforcement-centric agencies to take a larger role in this type of investigation; particularly when self-driving cars become the norm. Of course if you conduct an internet search today for "hack a moving car," you'll find plenty of examples of the "next thing" in vehicle forensics. If someone hacks the vehicle's guidance computer and causes a death or serious bodily injury today, who would you call to conduct that forensic examination?

**This report is based upon a composite of multiple reported crimes and is not necessarily intended to depict any specific persons or events.*

The inside view of the "black box".

Body Cameras in E

BY TIM MILLER

So far the debates about body cameras in cases of alleged excessive force have been about whether they get to the truth about what really happened. One argument is that the recording can refresh an officer's memory. Another is that the officer will simply shape his or her testimony around the recording. Enter the Fourth Amendment's reasonable officer standard. It considers the totality of the facts and circumstances from the perspective of a reasonable officer (which is obviously the reviewing court, reviewing everything through a hypothetical eye). But since the focus is on what a reasonable officer could believe, what really happened is not determinative. Here is how this came up:

Dispatch told me there was an officer down. When I arrived on scene a crowd of people ran by pointing wildly to where they had been. I walked on, looking for the injured officer and saw someone in a blue uniform lying on the ground. The officer appeared to be unconscious or worse. A man with a pistol in his hand was standing over the officer. He shouted and waived the gun around. I yelled, "Drop the gun!" but he continued to shout and point the gun - - first at the officer on the ground and then at me. I shot him.

That was only a scenario on a use of force simulator; but the instructor's feedback raised questions about how a court would consider the events, had they been real.

- **INSTRUCTOR:** What did you hear when the crowd ran by?
- **MILLER:** Nothing, really.
- **INSTRUCTOR:** You didn't hear the woman yell, "He's got a gun?"
- **MILLER:** No; I certainly didn't hear that.
- **INSTRUCTOR:** Ok; let's review. (Like a body camera, the instructor re-played the crowd running past me. Sure enough, a woman in the crowd shouted, "He's got a gun!")
- **MILLER:** I still don't remember; but no matter. I saw a gun and I shot to stop the threat posed by the man holding it. (I quoted the U.S. Court of Appeals for the Eleventh Circuit. An officer is not required to wait for an armed and dangerous felon to draw a bead on him, especially after orders to drop the gun have gone unheeded.)
- **INSTRUCTOR:** That wasn't a gun. (And sure enough, the re-play showed the man holding a hammer.)
- **MILLER:** Oh…

The Police Executive Research Forum reported that reviewing body camera footage may help get to the truth of what really happened. The review may jog the officer's memory. (But not in my case. I reviewed the tape and I still cannot recall a warning about a gun. And I still picture the man holding

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a pistol instead of a hammer.) Other executives believe that the truth – and the officer's credibility – are better served if an officer is not permitted to review footage of an incident prior to making a statement. One said, "In terms of the officer's statement, what matters is the officer's perspective at the time of the event, not what is in the video." (Personally, I would love to be judged from my own perspective, but the plaintiff's attorney might object.)

Then comes the Supreme Court's analysis in *Graham v. Connor*, the seminal case for judging police officers accused of using excessive force to seize someone under the Fourth Amendment. The Court's instructions were to consider "… the totality of the facts and circumstances …" (not what I can remember) and to consider everything "from the perspective of a reasonable officer on the scene ..." (obviously not my own). Whether I can recall the statement about a gun should be no more determinative than … well, my personal motive for shooting the man. If motive was determinative, the fate of two officers – using the same force, and under the same circumstances – would depend on who had the better motive. If memory was determinative, their fate would depend on who had the better memory. The *Graham* analysis does not look into the subjective hearts and minds of the officers. It is an objective test that looks at everything through the lens of a reasonable officer.

The saying goes that hindsight is always 20/20, but after-the-fact assessments like "You should have …" or "I would have …" are forbidden. (Incidentally, they are also generally made after getting to the truth about what really happened.) There are no perfect answers under an objective test and looking for one goes against the grain of the *Graham* analysis. The camera stopped, so to speak, after I pulled the trigger. Now the reasonable officer looks backwards.

