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JOURNAL



A Look at Terrorist Behavior: How They Prepare, Where They Strike

by Brent Smith, Ph.D.

Interagency Coordination: Response to the
2005 London Train Bombings

'Internationalizing' Criminal Justice Research

Expert Systems Help Labs Process DNA Samples

Cold Cases: Resources for Agencies, Resolution for Families

Cold Cases: Strategies Explored at NIJ Regional Trainings

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DIRECTOR'S MESSAGE

As this issue of the *NIJ Journal* goes to press, we are just three weeks away from the 16th annual NIJ Conference, which has become the preeminent gathering for criminal justice practitioners, researchers and policymakers. This year at the Conference, many people will be talking about NIJ's forensic DNA portfolio. Several new DNA activities are under way or about to get under way:

- A rigorous review of the exonerations of the wrongly convicted to help us better understand how eyewitness testimony, false confessions, forensic science, investigative practices and other issues relate to wrongful convictions.
- A workshop for stakeholders — law enforcement, prosecutors and defense attorneys, crime laboratories and innocence-project advocates — to help states understand how to apply for post-conviction DNA funding.
- An evaluation of post-conviction programs in two states to develop “best practices” and assist in efficient post-conviction reviews and DNA analysis.

NIJ recently held a meeting of the study group for an eyewitness identification field experiment that seeks to understand the impact of asking witnesses to identify suspects using various lineup techniques. Two police departments — Dallas and Washington, D.C. — are participating in the field experiment. Because inaccurate eyewitness identification may be responsible for a large percentage of wrongful convictions, we are especially eager to find the best way to use eyewitness evidence.

Also on the DNA front, NamUs.gov — the nationwide repository of missing persons records and unidentified decedent cases, launched last summer — had its first successes. Two jurisdictions, one in Florida and one in Kentucky, matched the DNA of unidentified human remains to data in NamUs.gov and finally closed two murder cases. The full stories are on NamUs.gov.

In June, NIJ released findings from an important field experiment that evaluated the use of DNA in burglary cases. The bottom line: Using DNA collected at burglary scenes resulted in twice the number of suspect identifications, arrests and prosecutions. The full results are available on our Web site, and articles are forthcoming in association magazines and the *NIJ Journal*.

NIJ continues its groundbreaking work to improve the performance of body armor and conducted-energy devices, such as Tasers®. As we go to press, we are planning to release the “Study of Deaths Following Electro Muscular Disruption: Interim Report” and the latest update to NIJ's body armor standard. Future issues of the *NIJ Journal* will carry stories about all these new developments.

Enjoy the articles in this issue. Our look at best practices in the areas of terrorism and solving cold cases, in particular, highlights NIJ's mission: To use research to answer questions and solve problems for our state and local criminal justice partners.



David W. Hagy
Director, National Institute of Justice



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David W. Hagy
Director, National Institute of Justice

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NIJ Journal Wins Two Awards

NIJ Journal, issue no. 258, has received a 2008 Gold Quill Award of Excellence from the International Association of Business Communicators. Recognized for publication design in the creative communications category, this issue used graphic diagrams, compelling photographs and other elements to illustrate and enhance articles on various topics, such as eyewitness evidence, prisoner reentry and training for sexual assault responders.

The cover story, "Missing Persons and Unidentified Remains: The Nation's Silent Mass Disaster," from *NIJ Journal*, issue no. 256, has won a Blue Pencil Award from the National Association of Government Communicators. Written by Nancy Ritter, editor of the *NIJ Journal*, this article takes an honest but poignant look at a problem many people are unaware of — the challenge of identifying remains.

Visit the *NIJ Journal* home page at <http://www.ojp.usdoj.gov/nij/journals/welcome.htm> to view these and other articles.





A Look at Terrorist Behavior: How They Prepare, Where They Strike

by Brent Smith, Ph.D.

Timothy McVeigh, the Sept. 11 hijackers and Eric Rudolph all had something in common — they selected targets hundreds of miles from where they lived. McVeigh wandered the Midwest living as a transient before making his bomb in Herington, Kan., and driving 250 miles south to blast the Alfred P. Murrah Federal Building in Oklahoma City. The Sept. 11 hijackers traveled hundreds of miles to their targets. And Rudolph drove nearly 300 miles from Murphy, N.C., to bomb an abortion clinic in Birmingham, Ala.

For local police departments searching for ways to stop terrorist acts before they occur, this does not bring much comfort. When looking at these attacks, officers might get the impression that there is not much they can do about terrorism other than improving physical security at high-risk targets.

But were these infamous terrorists typical?

Although we know a great deal about the behavior of traditional criminals, little information has been available about terrorists. Are they much different from conventional criminals, who tend to commit their crimes close to home?¹ Research has shown that traditional criminals are spontaneous, but terrorists seem to go to great lengths preparing for their attacks — and may commit other crimes while doing so. How long does this planning take? And do different types of terrorist groups vary in preparation time?

To help answer these questions, the National Institute of Justice (NIJ) launched a series of projects to explore patterns of terrorist behavior.² In the first of these projects, a panel of experts³ was assembled to examine 60 case studies involving terrorist incidents in the U.S. during the past 25 years.⁴ These cases involved the four major types of U.S. terrorist groups: left wing, right wing, single

issue and international.^{5,6,7} The panel — including this author — looked at the homes of the terrorists, the locations of planning and preparation, and the sites of the terrorist incidents to discover whether any patterns emerged.

What we learned was intriguing: The cases of McVeigh, the Sept. 11 hijackers and Rudolph are actually unusual. In fact, we found that most terrorists live close to their selected targets, and they engage in a great deal of preparation — some over the course of months or even years — that has the potential of coming to the attention of local law enforcement.

Terrorists Think Globally but Act Locally

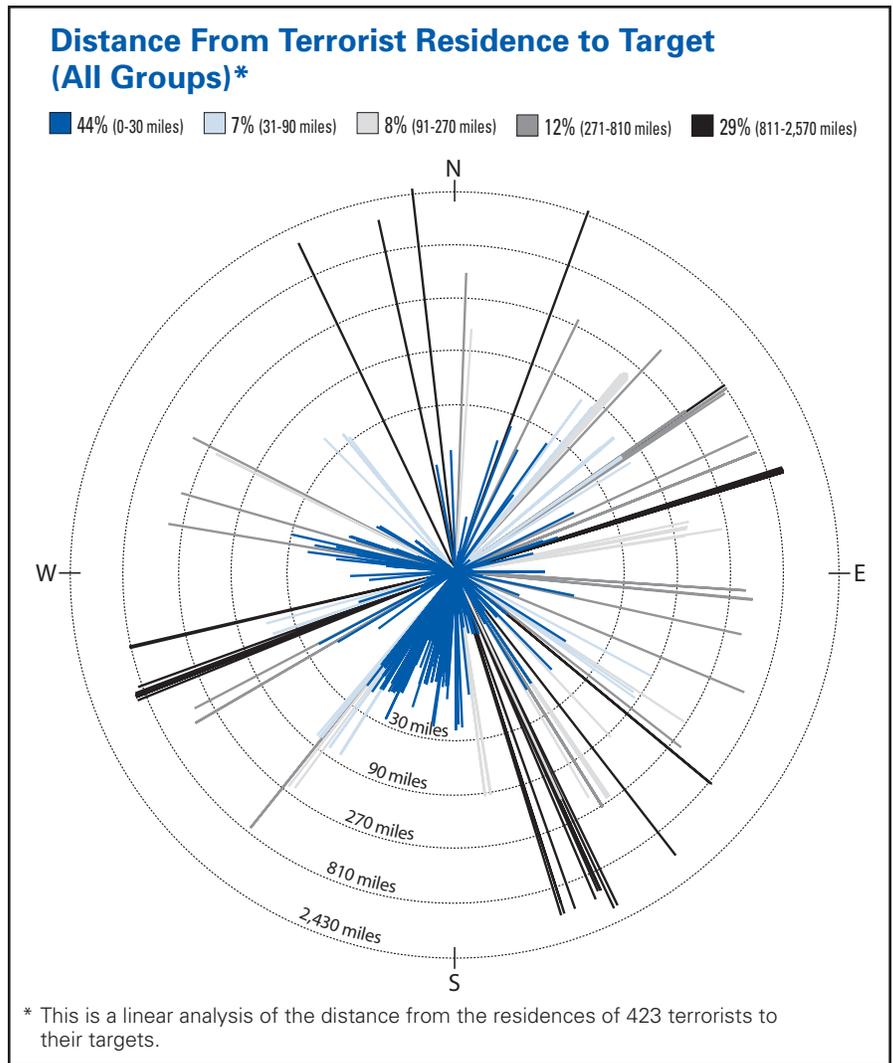
We studied:

- Ten attacks by international groups that involved 93 preparatory acts.
- Fourteen attacks by right-wing groups that involved 55 preparatory acts.
- Twenty-nine attacks by environmental groups that involved 80 preparatory acts.
- Six attacks by left-wing groups that involved eight preparatory acts.

