Solutions for Forensic Science

This issue of TechBeat focuses on developments in forensic science, which plays an integral part in the criminal justice system.

Forensic science disciplines such as firearms identification, document and latent print examinations, trace evidence and DNA can serve as powerful tools in criminal investigations. Forensic evidence can be used to determine the cause of death, identify suspects, find missing persons, associate perpetrators to crimes and exonerate the innocent.

Innovation in DNA analysis, technology to advance the exchange of case information among agencies and a dynamic missing persons database are among the recent developments highlighted in this edition.

Innovation in DNA Analysis

A n innovative method for profiling DNA can speed analysis of samples, reduce costs and allow identification of previously hard-to-identify specimens.

The method, denaturing high-performance liquid chromatography (DHPLC), allows the rapid and accurate separation of mixtures that contain the mitochondrial DNA (mtDNA) of more than one person. It has the potential to benefit criminal and mass disaster investigations requiring timely analysis of mtDNA. For example, the technology is useful in forensic analysis because it can separate mixed samples that contain the DNA of both a suspect and a victim in a crime.

DHPLC technology was originally developed by Transgenomic for medical applications such as screening for breast cancer susceptibility in women, according to Phil Danielson, professor of forensic genetics at the University of Denver’s Department of Biological Sciences. Danielson and his team subsequently adapted the biomedical technology to a forensic application, using grants from the Office of Justice Programs’ National Institute of Justice (NIJ).

“I had met with law enforcement lab practitioners a long time ago and I was amazed at the number of challenges they faced in trying to carry out standard forensic testing,” Danielson explains. “It intrigued me, the rigor and precision required of forensic lab analysts impressed me, and I thought I could apply molecular biology to the field of forensics.”

One challenge facing lab analysts at the time was separating mixtures of mtDNA on evidentiary material.

“They could not separate mixtures and even analyzing mtDNA was too cumbersome for most laboratories,” Danielson says. “We have a well-equipped lab and after talking to practitioners, we tried to come up with new technologies they could use to rapidly and accurately analyze mtDNA.”

The resulting DHPLC method took years of research. With the help of the National Law Enforcement and Corrections Technology Center (NLECTC) and lab practitioners’ advice, Danielson’s team developed a funding proposal and obtained their first NIJ grant in 2003. NLECTC is associated with the university, and helped put researchers in touch with practitioners to obtain bone samples from unclaimed remains to use in testing.

“We put together a team of researchers from the U.S., Denmark, Iceland and China, a team of highly skilled people who put their heads together and developed a forensic application for DHPLC,” Danielson says.

Nuclear vs. mtDNA

DNA (deoxyribonucleic acid) is the basis for an individual’s genetic makeup. Nuclear DNA, the DNA found in a cell’s nucleus, is a tool for identifying people, but is fragile.

Cells also contain mtDNA, which is inherited only from the mother and is available in larger quantities per cell. Because mtDNA, which is located outside the cell’s nucleus, is much more

A new tool is at hand to assist questioned document examiners in the analysis and comparison of handwriting samples.

CedarFox is a system for analyzing complex documents, particularly handwritten ones, and will assist the forensic document examiner by greatly reducing evidence examination time. The system was developed by the Center of Excellence for Document Analysis and Recognition (CEDAR) at the State University of New York at Buffalo.

The research behind the technology development was done by Sargur Srihari, a professor of computer science and engineering, and his team using funding from the Office of Justice Programs’ National Institute of Justice (NIJ). In turn, NIJ funded CedarTech to make the research findings and software available to questioned document examiners.

“At this point in time it is a technology that can be transferred to the end user,” Srihari explains. “While we are still

(See Innovation in DNA Analysis, page 3)

(See Tool for Document Examination, page 2)
Several law enforcement agencies have experimented with the software and have done extensive testing, including the FBI and the Canada Border Services Agency in Ottawa. The Netherlands Forensic Institute has also obtained a copy, and the West Virginia University Forensic and Investigative Science Program has allowed students to use the software as a learning tool, according to Srihari.

The software is helpful for examiners because it can save time, but it does not replace the human examiner. For example, the computer can determine which of several large questioned documents are the most similar to a known document, and an examiner can then analyze the most similar ones.

“It’s a tool, it’s not the only thing they would have used to solve a case,” Srihari says. “It’s a tool for speed, because the computer can make a large number of matches that for humans would be quite laborious. Computer matching can be done fairly quickly and provide some preliminary indication of how similar the handwriting samples are.”

The software also helps examiners to compare the most similar samples and has a scoring feature to compute how strongly the handwriting samples are matched.