Hindsight is a rule of relevance, and while the Court does not give specific instructions about what is relevant and what is hindsight, in an analysis where the operative word has always been reasonableness, a fact should be relevant if it was reasonably known at the time. Stated differently: Looking backwards, could a reasonable officer in the shoes of the real one have seen or heard that fact, or at least believed it to be true? If a fact was reasonably known (or reasonably believed to be true based on other facts) it should be considered. Obviously, if the woman came up to me after the shooting and said "I thought he had a gun" her statement would be after-the-fact – gained in hindsight – and not relevant. But her warning was as clear as a bell on the replay. I did not hear her; but a reasonable officer could have. Her statement was reasonably known. The question now: Based on everything else that was reasonably known, could a reasonable officer believe that the man was holding a gun? If so,

the fact that it turned out to be a hammer should be hindsight.

Not hearing the woman's warning about a gun was probably due to a natural human reaction to stress that causes the sense of hearing to diminish. Stress, fatigue, and exertion – conditions well known to law enforcement officers – can greatly affect memory. In a survey of officers involved in shootings, 84 percent reported not hearing even the loudest of sounds. "If it hadn't been for the recoil, I wouldn't have known my gun was working," an officer reported. The same study reported that 79 percent of the officers experienced tunnel vision and almost half could not recall significant details about what they did.

Another study found inconsistencies between written use of force reports and body camera recordings. Eleven officers were asked to react to certain use of force scenarios, report what they saw, and then compare their written report to the footage on their body cameras. Every officer failed to report other potential weapons in the scenario, including a gun plainly visible on a table. Eight of the eleven officers failed to report a third person in the room. Two did not report uses of force.

There is probably nothing more subjective than memory, and memory is probably most vulnerable during a tense, uncertain, and rapidly evolving situation where an officer is trying to defend himself or others from a significant threat. Body cameras are just another piece of technology that gets some of the facts before the court. They are no different than the hundreds of millions of smart phones that make every citizen a reporter – and neither friend nor foe to anyone. They simply record facts. Officers can certainly add to the facts. Force science experts may add more by explaining why an officer did not hear something, or saw something that was not there. But in the end, the court through the reasonable officer decides if the plaintiff established that the force was constitutionally excessive.

Officers are more likely to be truthful if they are told the truth about how they are judged. And the truth is that the recording in an officer's brain will most likely be different than the electronic copy. Me? I thought the man was holding a gun. I would also like my attorney to argue that the woman's statement about a gun makes my belief more objectively reasonable, whether I heard it or not. Still, the reasonable officer may find both of us incredible (in a bad way). Then forget the gun. Could a reasonable officer believe that the man posed a significant threat while swinging the hammer? Sometimes what actually happened is reasonable.

[1]*Graham v. Connor*, 490 U.S. 386, 396 (1989) citing *Tennessee v. Garner*, 471 U.S. 1, 8-9 (1968).

[2]"Officer down" is an alert that a police officer has been killed or wounded.

[3]Montoute v. Carr, 114 F.3d 181, 185 (11th Cir. 1997).

[4]See Miller Lindsay, and Jessica Toliver. Police Executive Research Forum (PERF). 2014. Implementing a Body-Worn Camera Program: Recommendations and Lessons Learned, Washington, D.C.: Office of Community Oriented Policing Services.

[6]An officer's evil intentions will not make a Fourth Amendment violation out of an objectively reasonable use of force; nor will an officer's good intentions make an unreasonable use of force constitutional. *Graham*, 490 U.S. at 397. The Court has repeatedly rejected attempts to bring the officer's subjective beliefs into a Fourth Amendment analysis. See also *Brendlin v. California*, 551 U.S. 249, 260 (2007). The Court has stated that probable cause to arrest depends on the facts known to the officer. *Devenpeck v. Alford*, 543 U.S. 146, 152 (2004). But there is a world of difference between the test for an arrest and objectively reasonable force to effect one. The officer has time to make a calculated decision before taking someone into custody. *Graham* at 397 (officers often have to make split second decisions about force).

[7]Artwoh, A. Perceptual and Memory Distortion during Officer-Involved Shootings. FBI Law Enforcement Bulletin, 71, 2002.

[8]Dawes, Heegard, Brave, Paetow, Weston, and Ho. Body-Worn Cameras Improve Law Enforcement Officer Report Writing Accuracy. Journal of Law Enforcement. 2015.

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How might Body Worn Cameras Affect Training on FLETC….?