According to our analysis, almost half (44 percent) of all terrorists examined lived within 30 miles of their targets. (See spatial analysis on this page, “Distance From Terrorist Residence to Target (All Groups).”) When the types of terrorist groups are examined separately, however, the findings are much different.

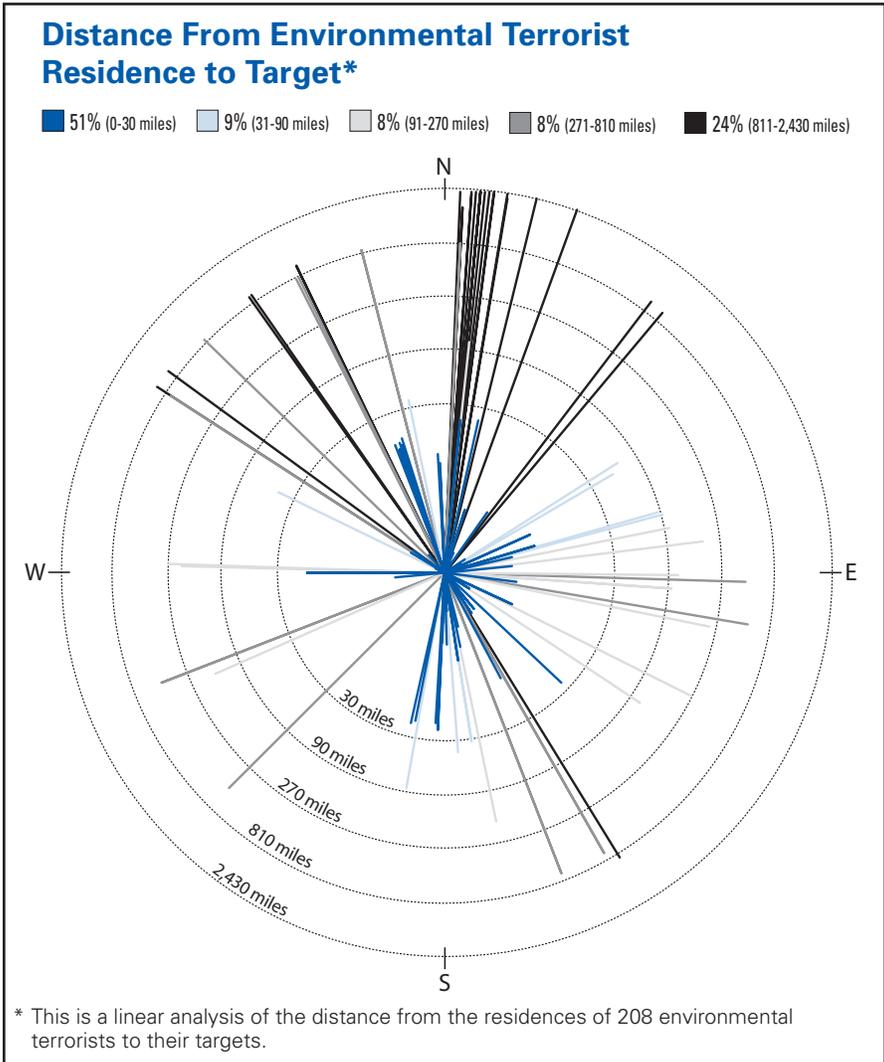
International terrorists lived relatively near their targets, whereas right-wing terrorists lived in rural areas but selected targets reflecting the “pollutants of urban life” in nearby cities.

Terrorists most commonly prepared for their attacks with surveillance and intelligence gathering, robberies and thefts to raise funding for the group, weapons violations, and bomb manufacturing. Again, most of these behaviors took place relatively near their homes, which, in turn, were close to the



targets. Terrorists may stay close to home because of new immigration status, lack of transportation, lack of knowledge of the urban landscape or a desire to avoid attention. Among single-issue terrorists in particular, 71 percent of the preparatory acts occurred within 12 miles and 92 percent within 28 miles of the target. This finding may also be attributed to the use of “uncoordinated violence” tactics by these environmental and anti-abortion extremists, which often results in local targeting by “lone wolves” sympathetic to the cause.

A separate follow-up NIJ project⁸ that analyzed the distance between more than 250 environmental and international terrorists’ homes and their targets confirmed the earlier preliminary findings that their spatial patterns are fairly similar. The analysis



found that about half of the environmental terrorists and nearly three-fifths of the international terrorists lived within 30 miles of their targets. (See the figure on this page, “Distance From Environmental Terrorist Residence to Target” and the one on page 5, “Distance From International Terrorist Residence to Target.”) Sixty-five percent of the environmental terrorists and 59 percent of the international terrorists prepared for their attacks within 30 miles of their target sites.

Although the terrorists studied committed most of their preparatory offenses near their homes, they conducted robberies, burglaries and thefts much farther away — an average of 429 miles from home. This suggests that most environmental and international terrorists live near the selected target and conduct surveillance and other general preparation near their homes and the eventual location

of the attack. Major crimes to procure funding for the group — like thefts, robberies and burglaries — however, are intentionally committed many miles away to avoid drawing attention to the group’s location and target choice.

The Terrorist’s Timepiece

We found that preparations generally began less than six months before the attack and ended with a flurry of actions a day or so before. This pattern varied by group type. Single-issue and right-wing terrorists engaged in substantially less preparatory crime over a shorter period — once again, most likely reflecting the use of “leaderless resistance” and lone-wolf strategies. The planning cycle of international terrorists tended to be longer. (See the table on page 5, “Cumulative Percentage of Preparatory Acts Over Time.”)

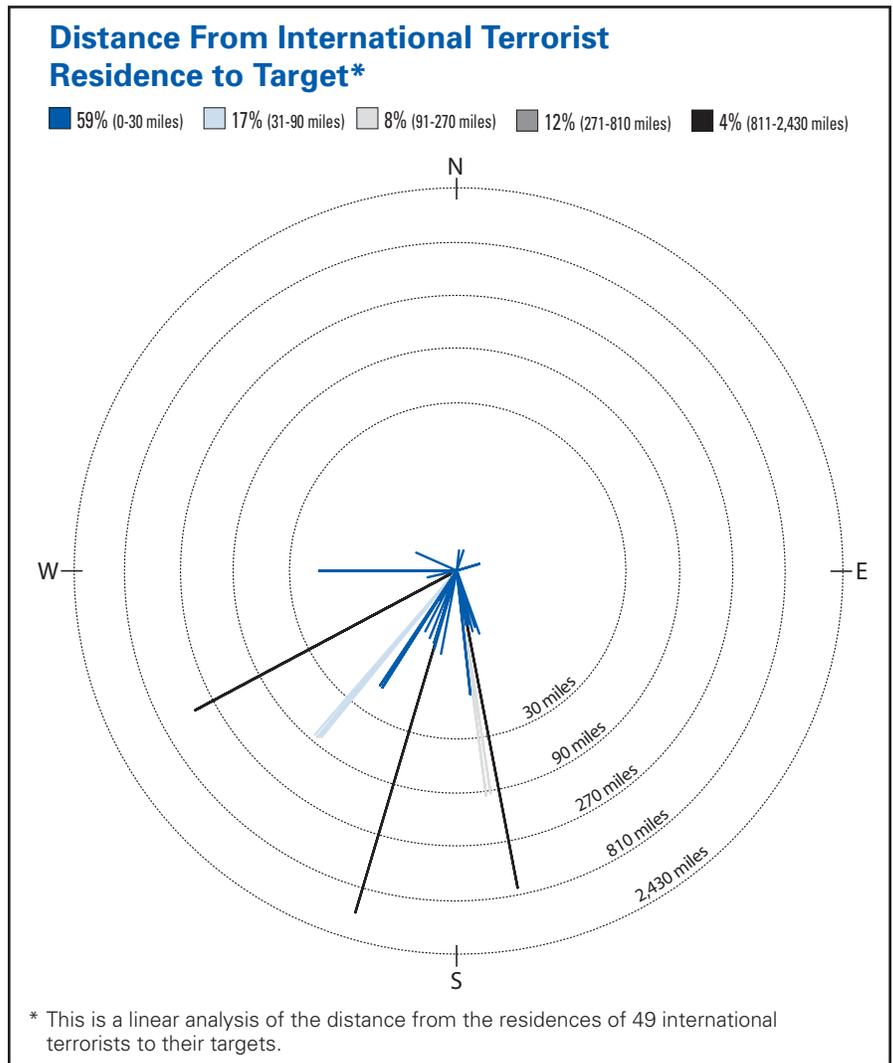
In our follow-up study, we took a closer look at the specific patterns of international and environmental terrorists by placing the preparations for all incidents on a time line. For instance, we examined the 21 incidents attributed to the environmental terrorist group known as “The Family,” which was responsible for the Vail, Colo., ski resort arson in 1998 and many attacks against Forest Service and Bureau of Land Management buildings from 1996 to 2000. The Family consisted of at least 16 people. Unlike most environmental terrorists who use uncoordinated violence and lone-wolf strategies, the group’s actions were more spontaneous than other environmental cases, with a short preparation period and little extended planning. Eighty-five percent of their known preparation activities — typically, inspection of the target, purchase of bomb-making items from local stores and identification of a staging area a short distance from the target — occurred within six days of the planned attack. An explosive device was assembled at the staging area a day or so before the incident and then delivered to the target. Participants usually returned to the staging area to destroy any evidence.