Research continues in an effort to improve algorithms and develop new methods of comparison for handwriting characteristics and reporting results on an opinion scale, but the technology transfer of what has been done to date is complete.

For more information, contact Sargur Srihari at Srihari@cedar.buffalo.edu. To download the CedarFox software, visit cedartech.com.
abundant than nuclear DNA, it can provide forensic investigators with a means to test older, damaged, degraded or tiny biological samples. Additionally, mtDNA can be extracted from samples with little or no nuclear DNA, such as hair shafts.

**Forensic DHPLC Application**

Traditional mtDNA analysis is complex and time consuming. Danielson and his team developed two major forensic applications for DHPLC to expedite processing.

The first is a comparative sequence analysis, in which different samples are compared as a screening tool for mtDNA. It quickly eliminates irrelevant samples, such as hairs from nonsuspect residents of a house where a crime occurred.

“The method is faster, cheaper and easier,” Danielson says. “The initial presumptive screening takes seven minutes, compared to hours and hours if not days by the old method. It costs less because it takes less human time to do the test. The presumptive screen is not a replacement for traditional analysis; it’s a screening tool. For example, it allows us to screen 12 samples and determine that two warrant further detailed analysis. We focus the analyst’s attention only on the samples that are most informative.”

The second application of DHPLC technology is the ability to separate mixtures that contain the mtDNA of more than one person, which was the primary focus of the team’s six years of research funded by NIJ. Researchers performed about 27,000 assays, or analyses, to separate mtDNA mixtures and validate the technology and show it works 100 percent of the time. “Everybody was doing assays day and night,” Danielson says.

A technological disadvantage is that the technology can only separate the mixtures of two individuals.

“We can do two with 100 percent accuracy,” Danielson says. “With a mixture from three people, it is very complex and some are not resolvable. Fortunately, the majority of forensic cases involved the mixtures of just two people.”

Another disadvantage is that mixture separation cannot be done by an analyst on his own with a computer spreadsheet because the analysis is very complex, so a software program is needed that will automate it computationally. Danielson explains. NIJ in 2009 provided a grant to hire a software engineer to create a user-friendly program for analysts in the United States. Creation of the software program is underway.

**Next Steps**

Danielson says the DHPLC technology is ready for practitioner use. They have seen interest from practitioners in China and Holland, where it can be easier to get some new technologies accepted in court than in the United States.

Courts hold admissibility hearings on new technology. Typically, courts apply Daubert, Frye or similar standards on a state-by-state basis. These standards are rules of evidence used to determine admissibility of scientific evidence in federal courts.

“We have to find the right test case in the U.S. to apply the technology,” Danielson says, and his team is focusing on Colorado.

Other ways analysts could use DHPLC technology is to link unidentified remains to reference samples for missing persons.

“Remains are stored by law enforcement agencies, and every once in a while skeletal remains are discovered,” Danielson says. “Depending on the condition, it is not uncommon for there to be very little of the nuclear DNA left, so usually it’s mtDNA that you look for, particularly if you have comngled remains or remains from more than one individual.”

“You generally use mtDNA when all the other forms of DNA testing fail,” Danielson says. “It’s DNA of last resort. We can also use it for cases where the only evidence is hairs; if it’s a cut hair or a hair without a root, it’s difficult to get results from nuclear DNA. For hair analysis, mtDNA is the gold standard.”

For more information on DHPLC DNA technology, contact Phil Danielsen at the University of Denver at (303) 671-3561 or pdanies@du.edu.
Clean Techniques for Handling Evidence

Law enforcement officers carry lots of equipment between their persons or in their vehicles. They carry handcuffs, guns, flashlights, laptop computers, video cameras and cell phones. And in recent years has come the addition of sterile gloves, bleach, disposable tools and face masks.

It is important for all forensic science disciplines, especially DNA identification, to analyze samples that have been collected and handled in a manner that prevents contamination. Laboratories practice “clean techniques” as a means of avoiding sample contamination, and recommend that use of those preventive practices begin in the field during sample collection.

“Most laboratories do a good job of training local officers and crime scene response personnel in biological evidence collection,” says Debra Figarelli, DNA technical manager at the National Forensic Science Technology Center of Excellence. “They advise them to not always wear disposable gloves, but to change gloves between every sample that is collected. They explain the importance of not talking over samples (to prevent saliva contamination) and to always wear a face mask if they have a cold or are prone to allergies.”

“The implementation of many of these procedures starts in the laboratory, but they’re a little more difficult to apply in the field where officers must deal with weather and less than ideal conditions in general,” Figarelli says. “Some agencies use disposable instruments/tools to collect evidence, opening a fresh kit for each sample, but for others, their budgets just won’t support that. I’ve worked with officers from the Phoenix Police Department and the Arizona Department of Public Safety, teaching them how to bleach and sterilize their instruments between collections, and I think any forensic laboratory around the country will do the same if requested.”

