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Special Technologies for Law Enforcement and Corrections

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About the Author

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Detecting minute traces of drugs in or on inmate mail. Overcoming incompatible agency data systems to forge statewide computerized information sharing. Predicting where an offender might reside based on mapping crime scenes. These formidable objectives are being achieved thanks to some unusual technologies now available to law enforcement and corrections agencies.

But the process of identifying and evaluating such technologies, much less developing or adapting them, is usually extremely difficult, at best, for individual agencies to undertake without assistance. Most public safety agencies lack the staff and money to follow all of the new and emerging technologies, to gain access to the evaluations and reports on what works, to engage in long-term technology training, and to consult with technical experts.

That's why NIJ established the National Law Enforcement and Corrections Technology Center (NLECTC) system—to offer no-cost technology assistance to State and local agencies. (For more information about NLECTC, see "Nationwide Technology Assistance for Public Safety Agencies," page 27.) This article describes a few of the special technologies[1] being developed in three regional facilities: Border Research and Technology Center (BRTC), NLECTC–Northwest, and NLECTC–Southeast.

Detecting Drug Contraband: Inmate Mail and Vehicles

Trace amounts of illicit drugs on or in inmate mail often reflect highly imaginative methods of concealing the contraband. They include injecting cocaine into the ink of a gel pen,

placing drops of liquefied LSD on the envelope (including its glue) or on stationery where the drug can be absorbed and dried, putting a stamp or sticker over dried drops of methamphetamine, or hiding shreds of marijuana behind an address label. Inmates consume the drugs by eating their mail or use the drugs for "currency" or other purposes.

Confronted with an ongoing struggle to detect drugs hidden in inmate mail, a jail facility in Pima County, Arizona, contacted San Diego, California-based BRTC, whose mission is to strengthen security technology capabilities and awareness along the Nation's borders. In response, a team from Sandia National Laboratories, which operates BRTC, conducted a 3-day experiment at the jail to determine the feasibility of using available trace drug detection equipment: a hand-portable unit (Hound II system, 24 pounds) developed by Sandia National Laboratories, and a benchtop detector (Barringer IONSCAN 400B, 47 pounds) suitable for use at a fixed location only.[2]

Both types of equipment performed well in the mailroom setting, finding traces of methamphetamine, LSD, cocaine, and marijuana on and in about 10 percent of incoming inmate mail.[3] The units can also detect heroin, PCP, THC, and other drugs at subnanogram levels. To detect trace amounts, the units functioned in swipe mode, that is, the operator swiped the surface of the item with a cloth-like medium and inserted the sample into the detector for analysis and identification.[4] Analysis time ranged from 4 to 10 seconds. If drugs were present, the detectors identified the substance and automatically alerted the operator. Such detectors could not, however, distinguish between mail contaminated by drugs or merely touched by persons who had handled drugs.

Because Hound II is portable, one unit can be used at multiple locations. For example, mail from inmates' legal representatives, whether valid or bogus, must be delivered to the addressee without being opened. The Hound II allows officers to sample such "legal" mail after inmates have opened it.

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Jail personnel can also carry the unit to locations where inmates might try to smuggle drugs into the jail after returning from work furlough or from meetings with visitors.

The portability feature of Hound II also permits it to be used to detect drugs in vehicles, as demonstrated in field tests. At a checkpoint in Texas, for example, agents of the South Texas Specialized Crimes and Narcotics Task Force use dogs for initial screening of vehicles. After a dog indicates the presence of drugs in a vehicle, it is directed to a secondary inspection area. When Hound II "sniffed" the steering wheel and door handles of one such vehicle, traces of heroin were detected. The main shipment was found in half of a renovated oil pan.

Hound II may also be of use at seaports, where dogs' performance may be hindered by the extremely hot and dusty conditions in ships' holds. Detection could be focused on both drugs and explosives, because Hound II's commercial detector (see note 2) can detect either, depending upon the type of detection module inserted into the unit (about 1 hour is required for a module change). Other sites that could benefit from Hound II include schools, airports, embassies, military bases, and other sensitive facilities. Recently, a State agency contacted BRTC Director Chris Aldridge to ask whether Hound II technology would be of use in verifying cleanup of meth labs.