International terrorists, on the other hand, engaged in nearly three times as many preparatory acts per incident as their

environmental counterparts. This may be due to the larger number of people usually involved in international incidents, the size and scope of the planned incident or simply a longer planning cycle. Comparing the 10 international terrorist incidents that occurred on American soil,⁹ we found that the average planning cycle for international terrorists was 92 days, as opposed to 14 days for environmental terrorists. Averages can be misleading, however, because of significant outliers, such as the multiyear planning cycle of the Islamic extremists seeking to destroy New York City landmarks in the mid-1990s. Whereas environmental terrorists committed an overwhelming majority of their preparatory activities in the week before the incident, international terrorists took up to six months to prepare.

Arming Police With Knowledge

For law enforcement agencies, the implications of these patterns are significant. Committing an act of terrorism will usually involve local preparations. Although much of this conduct will not necessarily be criminal, early intelligence may give law enforcement the opportunity to stop the terrorists before an incident occurs. Knowledge of the threat — for example, understanding how long environmental or international terrorists prepare for their attacks — will affect the manner in which local officials respond. Identifying preparatory actions by environmental extremists may signal that an attack is imminent, whereas similar behavior by an international group might suggest that an attack is still several months away.



Understanding that most terrorists “act locally” can be important to know as investigative agencies seek to prevent terrorism and arrest perpetrators. These local patterns may be used by agencies to more efficiently

Cumulative Percentage of Preparatory Acts Over Time

Type of Terrorist Group	Incident day	Day before	2-3 days	4-7 days	8-14 days	15-30 days	1-3 mos	4-6 mos	7-12 mos	1-3 yrs	3+ yrs
International	5%	9%	13%	21%	32%	55%	68%	84%	89%	97%	100%
Right wing	15%	26%	31%	44%	49%	67%	94%	96%	96%	100%	
Environmental	20%	43%	72%	80%	91%	95%	98%	100%			
Left wing	50%	75%	88%	88%	88%	88%	100%				
All categories	13%	27%	40%	48%	57%	72%	85%	93%	95%	99%	100%

Percentage of acts completed within a specified time range:



patrol known, high-risk target areas and gather intelligence on suspected actions within a specific distance from potential targets. As we continue to deepen our understanding of the relationship among the location of the terrorist's home, terrorist preparation activities and the target, this growing knowledge should help officers prevent and respond to attacks.

NCJ 222900

For More Information

- More information on this study is available at <http://trc.uark.edu>.
- For more information on NIJ's terrorism research, see <http://www.ojp.usdoj.gov/nij/topics/crime/terrorism>.

Notes

1. Wright, R., and S. Decker, *Burglars on the Job: Streetlife and Residential Break-ins*, Boston: Northeastern University Press, 1994; Wright, R., and S. Decker, *Armed Robbers in Action: Stickups and Street Culture*, Boston: Northeastern University Press, 1997; and Reppetto, T. A., *Residential Crime*, Cambridge: Ballinger Publishing, 1974.
2. "Pre-Incident Indicators of Terrorist Group Activities," NIJ Grant # 2003-DT-CX-0003; "Geospatial Analysis of Terrorist Activities: The Identification of Spatial and Temporal Patterns of Preparatory Behavior of International and Environmental Terrorists," NIJ Grant # 2005-IJ-CX-0200; and "Terrorism in Time and Space," NIJ Grant # 2006-IJ-CX-0037.
3. The members of the panel and their areas of expertise were: Ron Arnold, environmental

ACKNOWLEDGMENTS

We would like to express our appreciation to the FBI, the U.S. House of Representatives Judiciary Subcommittee on Crime, the U.S. Senate Judiciary Committee, Sen. Jeff Sessions, the National Memorial Institute for the Prevention of Terrorism in Oklahoma City, the Department of Homeland Security and NIJ for supporting our research and the American terrorism study.

terrorism; Steve Chermak, right-wing terrorism; Kelly Damphousse, terrorism database management; William Dyson, domestic and international terrorism; Mark Hamm, right-wing terrorism; Robert Heibel, left-wing terrorism; Austin Turk, terrorism and political violence theory; and the author, Brent Smith, domestic and international terrorism.

4. Cases were selected primarily from the American Terrorism Study, a project that involves data collection on all persons indicted as a result of an FBI "terrorism enterprise" investigation as defined by the attorney general guidelines for domestic and international terrorism investigations.
5. Left-wing terrorist groups generally refer to those that adhere to a "forward-looking" ideology, one that advocates a political or social system that has not existed before in the U.S. Typically associated with extreme liberalism, examples include the May 19th Communist Party, the Weather Underground and the Black Liberation Army.
6. Right-wing terrorist groups generally refer to those that adhere to a "backward-looking" ideology, one that advocates a return to a political or social system that is perceived to have existed previously in the U.S. Typically associated with extreme conservatism, examples include the KKK, white supremacy groups like the Aryan Nations or groups like the Sheriff's Posse Comitatus that oppose centralized federal power.
7. Like the name implies, single-issue terrorist groups advocate on behalf of a particular political or social issue, such as anti-abortion or the environment.
8. "Geospatial Analysis of Terrorist Activities," NIJ Grant # 2005-IJ-CX-0200.
9. Temporal data on international terrorists are limited due to the small number of international incidents that have taken place in the U.S. Because of the FBI's success in disrupting plots, the number of cases is small.

About the Author

Brent Smith is a professor of sociology and criminal justice at the University of Arkansas. A student of terrorism for nearly 30 years, he created the American Terrorism Study in 1988 with assistance from the FBI. Smith currently serves as director of the Terrorism Research Center (TRC) in Fulbright College at the University of Arkansas. He was assisted on the projects discussed in the article by Kelly Damphousse, professor of sociology and associate dean of the College of Arts and Sciences at the University of Oklahoma; Jackson Cothren, assistant professor of geosciences and affiliate of the Center for Advanced Spatial Technologies at the University of Arkansas; and Paxton Roberts, research associate at TRC.

Recently Released Resources by NIJ

Geography and Public Safety, Vol. 1, Issue 1

NIJ and the Office of Community Oriented Policing Services introduce *Geography and Public Safety*, a new quarterly publication that focuses on the relationship between geography and crime. Articles in this issue explain how crime analysts use applied geography to understand crime and public safety, explore targeting crime in hot spots and places, and demonstrate how to use ModelBuilder for geographic information system tasks. The newsletter is available at <http://www.ojp.usdoj.gov/nij/maps/gpsBulletin-2008v1.pdf>.

Electronic Crime Scene Investigation: A Guide for First Responders, Second Edition

Electronic evidence is fragile and can be altered, damaged or destroyed by improper handling or examination. The second edition of this guide provides updated information and suggestions for first responders; it explains how to recognize, collect and preserve electronic evidence at a variety of crime scenes. This Special Report is available at <http://www.ncjrs.gov/pdffiles1/nij/219941.pdf>.