Figarelli suggests that law enforcement agencies and laboratories work together to build cooperative relationships that include teaching clean techniques, and adds that online training courses are available at NJI’s www.DNA.gov Web site.

“The methods we’re using are very sensitive, and we don’t want to introduce contaminants that might interfere with interpretation of DNA data,” she says.

The emphasis on clean techniques became much greater with the advent of DNA testing in the 1980s. Prior to that, laboratories were primarily using ABO and enzyme typing for analysis, which required larger samples and were less sensitive than the current DNA typing and therefore contamination was not a concern since it was unlikely that those tests were sensitive enough to detect contamination.

Some of the procedures that have become commonplace in the laboratory include:

- Always wearing gloves and changing them between samples. Some labs also mandate face masks and/or hairnets.
- Using a barrier, such as a piece of butcher paper, between the countertop and the sample during analysis.
- Opening only one sample at a time.
- Processing items under a hood.
- Constant cleaning of countertops and instruments, using either a freshly prepared 10 percent bleach solution or other commercially available decontamination solutions.
- Processing samples from known individuals separately in time or space from unknown forensic samples; for example, in a sexual assault case, a reference sample such as a buccal (cheek) swab from the victim, could be processed at a different time or in a separate area from that of the biological evidence collected at the crime scene.
- Ensuring that the amplification or creating copies of DNA from the samples (a process that Figarelli likens to “photocopying” the DNA) is generated, processed and maintained in a room(s) separate from the evidence examination, DNA extractions and amplification-setup areas.

“When we started amplifying biological samples using the polymerase chain reaction in the early 1990s, laboratories really started to pay attention to applying clean techniques,” Figarelli explains. “The DNA analysis methods commonly used today in crime laboratories are so sensitive that it may only take a few foreign cells to contaminate a sample; a sneeze or forgetting to change gloves could introduce contamination. And many of the clean technique procedures not only protect the evidence but protect the analyst from pathogens such as HIV or hepatitis that may be present in the biological samples.”

Many laboratories also routinely maintain in-house databases of the DNA profiles developed from staff members. If a DNA profile is generated from a sample that cannot be linked to the crime, the laboratory may query their staff database to ensure that it does not belong to a staff member before entering the unknown DNA profile into the Combined DNA Index System (CODIS).

“The hope is that the laboratory’s clean techniques will prevent contamination from occurring during sample handling and analysis, but laboratories should have a strong enough quality control system in place so that they can rule out staff contamination before submitting the DNA profile for search in the FBI’s database,” Figarelli says.

Laboratories may also contact the officer or technician who collected the evidence and ask for a reference buccal swab, although for many organizations, officers have the option of refusing.

“When a laboratory does ask an officer for a reference sample, they are not trying to imply that they did something wrong,” she says. “What analysts really want is for officers or crime scene personnel to be able to go to court and state with confidence that any unknown DNA profile developed in a case is a true unknown sample, and show that the laboratory has excluded the possibility of contamination from individuals who came into contact with that sample during sample collection and/or analysis. This is the primary goal of all clean techniques procedures.”

For more information on forensic clean techniques, visit http://www.dna.gov or contact the forensics laboratory used by your agency.
Advances in forensic science, especially in DNA analysis, have gained notoriety from the media that has in turn created unrealistic perceptions in the minds of judges and jury members. Their high expectations of accuracy can create problems relating to the use of certain forensic evidence in court, specifically impression evidence. However, a recent study conducted by Intel­ligent Automation, Inc., using funding from the Office of Justice Programs’ National Institute of Justice (NIJ), may help to eliminate some of those problems in the area of firearms evidence.

Dr. Benjamin Bachrach, principal investigator for the project and vice president of the company’s Signals Sensors and Systems Division, explains that the project involved assessing the individuality and repeatability of features that transfer between a barrel and a bullet, with the goal of strengthening the scientific foundations of firearms examination in firearms examination results. The extensive project encompassed a three-year time span and involved firing 2,800 bullets using nine different brands of weapon barrels and two different types of ammunition. The project involved collaboration with the Baltimore County (Md.) Police and Washington State Police, as well as the FBI.

“The problem that firearms examiners have been having when testifying in court is that their conclu­sions are guided by their experience, and are therefore very difficult to quantify,” says Bachrach. “By contrast, DNA evidence enjoys the benefit of extensive and well­established statistical validation studies. With the com­pletion of this and related studies, there is now a body of science funded by NIJ that can – at least for barrels of certain quality – help firearms examiners convince a jury of the accuracy of firearms identification.”