Sandia National Laboratories reports that Hound II features include ease and speed of operation, high sensitivity, and a low false alarm rate. Training requirements for Hound II are considered minimal. Cost, however, is

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not, at approximately $74,000. A much less expensive, and less weighty, version is under development at Sandia National Laboratories: MicroHound, when commercialized, will have an estimated per-unit cost of between $5,000 and $10,000, with a weight of approximately 12 pounds (half the weight of the current Hound II). For more information about both Hound versions, contact BRTC or Sandia National Laboratories, Department 4148, Albuquerque, NM 87185.[5]

Achieving Interoperability and Coping With Harsh Winter Weather

In summer 2002, a member of the advisory council of Anchorage-based NLECTC–Northwest[6] asked Center Director Bob Griffiths to demonstrate what appeared to be a highly effective law enforcement information-sharing system. The system uses software that enables otherwise incompatible data systems to communicate with one another. Following a successful demonstration, the advisory council listed interoperability as a top priority. In May 2003, the Alaska Association of Chiefs of Police voted to pursue data interoperability throughout the State and asked NLECTC–Northwest for assistance.

Thus, ALEISS—the Alaska Law Enforcement Information-Sharing System—was under way. NLECTC–Northwest facilitated the formation of ALEISS, which at this writing consists of seven agencies, by helping to prepare a memorandum of understanding detailing privacy, security, and responsibility protocols to govern future use and operation of the system. NLECTC–Northwest also assisted in hardware acquisition, installed it in a secure room at the center, and agreed to maintain the system until ALEISS graduates from interoperability and information-sharing "demonstration" to "operation."

The heart of ALEISS is CopLink, interoperability software that can be used to create interagency, regional, or multistate data-sharing networks.[7] CopLink, developed with assistance from an NIJ grant, enables vast quantities of seemingly unrelated data, currently housed and scattered among incompatible agency record management systems, to be organized within and accessed through a single, highly secure Intranet. Each participating agency exercises real-time control over what data are shared, with whom, and when. Data continue to reside with and to be updated at the existing source.

Now deployed in more than 100 jurisdictions nationwide, CopLink creates a detailed audit trail for each search conducted. The trail helps officers justify warrant requests and system administrators identify user practices that violate privacy and other protocols established by participating agencies in accordance with local, State, and Federal laws.

Dubbed "Google™ for law enforcement," CopLink speeds identification of criminal suspects, relationships, and patterns. Underlying CopLink is the premise that most crimes are committed by people who already appear in police records, perhaps as a gang member or sex offender, perhaps in mug shot archives, prison and arrest records, court citations, pawn shop records, or lists of outstanding motor vehicle violations. CopLink allows an officer to enter a small piece of information—a tattoo, nickname, or letter on a license plate—that the software will use to search the databases of participating agencies and find other potential pieces of the puzzle, perhaps leading to one or more suspects.

Just as ALEISS is the first effort in the Nation to form a statewide interoperable data-sharing system for law enforcement, so also is NLECTC–Northwest's winter-tire testing project a first. Both activities exemplify the Center's mission to focus attention on the specialized information and operational technologies needed by law enforcement and corrections agencies operating under the extreme weather conditions and across the vast distances in Alaska and other sections of the country.

The impetus for winter-tire testing came from Center staff. Other agencies quickly saw the value of the project and offered their support. So in February 2004, NLECTC–Northwest tested the pursuit-rated winter tires recommended for use on the Ford Crown Victoria Police Interceptor. The test compared winter tires with the less expensive all-season tire supplied with Police Interceptors. The latter tire is often favored by agencies because of tight budgets. Test participants included the Royal Canadian Mounted Police, Canadian Police Research Centre, Ford Motor Company, U.S. Army Cold Regions Research and Engineering Laboratory, and the Tekne Group. Among test results:

- A set of four matching winter tires, rated for severe snow conditions, work best for winter driving. Every brand of winter tire tested, even the worst, performed significantly better than the all-season tire supplied with the vehicle.
- Winter tires at 50 percent of normal tread depth delivered superior performance in snow compared to the all-season tires supplied with the vehicle.
- A mismatch of tires (e.g., winter tires for rear wheels and all-season for front) can cause unstable vehicle handling and should be avoided.[8]

Another winter-related research project investigated the best method for coating, casting, and photographing evidence in the form of snow impressions, such as those made by shoes and tires. The State of Alaska Crime Laboratory conducted the research. NLECTC–Northwest helps disseminate the findings.[9]

Crime Mapping: Tracking Offender from Crime Scene to Likely Residence

With its focus on information technology, NLECTC–Southeast has been providing geographic profiling assistance to law enforcement for several years. Such profiling helps agencies understand how an offender traverses an area in search of victims. This involves consideration of a wide range of factors, including the locations of businesses, faith-based organizations, unemployment pockets, and crime scenes.

Feedback from NLECTC–Southeast's advisory council to Center Director Thomas Sexton indicated that commercially available geographic profiling models were well beyond the reach of law enforcement agencies because of cost and training-time considerations. Software cost was about $60,000 and training time generally 1 year. The Center worked with the technology provider to streamline its profiling model to lower the cost to about $6,000 and significantly shorten the training time for crime analysts.

Subsequently, a sheriff's office in Florida requested assistance from NLECTC–Southeast (based in North Charleston, South Carolina) regarding a component of CrimeStat II, a stand-alone spatial statistics program for the analysis of crime incident locations. Developed by Houston, Texas-based Ned Levine & Associates under grants from NIJ, CrimeStat is free and can be downloaded from the National Archive of Criminal Justice Data.[10]

The request from the Florida sheriff's office pertained to a CrimeStat II component—the journey-to-crime module—which is one aspect of the multifaceted geographic profiling technology.[11] The module assists law enforcement agencies in their investigations of serial murder, rape, robbery, arson, and other crimes.

[CrimeStat III] can analyze travel patterns not only for serial offenders but for multiple offenders committing single crimes. According to the program's developers, CrimeStat III will convey a much better understanding of criminal travel activity.

On the basis of the location of incidents committed by the serial offender, the journey-to-crime module makes statistical guesses about where the criminal is likely to reside. Those guesses are based on the travel patterns of a sample of known serial offenders who committed the same type of crime. On the assumption that a distance relationship exists between the residences of serial offenders and where they choose to commit their crimes, the module estimates the distance serial offenders travel to commit crimes and, by implication, the likely location from which they begin their "journey to crime."

CrimeStat III, which was released this year, is characterized as a big leap forward. It can analyze travel patterns not only for serial offenders but for multiple offenders committing single crimes. According to the program's developers, CrimeStat III will convey a much better understanding of criminal travel activity.

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Notes.

1. Reference in this article to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government, any agency thereof, or any of their contractors or subcontractors.
2. The Hound II is a sample collection and preconcentration device that works with a commercial chemical detector, the GE IonTrack VaporTracer. The VaporTracer detector is based on ion trap mobility spectrometry. The Barringer IONSCAN 400B (acquired by Smiths Detection) is based on ion mobility spectrometry. Both units detect trace amounts of explosives as well as drugs.
3. Sandia National Laboratories personnel first conducted a survey of the jail's mail room to determine whether existing background drug contamination from previous mail would interfere with use of the drug detector equipment. Results indicated insignificant contamination. Thus, subsequent detection of drugs on or in inmate mail could not be attributed to cross-contamination left by earlier mail. Some outgoing inmate mail also contained drugs.
4. The portable unit also operates in a vapor mode, detecting drug vapors emanating from within an envelope or package.
5. A report, *Contraband Detection in the Pima County Jail Mail Room*, prepared by Sandia National Laboratories' Gary W. Shannon (December 23, 2002), discusses the use of Hound II and Barringer IONSCAN 400B. Available only to corrections and law enforcement agencies, the report may be requested on an agency's official letterhead and addressed to Contraband Detection Report, BRTC, 1010 Second Avenue, Suite 1920, San Diego, CA 92101–4912. Or fax the request to 888–660–BRTC. Inclusion of the requesting agency's email address would be appreciated.
6. NLECTC–Northwest began operations in 2001 in partnership with Chenega Technology Corporation, a technology support company.
7. Prototype work on CopLink began in 1996 at the Artificial Intelligence Laboratory at the University of Arizona in partnership with the Tucson (Arizona) Police Department. The commercial version is available from Tucson-based Knowledge Computing Corporation.
8. After a review of the testing and its results, researchers will finalize their report on test findings, methodology, and other details. The report is scheduled for dissemination at http://www.justnet.org.
9. For more information, see Hammer, Lesley, and James Wolfe, "Shoe and Tire Impressions in Snow: Photography and Casting," *Journal of Forensic Identification*, 56(6) (November–December 2003): 647–655.