Paving the Way for Project Safe Neighborhoods: SACSJ in 10 U.S. Cities

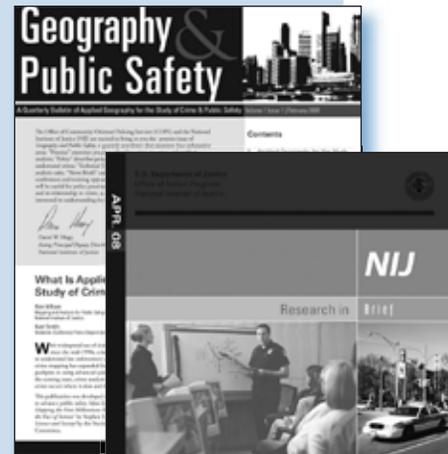
Strategic Approaches to Community Safety Initiative (SACSJ), the precursor to Project Safe Neighborhoods, brought together multiple government agencies, community-based groups and researchers in a highly focused effort to reduce homicide and youth and firearms violence in 10 cities. This initiative was spearheaded by U.S. attorney's offices. SACSJ strategies, which became part of Project Safe Neighborhoods, continue to demonstrate success, specifically in preventing and reducing firearms violence. This Research in Brief is available at <http://www.ncjrs.gov/pdffiles1/nij/216298.pdf>.

The Evaluation of the Judicial Oversight Demonstration: Findings and Lessons on Implementation

The Judicial Oversight Demonstration (JOD) Initiative, jointly funded by NIJ and the Office on Violence Against Women, set out to improve services offered to victims of domestic and intimate partner violence. The Urban Institute, under a grant from NIJ, evaluated the Initiative's activities. This Research for Practice, the second in a series on JOD, addresses key findings and lessons learned about the implementation of court-involved domestic violence prevention programs. It is available at <http://www.ncjrs.gov/pdffiles1/nij/219077.pdf>.

New Web Topic Pages

- Crime Prevention
- DNA and Property Crime
- Gun Violence
- Tribal Crime and Justice





Interagency Coordination: A Case Study of the 2005 London Train Bombings

by Kevin J. Strom, Ph.D., and Joe Eyerman, Ph.D.

Editor's Note: This is the first in a two-part series on interagency coordination that looks, in particular, at the response to the 2005 London bombings. In the next issue of the *NIJ Journal*, we will look further at challenges faced by British agencies in responding to the attacks and lessons that may be learned from them.

On July 7, 2005, at approximately 8:50 a.m., a series of bombs exploded on three London Underground trains. One hour later, a fourth bomb exploded on the upper deck of a bus in Tavistock Square. The attacks — the work of four suicide bombers — marked the deadliest bombings in London since World War II and the first suicide attacks in modern Western Europe.

The response of London's emergency services and transportation system to the bombings is considered the city's most comprehensive and complex response ever to a terrorist attack.¹ Responding agencies faced challenges during and immediately after the attacks, but major problems in emergency

coordination were minimized because London officials had established relationships with one another and had practiced agreed-upon procedures. Consequently, everyone knew their roles and responsibilities; a command and control system was up and running quickly; and mutual aid agreements — planned out in advance — were successfully initiated and applied.

This article is based on our research regarding the multiagency response to the London attacks, including barriers and ways to overcome them. As part of that National Institute of Justice-funded study, we interviewed officials from law enforcement, fire and medical services, and public health agencies who were directly involved in the July 2005

London response.² We asked about their role during the response, the strategies for coordination that facilitated it, the barriers they encountered and possible strategies for improving coordination among agencies responding to emergencies.

Why Do Emergency Coordination Efforts Fail?

Like the U.K., the United States faces a range of potential threats that would require a quick and coordinated response by many agencies. Our nation's capacity to prepare for and respond to terrorist attacks, natural disasters and other large-scale emergencies — especially ones involving simultaneous attacks at different locations — hinges on the ability of agencies to communicate with one another, share resources, and coordinate and execute a joint effort.

Researchers who study coordinated emergency response have identified both barriers and promising practices to help law enforcement and public health agencies improve interagency support during such situations. First and foremost, we know that multiagency coordination is a challenge at all levels. Even small problems can be exacerbated when crises occur in several places simultaneously or when reports by the media heighten public panic. Overlapping jurisdictions and responsibilities in emergency response can compound budget concerns, interagency friction and miscommunication.

In our own research, we found four general barriers to interagency coordination:

- **Communication.** Agencies tend to develop their own jargon based on their areas of focus and internal workings. The subsequent lack of a common language often impedes cross-agency communication.
- **Leadership.** Coordinated planning and response require an ongoing commitment from agency leaders. Response can fail when a leader of a critical partner agency is unwilling to commit qualified staff and resources because he or she is unconvinced of the benefits to the agency.

LESSONS LEARNED IN OVERCOMING BARRIERS TO INTERAGENCY COORDINATION

Our research has helped us identify several promising practices for overcoming barriers and successfully coordinating with other agencies during an emergency. These include up-front planning and ongoing collaboration and training, such as:

- Creating and instituting standing procedures for rapidly recognizing and declaring a major multiagency incident.
- Having a standardized process for multiagency preparation and response that is rehearsed and used regularly for major events — and, therefore, becomes familiar to all emergency response agencies.
- Using a “liaison” model, in which personnel from one agency are assigned to work at other agencies for periods of time; sharing staff in this way facilitates communication and on-site consultation across agencies.
- Developing relationships to facilitate cooperation among agencies by holding joint trainings, planning sessions and informal social events (such as off-site dinners).
- Encouraging participation of all relevant agencies' senior and junior staff in joint training and planning sessions to foster relationship building, communication, trust and appreciation for each other's roles.
- Providing continued reinforcement from senior management through ongoing support for annual trainings and interactions and dedicating resources to joint initiatives.
- Implementing procedures to coordinate and send joint messages to the news media to forestall panic and exaggerated public perceptions.

Editor's Note: In the next issue of the *NIJ Journal*, we will further discuss challenges faced by the British agencies in responding to the 2005 London bombings and lessons learned from them.

- **Cultural differences.** Although public safety and health officials share the common goal of saving lives, each agency develops its own cultural standards of behavior that reflect the educational and social backgrounds of its staff, organizational hierarchy, leadership style and core mission.
- **Legal and structural differences.** Each agency has a unique internal hierarchy, different processes for working through the chain of command, legal limitations, and varying geographical and topical jurisdictions. These differences can discourage, delay or prohibit joint planning initiatives.

To identify promising practices that can be used to resolve coordination barriers in the United States and elsewhere, we examined London's response in relation to a general coordination model. Applying this model — just one coordination model among many — to the 2005 bombings response provides an interesting look at some of the following interagency coordination promising practices.

The London Bombings: Declaring a 'Major' Incident

London's public safety agencies have been collaborating for a long time. In 1973, city leaders formed the London Emergency Services Liaison Panel (LESLP), with representatives from the London Metropolitan Police Service, City of London Police, British Transport Police, London Fire Brigade, London Ambulance Service and local London authorities. LESLP developed a manual, *Major Incident Procedure Manual*,³ which is the core memorandum among the members and includes a comprehensive outline upon which London's coordination model of emergency response is founded.

The manual defines "major incident" broadly so that any emergency response agency can declare a major incident and thus increase the likelihood that multiple agencies will respond immediately. A key facet of the London bombing response was, in fact, rapid recognition and declaration of a major incident.

London's Standardized Command Structure

LESLP's manual also describes the responsibilities of each agency during any major incident and defines the general roles that relevant personnel perform on the scene. The roles are defined by three levels of leadership: Gold, Silver and Bronze.⁴ The three levels of command are used across the U.K. for all large-scale emergencies. Consequently, relevant agencies are familiar with the roles and responsibilities of each level.

In addition, all agencies have agreed that the U.K.'s law enforcement serves as the coordination lead. Thus, there is no confusion about which agency is in charge during a major incident. Because these procedures were already in place at the time of the 2005 bombings, there was limited confusion about the roles and responsibilities of responding agencies.

Joint Training and Planning

The anti-terrorism branch of the London Metropolitan Police Service hosts quarterly joint exercises, known as the Hanover Series, to practice what to do in the event of a major incident. Partner agencies and other stakeholders meet in the outskirts of London for weekend tabletop exercises that increase everyone's knowledge of roles and responsibilities. According to emergency service personnel, the practice sessions also increase familiarity with other key personnel, provide the opportunity to test procedures and rehearse the standardized LESLP command and control system, and help agencies learn how to respond and react collectively.

The exercises use the Silver and Gold components of LESLP's command and control structure and therefore help reinforce and improve multiagency coordination. Perhaps most importantly, the scenarios introduced during the Hanover Series are grounded in practical, wide-ranging incidents that require in-depth planning and response duties. These exercises usually reflect local, national and international events and address a series of issues to improve multiagency cooperation.