Bachrach says that although a number of parameters influenced the individuality and repeatability of the results, the manufacturers of the firearm barrel and the bullets were key.

“For certain brands, the transfer of characteristics was very repeatable and the bullets could be identified very well. However, for a group of low-end, relatively inexpensive products, we could not show repeatability as well,” he says.

The results of the study have been published in "Statistical Validation of the Individuality of Guns Using 3D Images of Bullets," a 66-page report that describes the study as “setting out to improve and make advances on state-of-the-art automated ballistic analysis systems and developing and vali­dating methodologies for ballistic identification.”

The report concludes that the study “provides a solid validation of the foundations of ballistic identification,” with some limitations noted and explained. The study included three major components:

• An examination of the effect of barrel wear. Results showed that barrel wear did not have a significant impact on the transfer of features between barrels and bullets.

• Development of methodologies that evaluated a barrel’s individuality and estimated the prob­ability of error when making bullet-to-barrel clas­sifications. The study focused on the comparison of bullets fired by barrels of the same make and manufacture for eight different barrel brands. The results of the study allowed that a classification approach could be applied to identify bullets fired from different barrels.

• Analysis of whether the conclusions of the first two components also applied to damaged bullets. This analysis was significant because bullets recovered as evidence often suffer some degree of damage. Results show that damaged bullets could be linked to a specific barrel with a high degree of certainty in some cases, although not as high as that of pristine bullets. More work remains to be done to improve the classification approach for damaged bullets.

The study also developed and used a 3D-based ballis­tic analysis system to try to determine:

• The quantitative criteria that should be used to establish a gun’s individuality.

• The quantitative criteria that should be used to establish that a specific gun fired a specific bullet.

• Whether it is possible to estimate the prob­ability of a bullet/gun match being incorrect.

Answers to these questions would help law enforcement agencies deal with potential Daubert challenges in court (see box). According to the report, “Automated ballistic analysis systems are specifically designed for the objective comparison of large numbers of samples, making them an ideal instrument for the development of objective perfor­mance bounds [measures]. The development of such procedures reinforces the scientific foundations of bal­listic evidence to be presented in court.”

“This is important because there has been a significant amount of criticism recently regarding the validity of the forensic sciences,” Bachrach says. “Specifically, one of the disciplines that has had question marks posed against it is that of toolmark and firearms examination, and these question marks could make it difficult to present evidence in court.” He adds that dissemination of study results should help convince judges and juries of the valid­ity of this type of analysis as a scientific discipline.

NamUs Helps Identify the Missing

The Bureau of Justice Statistics has estimated that, in a typical year, medical examiners and coroners handle approximately 4,400 unidentified human decedent cases, 1,000 of which remain unidentified after one year. As of 2004, more than half of the nation’s medical examiners’ offices had no policy for retaining records of unidentified human remains, including X-rays, DNA or fingerprints. This makes comparison of records across jurisdictions very difficult. (Medical Examiners and Coroner’s Offices, 2004, http://bjs.ojp.usdoj.gov/index.cfm?ty=pdfarticle&aid=782).

“Before NamUs, several local and state agencies had Web sites similar in concept to NamUs in place, most notably Clark County in Nevada and Fulton County in Georgia,” says NamUs coordinator Billy Young. “They put out information about their unidentified decedents and it was successful. NamUs takes this to a national level. People travel all over the country and this way the whole country is helping you search. We see missing persons highlighted on television and on the walls in grocery and discount stores. In this day and age, almost everybody uses the Internet. If people read about a missing person on the Internet, then there are more eyes looking for that person. You can’t have too many people looking for someone who has to have seen that person.”

Clark County Coroner Michael Murphy welcomes the opportunity that NamUs provides for nationwide search capability and he hopes the effort may someday expand to the international level.

“The real key is that this provides an opportunity for the different disciplines involved in missing persons cases, especially for families, to be involved,” Murphy says. “This is monumentally important to these families. When we talk to families, one of their greatest concerns is that they feel they are set aside. This lets them be involved in the resolution of their own pain and anguish.”

Murphy says that when Clark County began its project, the initial reaction in the local press seemed “less than favorable” and included interviews with other area coroners and medical examiners who opposed the approach.

For more information or to use NamUs, visit http://www.namus.gov/. In May 2009, the International Association of Chiefs of Police recognized NamUs with an Excellence in Technology Award for superior achievement and innovation in the field of law enforcement communication and information technology.
Distinguishing NamUs and the NCIC Database

The National Crime Information Center (NCIC) database includes documented criminal justice information and may be accessed only by law enforcement professionals. NamUs, on the other hand, can be accessed by state and local agencies (such as county medical examiners) who may not be law enforcement professionals, and by the public in general. It thus expands the pool of individuals providing information on missing persons cases and facilitates research that may aid law enforcement agencies in their investigations. NamUs can and does request information exchanges with NCIC; a law enforcement agency can choose to ask for such a data exchange rather than entering cases a second time into NamUs.