BY LAUREN WARE

The question of whether law enforcement officers should wear body worn cameras in the course of their duties has sparked impassioned dialogue regarding issues of privacy, government overreach, civil rights, officer safety, and economic resources. As government officials and American citizens debate the merit and feasibility of implementing body worn camera systems on our uniformed officers, FLETC is actively monitoring the implications of such a policy change on how we execute our training mission.

The staff of the Outreach and Exploration Branch of the FLETC Training Innovation Division have been out ahead of this emerging development, and are already coming up with strategies for FLETC to consider as it seeks to prepare students to do their jobs utilizing this new piece of technology.

At this stage, each option identified brings with it a litany of questions that must be addressed. For instance, can we achieve our training objectives by simply adding a block of instruction on the realities of body worn cameras? Would one scenario requiring the student to actually wear the camera suffice? What value could be gained by having students wear the cameras at all times during training? Much like we require students to wear a duty belt with an inert red gun to become accustomed to ever-present responsibility of a loaded firearm, would we not achieve a similar effect by strapping a recording device to the front of student uniforms? Does it matter whether the devices are "in role" or not? If their value is contingent upon actively recording video, is FLETC equipped with the capacity to store and analyze this footage? Is FLETC prepared to address the privacy implications of employees who are inevitably inadvertently recorded as the student navigates the FLETC campus? These are just some of the many questions FLETC is wrestling with as it anticipates implementation of this new technology.

Rather than just see another training requirement, FLETC is viewing body worn cameras as a training enhancement opportunity. If FLETC is eventually tasked with training students to comfortably operate with the body worn camera device, could not this new piece of technology be leveraged simultaneously to improve our training product? FLETC has long embraced the student-centered feedback model, and has utilized after action review videos to help demonstrate training concepts to students. Many times, during a scenario debrief, the student must acknowledge the disparity between what they perceived their actions to be and what their actions were in reality. Nothing is more effective than letting the student self-assess and learn from his or her own observations of his or her own conduct.

Recordings captured on body worn camera devices could potentially offer an up-close and personal view of student performance that would aid in feedback and evaluation. It may further reinforce concepts taught by the Behavioral Science Division concerning the impact of stress and the narrowing or exclusion of sensory information during a law enforcement encounter. Just as described in the previous article by Tim Miller, it is very eye-opening for a student to hear something on a recording that they didn't hear during the real-time scenario.

While it is unclear how long the debate over law enforcement's use of body worn cameras will go on, FLETC will continue to track the storms of change, and prepare to answer that call with fast, focused, and flexible training.

FAST FACTS

FLETC Domestic Training Sites:

- Artesia, New Mexico
- Charleston, South Carolina
- Cheltenham, Maryland
- Glynco, Georgia
- LA Port, California

Export Locations:

State and Local Law Enforcement

- Nationwide

International Law Enforcement Academies:

Academic, Operational and Program Support

- Bangkok, Thailand
- Budapest, Hungary
- Gaborone, Botswana
- San Salvador, El Salvador
- Roswell, New Mexico

International Training and Capacity Building Programs:

- Delivered Worldwide

Consolidation: Consolidation of law enforcement training permits the Federal Government to emphasize training excellence and cost-effectiveness. Professional instruction and practical application provide students with the skills and knowledge to meet the demanding challenges of a federal law enforcement career. They not only learn the responsibilities of a law enforcement officer, but through interaction with students from many other agencies, also become acquainted with the missions and duties of their colleagues. This interaction provides the foundation for a more cooperative federal law enforcement effort.

Integrated Instructional Staff: FLETC has assembled the finest professionals to serve on its faculty and staff. Approximately 50 percent of the instructors are permanent FLETC employees. The remaining instructional staff are federal officers and investigators on assignment from their parent organizations or recently retired from the field. The mix provides a balance of instructional experience and fresh insight.

A Historical Perspective

U.S. Immigration Service Border Patrol inspectors, Camp Chigas, El Paso, TX in 1927.

Today U.S. Customs and Border Patrol agents employ off-road vehicles and helicopters.

Customs inspectors at the Detriot-Windsor Ferry station in 1898.

U.S. Customs Rainbow Bridge Port of Entry, Buffalo, NY. *Photos courtesy: U.S Customs & Border Protection.*

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