One Voice, One Message

Having a single media spokesperson can help ensure that consistent information is released to the public in a timely manner. It can also help avoid conflicting and confusing statements from different agencies. Shortly after the 2005 bombings, the Metropolitan Police Service assumed the lead position of a joint media "cell" and convened a group of public information officials from partnering

agencies and the central government. The group met quickly after the bombings to agree upon roles and responsibilities and to develop a joint message. It provided the public — via the media — with a constant stream of information that helped to restore calm and ultimately to identify the bombers.

Developing a National Coordination Model

Since 2001, there has been an increased emphasis on multiagency planning and response, and efforts have been taken in the United States and elsewhere to develop coordinated approaches. In public safety and homeland security, informal agreements between agencies can serve as a first step toward minimizing barriers to coordination. Informal agreements can allow agency leaders to achieve their goals through cooperation rather than direct competition and can help clarify each agency's expectations. After working relationships have been established, agencies may then decide to develop more formal agreements that describe the planning, collaboration and training elements discussed above.

The July 2005 bombings in London are just one example of a complex event that required extensive response planning and training. Other examples include public health outbreaks, serial violence like the D.C.-area sniper attacks and natural disasters like Hurricane Katrina. Identifying and developing a national coordination model — and learning from earlier cases — should greatly improve our nation's abilities to respond to terrorist attack or other major homeland security events.

NCJ 222901

For More Information

- Eyerman, J., and K.J. Strom, *A Cross-National Comparison of Interagency Coordination Between Law Enforcement and Public Health*, final report submitted to the National Institute of Justice, Washington, D.C.: February 2006 (NCJ 212868), available at <http://www.ncjrs.gov/pdffiles1/nij/grants/212868.pdf>.
- Eyerman, J., and K.J. Strom, "Multiagency Coordination and Response: Case Study of the July 2005 London Bombings," *International Journal of Comparative & Applied Criminal Justice* 32 (1) (2008): 89-110.
- Strom, K.J. and J. Eyerman, "Interagency Coordination in Response to Terrorism: Promising Practices and Barriers Identified in Four Countries," *Criminal Justice Studies: A Critical Journal of Crime, Law and Society* 20 (2) (2007): 131-147.

Notes

1. London Regional Resilience Forum, *Looking Back, Moving Forward. The Multi-Agency Debrief: Lessons Identified and Progress Since the Terrorist Events of 7 July 2005*, London: Government Office for London, 2006, available at <http://www.londonprepared.gov.uk/downloads/lookingbackmovingforward.pdf>.
2. The authors thank the London planning and response community for their candid and thoughtful participation in this study; this project would not have been possible without their support.
3. London Emergency Services Liaison Panel (LESLP), *Major Incident Procedure Manual, Sixth Edition*, London: Metropolitan Police Service, 2004.
4. These levels of command are often called "strategic," "tactical" and "operational." In London's emergency command structure, these roles are not related to rank within or across agencies.

About the Authors

Kevin J. Strom is a senior scientist in RTI International's Center for Crime, Violence, and Justice Research. He has 12 years of experience in criminal justice research, including law enforcement responses to community violence, the causes of interpersonal violence and interagency coordination in response to terrorism. **Joe Eyerman** is a senior research methodologist and director of the Health Security Program at RTI International. He has 17 years of experience with quantitative and qualitative modeling and analysis of social behavior; his primary research interest is in the formal and statistical modeling of decision processes related to individual and organizational political behavior, violence and terrorism.



'Internationalizing' Criminal Justice Research

by Philip Bulman

Editor's Note: NIJ recently added two experts to its International Center and moved it into the Director's Office to raise the Center's profile and ensure that it takes full advantage of technology and social sciences advances internationally. Because this issue of the *NIJ Journal* features two articles on international issues, we asked staff writer Philip Bulman to look at ways in which NIJ's International Center is "internationalizing" the Institute's research portfolios.

When the National Institute of Justice (NIJ) set out to develop updated standards for portable X-ray equipment used by bomb squads, British scientists and engineers did most of the work.

"Explosives have no nationality," said Chris Tillery, associate deputy director for science and technology at NIJ. "Most countries have the same concerns."

Because NIJ has close contact with the British Home Office Scientific Development Branch, officials on both sides of the Atlantic Ocean knew that American and British law enforcement agencies were independently working on similar projects. This contact

made it possible for the American effort to leverage the considerable experience and expertise developed by the British over decades. The collaboration is a good example of how international efforts can ultimately help U.S. state and local law enforcement agencies.

NIJ's work is increasingly international in scope. The Institute supports partnerships and projects with other nations, collecting and sharing knowledge with researchers and working together to develop new information — all to benefit U.S. state and local agencies. These partnerships can also save one country from unintentionally reinventing the wheel that another country has already developed.

Technology development has been a fruitful field for international law enforcement collaborations, but many other efforts are under way as well. Criminal enterprises work across borders in such pursuits as drug and human trafficking. Cindy Smith, chief of NIJ's International Center, said that in cases for which the roots of crime may be overseas, American law enforcement organizations can gain important insights from research that is not U.S.-myopic.

For many years, NIJ's International Center has funded research partnerships in countries where events were influencing crime in the U.S. These partnerships include research in El Salvador on the MS-13 gang, a Burmese project focused on drug smuggling and a study of Chinese smugglers who helped people enter the U.S. illegally.¹ NIJ is now expanding its International Center to ensure that all of its research portfolios consider what the U.S. criminal justice research community can learn from and share with other countries.

Using International Knowledge to Solve Local Crime

Much of the Institute's international work helps U.S. state and local law enforcement agencies leverage the criminal justice solutions that already have been discovered elsewhere. Regular contact with other countries can be critical when addressing such issues as the illegal drug trade, terrorism and human trafficking.

Forensics is another area where international contacts are fruitful. Mike Sheppo, chief of NIJ's Investigative and Forensic Sciences Division, noted NIJ's relationship with Australia's National Institute of Forensic Science. A formal memorandum of understanding between the two countries has given researchers who are doing similar work an effective way to share their findings, particularly in the areas of processing damaged DNA and using robotics in crime laboratories. The project has been so successful, Sheppo added, that it is expected to lead to other international collaborations, especially among crime laboratories.

For many years, NIJ's International Center has funded research partnerships in countries where events were influencing crime in the U.S.

Another benefit of international collaboration is learning about innovative programs that are emerging overseas. For example, the U.S., which currently has the world's highest incarceration rate, may benefit from other countries' experiences in attempting to reduce both crime and incarceration rates. Smith offered another example of a British program that reported improved relationships between crime victims and law enforcement after a police officer was assigned to follow every case through to conclusion.

Sharing Information

Best practices research flows in both directions. For example, NIJ helped pioneer the Arrestee Drug Abuse Monitoring (ADAM) program in the U.S. This voluntary drug-testing program in American jails identified important regional variations in drug abuse: Some areas were found to have high rates of methamphetamine abuse, whereas cocaine or heroin abuse was more prevalent in other regions.

The ADAM program helped state and local authorities focus on the widely abused drugs in their regions, said Christine Crossland, senior social science analyst in NIJ's Violence and Victimization Research Division. The program proved to be so successful, she noted, that it attracted attention overseas, which, in turn, resulted in NIJ's technical assistance in setting up similar programs in Australia and the U.K.

Many police departments in the U.S. now grapple with the threat of terrorism in addition to dealing with conventional crimes, such as drug sales and burglaries. This, as so many state and local law enforcement agencies know, puts a strain on resources. In one project, NIJ brought

experts from cities in the U.S. and Israel together to share best practices on how cities can respond to terrorism threats. This collaboration, which culminated in a series of papers discussing Israeli and American perspectives, will result in a book to be published later this year.

Partnering With Chinese Researchers

In the international arena, federal agencies often work together to offer expertise to a foreign country. In one such project, NIJ teamed up with the Bureau of Justice Statistics and the Bureau of Prisons to work with professionals in the People's Republic of China. The project includes the University of Maryland and several Chinese universities that are working to develop and set up an academic criminal justice curriculum.

Many experts who have worked with partners in China have remarked on that government's commitment to achieve genuine reform in its vast justice system. NIJ senior science advisor Edwin Zedlewski said that officials and researchers in China seem open to U.S. criminal justice expertise and eager to learn from others by applying in China the best of what other systems have to offer. This is an important opportunity for change, he added, because even modest improvements in China's vast justice system will likely have significant public safety outcomes for millions of Chinese.