Some of the benefits that law enforcement officers can realize from using NamUs include:

• Restriction of sensitive case information.
• Transmission of dental records and radiographs via e-mail to permit immediate comparisons by expert odontologists.
• Printing of comprehensive case reports from the system.
• Utilization of extensive search capabilities. Investigators can modify search parameters to broaden or narrow searches based on case-specific information such as date last seen, demographics, dental information and distinct body features.
• Access to subject-matter experts such as anthropologists, odontologists, fingerprint experts and DNA analysts at no cost.

Help From Families and From Strangers

Jody King. On April 20, 2009, Connecticut State Police responded to the scene of a single-car accident on Interstate 91 near Enfield; first responders on the scene found a vehicle but not the driver, Jody King of Ticonderoga, N.Y. A passenger in the vehicle said King appeared to be disoriented after the accident and had gone toward nearby woods. Personal effects, including King’s identification ring — into NamUs, a medical examiner positively identified the body the next day.

“That’s the power of having this information out there for people to use and see,” says NamUs coordinator Billy Young. “If his family had not been so diligent in posting the records, the body might have remained unidentified. A lot of the better case records come from families working together with law enforcement. If the family can tell you what dentist to contact for records, it can save a lot of time. A description of a tattoo could provide the key; for medical examiners tattoos are huge. Just knowing there is a tattoo rules out all the unidentified persons who don’t have one. In King’s case, thefamily provided information about the wedding ring that only they would know.”


Sonia Lente. While the time during which King’s relatives did not know his fate was relatively short, Sonia Lente had been missing from Albuquerque for more than six years when a civilian “cybersleuth” used NamUs to make a connection between Lente and a body found two years after her 2002 disappearance. Investigators had thought the body might be Lente’s upon its discovery, but could not positively identify the remains. At the time the cybersleuth called their attention to the case, a statewide call for missing women’s dental records in connection with another case had yielded Lente’s dental X-rays. A positive identification was made and Lente’s family notified.

“There’s a lot of people who do this for a hobby, who look for missing persons and try to identify them,” Young says. “This case illustrates how NamUs can help them be successful. Thanks to the public’s being able to use this site, there are families who have closure.”


Toussaint Gumbs and Michael Francis. The body of Toussaint Gumbs, one of the first people identified through the use of NamUs in June 2009, had actually been found in Richmond at about the time relatives reported his disappearance, but it took 14 years and the assistance of another civilian volunteer to make the connection. A positive identification of Michael Francis followed Gumbs’ by just a few days.


Luis Fernandez. Officer Jim Shields of the Omaha (Neb.) Police Department learned about NamUs at a conference held at the University of North Texas Center for Human Identification and entered the Luis Fernandez case immediately upon his return in March 2009. A civilian located a possible match with remains found in Iowa just one month later, but it required first an inconclusive search with dental records and finally a DNA test to confirm Fernandez’ identity on Jan. 11, 2010.


For more information about the Toussaint Gumbs case, visit http://www2.timesdispatch.com/rtd/news/local/crime/article/MISS03_20091002-222207/297097/.

A project to advance the exchange of forensic case information between law enforcement agencies, crime laboratories and the courts promises to boost lab efficiency and management of data.

The Forensic Information Data Exchange (FIDEX) system provides an electronic Web-based platform for law enforcement agencies to submit examination requests and allows crime labs to more efficiently handle case management. The Office of Justice Programs’ National Institute of Justice (NIJ) developed FIDEX through the National Forensic Science Technology Center, which contracted with Waterhole Software in Colorado to design the software.

Although many crime labs have laboratory information management systems (LIMS), law enforcement agencies frequently use handwritten forms and other hard copy methods to submit requests for analysis and case information to crime labs. Also, most information that is exchanged on results of forensic analysis and case disposition, such as a verdict, plea or dismissal, is not done electronically.

A 2009 informal assessment of 94 state and local crime laboratories by the IJIS Institute found that although 79 percent of respondents indicated they had some form of a LIMS, 87 percent of those said they are still accepting requests for examination via a handwritten long form, rather than by electronic means. Also, 58 percent of respondents said that they needed clarification regarding what examinations are being requested from the lab. These factors result in significant administrative burdens placed on the case agents and laboratory analysts, which contributes to delays in turnaround time.