NATIONWIDE TECHNOLOGY ASSISTANCE FOR PUBLIC SAFETY AGENCIES

Operated by the Office of Science & Technology at NIJ, the National Law Enforcement and Corrections Technology Center (NLECTC) system consists of a national center and several regional centers and offices. They serve as "honest brokers," offering a wide range of technology assistance to State and local law enforcement and corrections personnel.

The regional centers and offices partner with technology-oriented organizations and are often co-located with them. Through those partnerships, NLECTC staff access the latest innovations in research and development. The regional facilities form a coordinated network helping agencies identify, test, demonstrate, acquire, adapt, and implement not only new technologies but also new applications of existing technologies. The network also provides scientific and engineering advice and helps innovators and industry develop, manufacture, and distribute new innovative products and technologies applicable to public safety.

NLECTC Points of Contact

- NLECTC–National, 2277 Research Boulevard, Rockville, MD 20850; 800–248–2742; asknlectc@nlectc.org.
- NLECTC–Northeast, 26 Electronic Parkway, Rome, NY 13441–4514; 888–338–0584; nlectc_ne@rl.af.mil.
- NLECTC–Southeast, 5300 International Boulevard, North Charleston, SC 29418; 800–292–4385; nlectc-se@nlectc-se.org.
- NLECTC–Rocky Mountain, 2050 East Iliff Avenue, Denver, CO 80208; 800–416–8086; nlectc@du.edu.
- NLECTC–West, c/o The Aerospace Corporation, 2350 East El Segundo Boulevard, El Segundo, CA 90245–4691; 888–548–1618; nlectc@law-west.org.
- NLECTC–Northwest, 3000 C Street, Suite 304, Anchorage, AK 99503–3975; 866–569–2969; nlectc_nw@ctsc.net.
- Border Research and Technology Center (BRTC), 1010 Second Avenue, Suite 1920, San Diego, CA 92101; 888–656–2782; info@brtc.nlectc.org.
- Rural Law Enforcement Technology Center (RULETC), 101 Bulldog Lane, Hazard, KY 41701; 866–787–2553; ruletc@aol.com.
- Office of Law Enforcement Technology Commercialization (OLETC), 2001 Main Street, Suite 500, Wheeling, WV 26003; 888–306–5382; info@oletc.org.
- Office of Law Enforcement Standards (OLES), 100 Bureau Drive, M/S 8102, Gaithersburg, MD 20899–8102; 301–975–2757; oles@nist.gov.

A wide range of NLECTC information, including links to Web sites of the regional centers and offices, can be found at http://www.justnet.org.

10. CrimeStat can be downloaded from http://www.icpsr.umich.edu/NACJD/crimestat.html. For additional information on crime mapping and related software, consult NIJ's MAPS program (Mapping & Analysis for Public Safety) at http://www.ojp.usdoj.gov/nij/maps.
11. The sampling and its analysis are part of the process of calibrating the journey-to-crime module to the characteristics of a given community. The Florida sheriff's office asked NLECTC–Southeast to assist in that task.