Although many of NIJ's international efforts involve collaborations with a single country, the Institute also engages in broad efforts, notably with the United Nations Office on Drugs and Crime. Headquartered in Vienna, Austria, this office focuses on research and

technical assistance that assists member countries in meeting the challenges of transnational crime, such as terrorism, corruption and drug trafficking. Zedlewski noted that NIJ, which is one of 17 research institutes of the U.N., provides criminology and criminal justice expertise as part of the U.S. State Department's delegation to the annual U.N. Crime Commission meeting. Also, as a member of the U.N. Programme Network Institutes, which operates under the U.N.'s Crime Prevention Program, NIJ offers input on U.N. resolutions and related documents and provides delegates and experts for various U.N. conferences.

The Institute also takes part in the International Research Directors Consortium, which includes criminal justice research organizations from Europe, Australia and New Zealand.

NIJ's "internationalization" of its research portfolios takes various forms, depending on the type and purpose of the project. For example, NIJ Director David Hagy said that researchers planning international projects may want to apply for a grant in a specific topic area. A topic such as prison radicalization might fit into a corrections area, whereas a comparative domestic violence victimization project would be suitable for a domestic violence solicitation.

The bottom line, however, is that NIJ's internationalization of its research portfolios will be so "invisible" in the field that a bomb squad technician rushing off to an emergency in the American heartland probably will not know that British scientists helped develop the standards for a piece of equipment he uses. But he may be able to do his job better as a result of this international sharing of knowledge.

NCJ 222902

About the Author

Philip Bulman is a writer and editor at the National Institute of Justice. He has more than 25 years of experience as a journalist and writer specializing in science policy, scientific research and technology development.

Note

1. *Characteristics of Chinese Human Smugglers*, available at <http://www.ncjrs.gov/pdffiles1/nij/204989.pdf>.



Books in Brief

The Long View of Crime: A Synthesis of Longitudinal Research

**Akiva M. Liberman, ed.
Springer, 2008**

Can longitudinal research — studies that follow individuals over many years — answer questions critical to criminal justice? What is the developmental life-course of criminal behavior? Is there one general offending pattern or multiple offending patterns? Which early risk factors, if any, are strongly predictive of criminal behavior? Do particular interventions prevent or retard future criminal behavior? In *The Long View of Crime*, editor Akiva Liberman asserts that these studies can answer such questions. The book synthesizes findings from 200 papers based on 60 longitudinal studies into six reviews. The volume focuses on adolescent experiences with employment, gang involvement and first arrests as well as the link between early childhood and adolescence.

Evidence-Based Crime Prevention, Revised Edition

**David P. Farrington, Doris Layton MacKenzie,
Lawrence W. Sherman and Brandon C.
Welsh, eds.
Routledge, 2006**

According to the editors of *Evidence-Based Crime Prevention*, crime policy is sometimes driven by political ideology, anecdotal evidence and current program favorites. The book reviews more than 600 scientific evaluations of programs intended to prevent crime in a variety of

settings, such as families, schools, jobs and communities. It grades the validity of programs using “the scientific methods scale.” This book attempts to provide policymakers, researchers and community leaders with information about what works, what does not and what is promising in crime prevention.

Downsizing Prisons: How to Reduce Crime and End Mass Incarceration

**Michael Jacobson
NYU Press, 2005**

In *Downsizing Prisons: How to Reduce Crime and End Mass Incarceration*, author Michael Jacobson argues that mass incarceration will not reduce crime or improve public safety. The many changes over the years to sentencing and corrections policies and practices (i.e., mandatory minimum sentencing, three-strike laws and for-profit prisons) initially designed to prevent or reduce crime have also contributed to the rise of the general prison population. Jacobson contends that given the fiscal constraints in many states, the only effective answer is an overhaul of the corrections system and a slowdown of prison expansion policies. He examines various methods that states have used to initiate prison reform and discusses policy solutions, such as changing how parole and probation agencies operate and supporting drug treatment programs for low-level offenders, which the book claims could possibly increase public safety while lowering corrections costs.



Expert Systems Help Labs Process DNA Samples

by Rhonda K. Roby

Criminal justice professionals who work in the field of DNA analysis know that a backlog of convicted offender samples exists in our nation's laboratories. It takes a long time to analyze a DNA sample of a convicted offender. Two forensic analysts must visually review the sample and apply a set of standard operating procedures that can have many sets of rules. The procedures can be difficult to apply consistently. After the review is complete, the data must be entered into the national database.

Completing all the steps quickly is a formidable challenge.

New software programs called "expert systems" are helping increase the speed of the review process. Expert systems capture all possible circumstances that experts encounter when they do their jobs and dictate what the appropriate responses should be. For forensic analysts, expert systems not only allow them to get consistent, accurate results more quickly, they also help them

review and upload many DNA profiles into the national database faster.

But can these expert systems help reduce the backlog of convicted offender samples that exists in our nation's laboratories?

According to the results of an evaluation by the National Institute of Justice (NIJ), they can. The NIJ Expert Systems Testbed (NEST) project, hosted by the Marshall University Forensic Science Center, evaluated the ability of three commercially available expert systems, designed specifically for forensic DNA laboratories, to rapidly and accurately review convicted offender single-source DNA samples for eventual upload into the national DNA database. Project researchers — including this author — found that the three programs will help reduce the

The products, manufacturers and organizations discussed in this article are presented for informational purposes only, and their discussion does not constitute product approval or endorsement by the U.S. Department of Justice.

backlog and ensure timely submission of data into the national database so ultimately more crimes can be solved.^{1,2}

What Are Expert Systems?

Expert systems are a subset of artificial intelligence. They store knowledge on how to respond to a particular result and, when a challenge is presented, use the stored knowledge in the program to respond with an explanation. The system, however, cannot completely replace a human expert because it contains only rules to solve most commonly encountered problems. The system must be able to recognize cases that are outside its rules and scope of knowledge or those in which there is a possible alternate judgment and alert a human expert reviewer.

Expert systems are developed with the close collaboration of the software development team and forensic science experts. Developers create the system by first conducting extensive interviews with experts in the field where the software will be used, writing algorithms to apply to the data and testing the programs with data appropriate for the software. The knowledge from these experts is then taken and applied consistently to the data review process by using the algorithms, automating the analysis and freeing analysts to focus on more complex challenges.

Use of this technology continues to increase in several industries as they become more aware of its benefits — for instance, expert systems are assisting physicians in making medical diagnoses, supporting NASA’s space program and managing inventories for large factories. They serve as scheduling and planning tools when the everyday consumer makes an online airline reservation. A search engine finds all possible airline companies, determines the routes based on particular requests and attempts to find the requested time frame. Once the consumer chooses a particular flight plan, the system can determine the class of travel, price and seat assignments.

For forensic DNA analysis, expert systems could easily be one of the most important

advances in analyzing convicted offender samples. By reviewing routine data rapidly and accurately, the system will allow analysts to focus on those samples with problems or “flags.” Also, because DNA analysis requires considerable training and experience, software that interprets information with little or no work by the forensic analyst is a noteworthy advancement for the DNA community.

Rapid, Accurate Analysis

Our evaluation focused on the technical review of software programs that:

- Are publicly available for purchase.
- Are configurable, off-the-shelf software.
- Are housed in a laboratory.
- Can be used by people who are unfamiliar with computer code.
- Meet technical specifications outlined in the forensic standards.³

We evaluated three software packages that met these criteria:⁴

- GeneMapper® ID v. 3.2 (Applied Biosystems, Foster City, Calif.).
- FSS-i³™ (Promega Corporation, Madison, Wis.), used with GeneMapper® ID v. 3.2 for peak detection and sizing.
- TrueAllele® System 2 (Cybergenetics, Pittsburgh).

We evaluated every step involved from buying the programs to running them. Our evaluation examined the time it takes to import data, run the application and complete the analysis. We also critically checked the flags, rules and features available with each program. We evaluated their ability to run without assistance by the analyst and to flag the samples needing human expert review. We further looked at the customer service and training provided by the vendors’ technical staff.

Our team found that the three expert systems evaluated for single-source samples will help reduce the DNA convicted offender backlog.⁵ We determined that each is able

For forensic DNA analysis, expert systems could easily be one of the most important advances in analyzing convicted offender samples.