FIDEX is based on the National Information Exchange Model (NIEM), and XML-based information exchange framework. Pilot projects to evaluate FIDEX in a working environment are ongoing in the Boston Police Department and the Phoenix Police Department.

The implementation portal exchange platform should be available for release in the coming months. However, agencies can start using some of the FIDEX standards and specifications by downloading the following Information Exchange Packet Documentation (IEPDs) from the IEPD Clearinghouse at www.it.ojp.gov.

• Forensic Case Submission. A standard for sharing data from a police records management system or evidence management system with a crime laboratory’s LIMS.

• Forensic Case Disposition Data Request. Share court case disposition information from the court and the prosecutor’s offices with the crime laboratory.

The Boston crime lab has about 20 forensic scientists and handles approximately 1,000 cases per year. Lab criminalist Kevin Kosiorek has been experimenting with the FIDEX portal and is pleased with the system so far.

FIDEX generates the evidence submission form (the so-called paper “long form” traditionally used by law enforcement) electronically, and notifies the lab that an examination request has been made.

"It is very easy to use," Kosiorek says. "Once you set up preferences as to what type of e-mail notification you want to receive regarding evidence coming into the system, as well as different meetings or court date alerts, it’s really easy. You just enter your case number and as the case is processed, you are sent notifications."

"Sometimes we are unaware of what is happening in a case, for example, we might receive comparison samples in a DNA case, but don’t find out right away. With FIDEX, if evidence comes in, I’m notified," Kosiorek explains. "The crime lab forensic scientist is the point person and can add people to the alert list such as district attorneys and detectives. It’s a great way for everyone to be on the same page."

Cases are tracked through the law enforcement incident number. When a user enters the number to check on the status of or add information to a case, the tool will gather all the information on it from disparate systems that are linked through the portal application, and arrange the information in different tabs. The organizational structure of the FIDEX portal includes case summary, which contains basic information such as incident date and location and disposition of a case; evidence; subject/victim; case parties; and scheduled events, such as court dates. Drop-down lists make it easy to add and standardize data.

Because additional evidence can always emerge in a case over time, every 24 hours (or other increment established by the user), the FIDEX portal can automatically query interlaced systems to update the record. If additional evidence has been identified or submitted for analysis, users associated with the case will automatically receive notification of the update.

FIDEX is intended to enhance the functionality of existing systems, explains Robin Wilson Jones, a consultant with NIJ. It is not meant to take the place of a LIMS within a crime laboratory or a records management system within a law enforcement agency. Rather, it allows for the interoperability of existing systems to streamline processing time and increase the accuracy of information being communicated among law enforcement, crime labs and the courts.

In addition to expediting and enhancing communications about a case, FIDEX can help agencies with management reporting. For example, it can track how many cases are assigned to an examiner and what percentage of time is spent on different types of casework, according to FIDEX developer Aaron Gorrell of Waterhole Software.

"We have just skimmed the surface of what we can do with the data," Gorrell says.

FIDEX continues to be refined as a result of practitioner comments. A final report and lessons learned will be issued later in 2010.

For more information on FIDEX, contact Aaron Gorrell of Waterhole Software at (719) 243-2568 or aaron.gorrell@waterholesoftware.com; Robin Jones of the National Institute of Justice at (202) 353-2436 or robin.w.jones@usdoj.gov; or William Ford, NIJ Information and Sensor Technology Division director.
Tracking (SMART).

Monitoring, Apprehending, Registering, and the Office of Sex Offender Sentencing, Juvenile Justice and Delinquency Prevention; the Office for Victims of Crime; the Office of Community Capacity Development Office; the Bureau of Justice Statistics; the Assistance of the Office of Justice Programs, which also includes the Bureau of Justice Assistance, such as, “This article was reproduced from Designers, Tina Kramer and John Graziano.

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Testing Results. Up-to-date listing of public-safety equipment evaluated through NIJ’s testing program. Includes ballistic- and stab-resistant armor, patrol vehicles and tires, protection gloves, handcuffs and more.

Publications. Publications from NIJ and NLECTC that you can view or download to your system, including printer-friendly versions of TechBeat articles and features.

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Links. Links takes you to other important law enforcement and corrections Web sites.

www.justnet.org

The National Law Enforcement and Corrections Technology Center, the National Institute of Justice (NIJ) and other federal agencies support the National Criminal Justice Reference Service (NCJRS), assisting a global community of policymakers, practitioners, researchers and the general public with justice-related research, policies and programs.

NCJRS offers a range of services and resources, balancing the information needs of the field with the technological means to receive and access support.

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The NCJRS Web site showcases the latest criminal and juvenile justice and drug policy information. Take advantage of:

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New Methods, Faster Results

National Institute of Justice

The Georgia Bureau of Investigation (GBI), Division of Forensic Science, has used NIJ funding to develop a simplified, faster method for analyzing samples of certain drugs, including THC (the active ingredient in marijuana), certain opiates such as morphine, and marijuana. The method can simplify protein extraction, which can reduce analysis time. Generally, drug samples are prepared for lab analysis using a time-consuming and labor-intensive extraction. The new technique uses a simplified protein extraction, which can reduce the time of sample preparation by 60 percent compared to these traditional methods, followed by liquid chromatography-tandem mass spectrometry (LC/MS/MS) analysis. Liquid chromatography is a technique that separates the components of a sample, and tandem mass spectrometry provides an extremely sensitive method of analyzing each separate component.

To obtain a copy of It Can Happen Here, contact NLECTC program manager Mike O’Shea at Michael.OShea@usdoj.gov.

Field Search Success Stories

NLECTC

Cooperating to Stop Stolen Vehicles

Weapons and Protective Systems Technologies CoE

General Motors' OnStar® recently developed cooperative technology that is in many ways unlike any other resource available to law enforcement today. OnStar advisors, working with law enforcement agencies, can employ Stolen Vehicle Slow Down (SVS) to signal a subscriber’s vehicle and disable the accelerator, safely slowing the vehicle while retaining steering and braking functionality. Using Remote Engine Block (REB), also available on select 2009 and newer vehicles, OnStar can signal the ignition of a stolen vehicle and render that vehicle inoperable at the next ignition attempt.

Cooperative technologies are pursued management tools used to prevent or safely end a pursuit by remotely communicating with the target vehicle and temporarily immobilizing its operating system. Cooperative technologies use a “virtual handshake” between the vehicle and remote communications. Remote law enforcement, dispatchers, and the wider community of subscribers assisted OnStar in developing communication protocols that would facilitate signaling and disabling stolen vehicles.

“Everything You Need to Know About Forensic DNA

National Institute of Justice

The Georgia Bureau of Investigation (GBI), Division of Forensic Science, has used NIJ funding to develop a simplified, faster method for analyzing samples of certain drugs, including THC (the active ingredient in marijuana), certain opiates such as morphine, and marijuana. The method can simplify protein extraction, which can reduce analysis time. Generally, drug samples are prepared for lab analysis using a time-consuming and labor-intensive extraction. The new technique uses a simplified protein extraction, which can reduce the time of sample preparation by 60 percent compared to these traditional methods, followed by liquid chromatography-tandem mass spectrometry (LC/MS/MS) analysis. Liquid chromatography is a technique that separates the components of a sample, and tandem mass spectrometry provides an extremely sensitive method of analyzing each separate component.

To obtain a copy of It Can Happen Here, contact NLECTC program manager Mike O’Shea at Michael.OShea@usdoj.gov.

Field Search Success Stories

NLECTC

Cooperating to Stop Stolen Vehicles

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The National Law Enforcement and Corrections Technology Center (NLECTC) system supports the National Institute of Justice (NIJ) mission of providing objective, independent, evidence-based knowledge and tools to enhance the administration of justice and public safety.

The NLECTC system is an integrated network of centers and Centers of Excellence that offer free criminal justice technology outreach, demonstration, testing and evaluation assistance to law enforcement, corrections, courts, other criminal justice agencies and crime laboratories — large or small, rural or urban and along U.S. borders — in the implementation of current and emerging technologies.

The NLECTC system has been reorganized to make it more sustainable, efficient and effective in providing services to the criminal justice community.

Established in 1994 by the Office of Justice Programs’ NIJ as part of its research, development, testing and evaluation initiatives, the NLECTC system serves as an “honest broker” resource for technology information and assistance and helps introduce technologies into practice within the criminal justice community. The mission of NLECTC is to support NIJ’s research and development activities, support the transfer and implementation of technology into practice, assist in the development and dissemination of guidelines and technology standards, and provide technology assistance, information and support.

The NLECTC system seamlessly delivers its expertise to the nation’s 19,000-plus police agencies; 50 state correctional systems; thousands of prisons, jails, and probation and parole departments; courts; and crime laboratories in a number of technology areas. These technology areas are supported by technology partners who provide the leveraging of unique science and engineering expertise. In addition, technology working groups and a national advisory council provide guidance relating to the technology needs and operational requirements of the public safety community for NIJ’s various technology focus areas and help to ensure that NIJ’s activities focus on the real-world needs of public safety agencies.