CONSIDERATIONS WHEN SELECTING AN EXPERT SYSTEM

When deciding whether to purchase an expert system, managers and analysts should consider their throughput needs, budget, human resources and information technology (IT) support as well as the features of the system and the continuing support of the vendor. Questions to ask include:

- How many instruments will be used to process single-source samples?
- On average, how many samples do you plan on processing in a week?
- How fast do you need to process your data?
- What is your review backlog?
- How many analysts do you have on your staff for processing single-source samples?
- What is the level of expertise for data review in your staff?
- Do you want the vendor to provide continued data optimization, or do you want to have all optimization control?
- Do you have information technology support in your agency?
- Do you have information technology support specifically for the DNA laboratory?
- Is the provision of an expert system tool at multiple workstations important? Would a single workstation be easier to manage?
- What is your budget for purchasing an expert system?
- Do you have the budget for the maintenance and support contracts?
- What are the needs for your quality assurance program?
- Would you like to have features in your expert system to help identify quality assurance problems?
- Which training program fits the needs and philosophy of your agency?
- Do you prefer training at your laboratory or training at the vendor site?
- Is a Web-based training program sufficient for your needs?

to rapidly and accurately conduct routine reviews (reviews of DNA samples without flags) and can significantly reduce the time spent in the human review of DNA profiles. When implementing one of these expert systems, only one analyst is needed to accept the good quality samples (with no expert system in place, two analysts are needed during a review), thereby reducing labor hours by half.

We determined, however, that the systems cannot fully replace a human expert or DNA analyst. The systems can be used as tools to evaluate single-source DNA samples and to alert the DNA analyst when results do not meet defined rules or there is a possible alternate judgment. But the final decision-making process in cases when results raise flags must remain in the hands of the trained DNA analyst.

As part of our evaluation, we also presented the features and limits of each system to

help forensic analysts determine which program will most benefit their laboratories and to aid managers when deciding whether to purchase or subscribe to expensive software. Here is a brief summary of each expert system that we evaluated.

GeneMapper® ID Software v. 3.2

We found the purchase of GeneMapper ID straightforward. The laboratory in which we evaluated the product purchases only software from the vendor; hardware is purchased separately. The consumer determines the number of licenses required by the laboratory and can self-install the software from a CD. The vendor provides a one-day on-site training on setup and basic software tools with purchases as well as technical support for telephone and electronic questions and free periodic webinars. More extensive training can be purchased. Our evaluation found many features in GeneMapper ID to be intuitive and the sizing and genotyping analysis to be

simple and effective. For more information on GeneMapper *ID* or the new product GeneMapper® *ID-X*, see <http://www.appliedbiosystems.com>.

FSS-i³™ Expert Systems Software

With FSS-i³, hardware is purchased separately; the laboratory purchases only software from the vendor. The vendor offers on-site or company-site training at a separate cost. The five-day sessions include installation, optimization and training. The vendor also offers technical support for telephone and electronic questions. Overall, we found the operation of the software straightforward. For more information on FSS-i³, see <http://www.promega.com>.

TrueAllele® System 2

With TrueAllele, hardware is included with the software. The laboratory can renew its support and updates annually. The vendor provides two company-site training sessions: a two-day executive training session for laboratory managers and administrators and a four-day training session for scientists using the software. The vendor also provides technical support for telephone and electronic questions. During our evaluation, we found that we had a steeper learning curve for TrueAllele, but once we understood the setup, it was fairly straightforward and the analysis of the size standard and samples was simple and effective. For more information on TrueAllele, see <http://www.cybgen.com>.

It is not the objective of the NEST project to identify the single best expert system for a laboratory. We recognize that crime laboratories are different, and each laboratory should consider its specific needs when choosing an expert system (see sidebar on page 18, "Considerations When Selecting an Expert System"). Instead, the goal of the NEST project is to continue to give managers and analysts the tools they need to determine which expert system would best fit their laboratory and ultimately help reduce the backlog of convicted offender samples across the country so more crimes can be solved.

NCJ 222905

For More Information

- A detailed report of our evaluation is available on the Marshall University Forensic Science Center's Web site at <http://forensics.marshall.edu/NEST/NEST-Intro.html>.

Notes

1. This article discusses the results from phase 1 of the project, which evaluated software for use with single-source DNA samples. We are now assessing software that can handle degraded DNA and mixtures that include DNA samples from more than one person. Results of phase 2 of the project are expected in 2009.
2. The goal of the NEST project is to evaluate, not validate, expert systems software. Validation refers to formal testing that must be completed before laboratories can upload genetic profile information to the national database. Some of these software programs have been validated and approved by the National DNA Index System (NDIS). They are now in use at the Florida Department of Law Enforcement and New York State Police. According to the standards, the specific combination of instrument, chemistry and software must be developmentally validated. Once NDIS validates and approves a particular combination, other laboratories are required to perform internal validation only if they adopt the same combination.
3. The forensic standards for an expert system call for specific criteria that address different functions.
4. Other software packages are currently available that were not on the market when we began the evaluation. The new programs are worthy of serious consideration.
5. Before a laboratory can adopt any expert system into its processes for submission of data into NDIS or the Combined DNA Index System applications, the system must first receive the approval of the NDIS board.

About the Author

Rhonda Roby has been the NEST project technical director for NIJ since the project's inception in May 2005. For the past eight years, she has worked with software development teams and evaluated expert systems for forensic DNA analysis. Roby also conducts research for the Missing Persons Program at the University of North Texas Center for Human Identification, where she focuses on automation, development of assays and procedures, and mitochondrial DNA research.



Cold Cases: Resources for Agencies, Resolution for Families

by Charles Heurich

It is 1974. The body of an 8-year-old girl who has been sexually assaulted has been found in a wooded area next to the park. The girl was last seen alive earlier that morning, leaving her house for school.

Fast forward to 2008. The case file and evidence sit in storage at a local police department. The case — never solved — continues to take a back seat to more recent cases. The family of the little girl waits and wonders if there will ever be resolution.

Every day across the U.S., investigations slow or stop completely, and cases go “cold.” Police agencies often lack the manpower, equipment and funding to support units dedicated to investigating and analyzing these cold cases. Homicide and sexual assault units are backlogged with active cases. Consequently, cold cases rarely get the attention they deserve. (See sidebar on page 21, “What Is a Cold Case?”)

The National Institute of Justice’s (NIJ) Solving Cold Cases with DNA grant program¹ helps states and local governments identify, review, investigate and analyze violent crime

cold cases — homicides and rapes — that have the potential to be solved through DNA analysis. Since NIJ issued its first solicitation for the cold case grant program in July 2004, the Institute has received more than 200 requests for funding, many from agencies trying to get cold case units started. Others have been looking for support to enhance established units — and in some cases, even to keep them in existence.

The goal of NIJ’s cold case grant program is to analyze or reanalyze evidence using modern DNA technology. In 2005, NIJ awarded a total of \$14.2 million to 38 state

and local agencies; in 2007, the Institute awarded more than \$8 million to 21 state and local agencies. Funds have been used for personnel, including overtime; equipment and supplies (both investigative and laboratory); investigative travel; training related to cold case investigation or DNA analysis; and outsourcing samples to private DNA laboratories when necessary.

The program has given agencies the opportunity to put resources toward solving homicides, sexual assaults and other violent offenses that may never have been reviewed or reinvestigated. Crime scene samples from these cases — thought to be unsuitable for testing several years ago — have yielded DNA profiles. And samples that previously generated inconclusive DNA results have been reanalyzed using newer methods.

Although complete data are still being compiled, as this issue of the *NIJ Journal* goes to press, more than 30 cases have been solved with DNA hits in the FBI's Combined DNA Index System (CODIS), which operates local, state and national databases of DNA profiles from convicted offenders, unsolved crime scene evidence, missing persons and arrestees (if state law permits the collection of arrestee samples). In addition, hundreds of probative DNA profiles — profiles that do not match the victim or any known people in the case — have been entered into CODIS, and thousands of cases have been reviewed under the program. Here are just a few stories from the field.

'It's Over'

The Palm Beach County (Fla.) Sheriff's Department, understanding the importance of having detectives dedicated to investigating cold cases, has eight full-time cold case personnel. With funding from NIJ, the unit has identified 225 cold cases to date, 89 of which have the potential to move forward for investigation or analysis because of possible biological evidence.

The department has screened nearly 700 items for biological evidence and more than

WHAT IS A COLD CASE?

The definition of a cold case varies from agency to agency. The National Institute of Justice currently defines a cold case as any case whose probative investigative leads have been exhausted. In essence, this means a case that is only a few months old may be defined as being "cold."