**Contact NLECTC for:**

**Technology Information**
NLECTC disseminates information to the criminal justice community at no cost through educational bulletins, equipment performance reports, guides, consumer product lists, product information databases, news summaries, meeting/conference reports, online videos and CD-ROMs. Most publications are available in electronic form through the Justice Technology Information Network (JUSTNET) at www.justnet.org. Hard copies of all publications can be ordered through NLECTC’s toll-free number, (800) 248-2742, or via e-mail at asknlectc@nlectc.org.

**Technology Identification**
The NLECTC system provides information and assistance to help agencies determine the most appropriate and cost-effective technology to solve an administrative or operational problem. We deliver information relating to technology availability, performance, durability, reliability, safety, ease of use, customization capabilities and interoperability.

**Technology Assistance**
Our staff serves as proxy scientists and engineers. Areas of assistance include systems engineering and communications and information systems support (e.g., interoperability, propaganda studies and vulnerability assessments).

**Technology Implementation**
We develop technology guides, best practices and other information resources that are frequently leveraged from hands-on assistance projects and made available to other agencies.

**Property Acquisition**
We help departments take advantage of surplus property programs that make federal excess and surplus property available to law enforcement and corrections personnel at little or no cost.

**Equipment Testing and Standards**
We oversee the development of performance standards and a standards-based testing program in which equipment such as ballistic- and stab-resistant body armor, double-locking metallic handcuffs and semiautomatic pistols is tested. NLECTC also conducts comparative evaluations (testing equipment under field conditions) on patrol vehicles; patrol vehicle tires and replacement brake pads; and cut-, puncture-, and pathogen-resistant gloves.

**Technology Demonstrations and Capacity Building**
We introduce and demonstrate new and emerging technologies through special events, conferences and practical demonstrations such as the Mock Prison Riot™. We also provide hands-on training assistance for the latest technologies through workshops and software programs dealing with crime mapping, community corrections and critical incident management. In addition, on a limited basis, NLECTC facilitates deployment of new technologies to agencies for operational testing and evaluation.
In 2007, the National Institute of Justice (NIJ) established the Forensic Technologies Center of Excellence (CoE) as part of the National Law Enforcement and Corrections Technology Center (NLECTC) system. Hosted by the National Forensic Science Technology Center (NFSTC) in Largo, Fla., in conjunction with four partner agencies, the CoE supports NIJ research, development, testing and evaluation activities within the DNA and general forensics programs.

Forensic Technologies CoE Director Kevin Lothridge says the partner agencies — the National Clearinghouse for Science, Technology and the Law (NCSTL) at Stetson College of Law; the National Center for Forensic Science (NCFS) at the University of Central Florida; Marshall University Forensic Science Center; and the Midwest Forensic Research Center — all had provided services to NIJ in the past. The CoE formed them into one cohesive unit with members that work together more closely than when they were independent of each other. Requests for information and assistance are channeled through NFSTC and relayed to the appropriate partner. The CoE’s goal is to become a “one-stop shop” that meets the forensic needs of the criminal justice community, and a great deal of effort has gone into creating webcasts and podcasts and providing educational outreach to them.

Each partner agency has an area of specialization. NCSTL provides extensive library services, Marshall specializes in DNA-related services, NCFS maintains the Y-STR database and the Midwest Center works on projects related to technology as well training process improvement. NFSTC offers a number of training courses and manages a nationwide DNA laboratory audit program and Grant Progress Assessment program for NIJ.

“We’re the first adopters of new technology and help transition it to the end users,” Lothridge says. “We look at everything, from things that officers and investigators would use at a crime scene, to tools for the crime lab and ultimately evidence in the court room.”

“We have a very full outreach calendar where all the CoE partners attend and help us staff the booths,” he adds. “The community doesn’t know what we are, and we have to explain this through our outreach. They come by, they learn and ask questions, and say they wish they would have known about us before. We have a pretty broad group of people that we try to serve, because forensics technology is being used more often by almost all agencies, even small ones.”

In light of that growing use of forensics technology, NIJ has tasked the Forensics Technologies CoE with the following responsibilities:

- Identifying technology requirements.
- Supporting NIJ’s research and development programs.
- Testing, evaluating and demonstrating technologies.
- Supporting the adoption of new technology.
- Developing technology guidelines.
- Providing specialized technology assistance and support to criminal justice agencies on a national basis.

The CoE also hosts and supports the General Forensics Technology Working Group and the DNA Forensics Technology Working Group, which are composed primarily of practitioners. These groups help NIJ identify priorities for its program plan. The CoE manages demonstrations that are part of the Expert System Testbed project and hosts technology transfer workshops.

For more information, visit [http://www.justnet.org](http://www.justnet.org) and [http://www.nfstc.org](http://www.nfstc.org).