Attention continues to be focused on cold cases — or "historical" cases as they are called in many countries outside the U.S. — due to the popularity of television dramas and the increased involvement and public visibility of family members.

Recent advances in DNA technology also are allowing officials to take a fresh look at these cases. Short tandem repeat analysis² allows officials to test samples that, in the past, were too small to examine and to use statistics to confirm that a DNA profile belongs to one specific person. Using mitochondrial DNA,³ they can also test hairs (as the Palm Beach County Sheriff's Department did in the case of Kizzy Brooms; see main story) and unidentified remains that may accompany a cold case as evidence.

Along with these technological advances, the creation of the Combined DNA Index System (CODIS) has improved the chances of solving cold cases with DNA. Established and managed by the FBI, CODIS allows DNA profiles to be uploaded into a database and searched against other profiles at the local, state and national levels. There are two main indices in CODIS: the forensic index, which houses crime scene or evidence DNA samples, and the convicted offender index, which contains profiles for convicted offenders from all 50 states. CODIS also contains profiles of missing persons and arrestees (if state law permits the collection of arrestee samples). (For more information on CODIS, see <http://www.dna.gov> and <http://www.fbi.gov/hq/lab/html/codis1.htm>.)

1,300 stains. More than 870 of these stains have been analyzed for DNA, and 34 probative DNA profiles have been entered into CODIS. One of these profiles allowed officials to close the case of 5-year-old Kizzy Brooms, who was raped and murdered in West Palm Beach in 1985. Three hairs found on Kizzy's sweatshirt and chest were tested with newer DNA technology in 2007. The profile generated from these hairs was entered into CODIS and matched the DNA profile of a convicted offender, who had been arrested for Kizzy's murder in 1996 but was later set free after complications with evidence. When the investigator told Kizzy's mother, "It's over," she broke down and wept.

Providing 'Time and Energy'

"Having two full-time detectives and one victim advocate [in the department's cold case unit] has given us the time and energy we need to successfully review cold cases and to identify evidence that can be submitted for [DNA] testing," said Lt. Donald Gross of the Fresno (Calif.) Police Department.

The victim advocate plays an important role in Fresno's cold case unit. She offers emotional support for victims and families when they first learn their case is being reopened as well as throughout the investigation and trial. She is available to answer any questions victims and families may have, and can offer them information on financial and medical services.

To date, Fresno's cold case unit has:

- Solved or closed approximately 40 sexual assault cases.
- Written six John Doe warrants (warrants written for a person matching the DNA profile, not for a named individual).
- Four cases pending.
- Obtained two convictions.

As of December 2007, Fresno has 27 cases in CODIS waiting for matches and 51 cases waiting for DNA analysis. In addition, 131 homicides have been reviewed, and 43 either have been sent out or are waiting to be sent out for DNA testing. The unit has had three CODIS hits, one of which led to the arrest of Eddie Nealy for the murder of a 14-year-old girl who was found floating in a canal in 1985.

Successes and Challenges

The Sacramento (Calif.) Police Department is also having success with funding from the NIJ grant program. In 2003, an unknown male offered a woman a ride home, sexually assaulted her and held her captive for hours. Evidence in the case was recently reexamined, and DNA was found. A DNA profile entered into the state DNA databank matched the profile of Timothy Foy, who

was subsequently arrested for the crime and convicted in August 2007. He received 65 years to life.

But like many agencies, the Sacramento Police Department continues to face challenges, particularly on cases in which the murder victim's identity is unknown. Detectives are currently investigating two homicides with unidentified victims. Both have DNA profiles, but there are no matches in any of the databases. Detectives have conducted interviews, searched missing persons reports and worked with the local media to obtain publicity. As potential family members are located, officials will collect DNA for comparison, hoping to one day identify the murder victims.⁴

Resolution for Families

In 1992, Stacy McCall disappeared in Missouri along with two other women, Susie Streeter and Sherill Levitt. Stacy's mother, Janice McCall, is co-founder of One Missing Link, a not-for-profit service organization dedicated to reuniting the missing and their families. Having a missing loved one is "devastating," she said.

Speaking at an NIJ cold case regional training in San Diego (see related story, "Cold Cases: Strategies Explored at NIJ Regional Trainings," on page 24), McCall urged police agencies to recognize the importance of having dedicated cold case units. Borrowing officers from other units does not give cases the attention they need and, in some cases, creates shortages in other investigations, she said.

There is never "closure" for families, McCall explained, there is simply "resolution." Knowing that there is a mechanism to help fund cold case analysis can help provide some relief to families. When asked about her greatest fear, McCall responded, "There are actually two — that we will find Stacy or her remains and that we won't find Stacy or her remains." Stacy, Susie and Sherill have yet to be heard from or found.

NCJ 222903

Notes

1. Although the grant program is called Solving Cold Cases with DNA, cold “hits” — the ultimate goal — are not the only measure of success. The identification of probative DNA profiles for entry into the Combined DNA Index System (CODIS) can also be considered a major goal. Once a profile is entered into CODIS, the hit might not come for weeks, months or even years; therefore, getting a profile into CODIS (which probably would not happen without the grant program) is a win for everyone involved.
2. Short tandem repeat (STR) technology is a forensic analysis that evaluates specific regions (loci) found on nuclear DNA. STRs are multiple copies of a short identical sequence arranged in direct succession in particular regions. The variable (polymorphic) nature of the STR regions analyzed for forensic testing intensify the discrimination between DNA profiles. For example, the likelihood that any two individuals (except identical twins) will have the same 13-loci DNA profile can be as high as 1 in 1 billion. For more information, see <http://www.dna.gov>.
3. Mitochondrial DNA (mtDNA) has provided forensic scientists with a valuable tool for determining the source of DNA recovered from damaged, degraded or very small

biological samples. mtDNA is a small circular genome located in the mitochondria, which are located outside of a cell’s nucleus. Most human cells contain hundreds of copies of mtDNA genomes, as opposed to two copies of the DNA located in the nucleus. This increases the likelihood of recovering sufficient DNA from compromised DNA samples, and for this reason, mtDNA can play an important role in missing persons investigations, mass disasters and other forensic investigations involving samples with limited biological material. For more information on mtDNA, see <http://www.dna.gov>.

4. For more information on NIJ's work on helping to identify unidentified human remains, see www.namus.gov.

About the Author

Charles (Chuck) Heurich is a program manager with the Office of Science and Technology (Investigative and Forensic Sciences Division) at the National Institute of Justice. He oversees the Solving Cold Cases With DNA grants program and the training component of the President’s DNA Initiative. His career in forensic science spans more than 15 years. Heurich has also worked as a crime laboratory technician for the Baltimore City Police Department and as a forensic scientist for the Montgomery County (Md.) Crime Laboratory.

New NIJ Web Site Is Live

The National Institute of Justice’s (NIJ’s) new Web site makes it easier for you to find what you are looking for.

The site now offers:

- Hot issues of the day on the home page.
- An “I want to” section with quick links to common tasks.
- Easier ways to find your favorite topics.
- A search function on every page.
- The ability to e-mail a friend and produce printer-friendly copies of pages.

The redesign also features an updated Topics section with links to NIJ’s research portfolios.

Over the next year, NIJ will be conducting “usability tests” for the new Web site to get feedback from our visitors. The first testing session will occur at the NIJ Conference (July 21-23).

We are committed to making our Web site as easy to use as possible. New information and pages are added all the time. Check back often.

<http://www.ojp.usdoj.gov/nij>



Cold Cases: Strategies Explored at NIJ Regional Trainings

by Beth Schuster

A prisoner, up for parole in a week, is charged with raping a mother and her daughter more than 14 years ago.

Officials arrest a man for murdering 11 women between 1977 and 1993.

A man convicted of raping and murdering a 6-year-old girl is linked to an earlier sexual assault of a disabled woman.

These are just three stories shared during a series of regional cold case trainings sponsored by the National Institute of Justice (NIJ). Funded under the President's DNA Initiative and hosted by the National Forensic Science Technology Center, these trainings leverage strategies and resources to help law enforcement officers solve cold cases. During the trainings, cold case investigators share information on how to prioritize cases, conduct interviews and maximize the use of forensic technologies.

In 2007, more than 200 people participated in six NIJ-sponsored cold case trainings across the country. An expert planning group made up of law enforcement officials, forensic scientists and NIJ staff members directed development of the training topics.

In 2008, the Institute plans to hold five trainings: one under the current format and four additional trainings — complete with an interactive virtual cold case file — hosted by the Virginia Center for Policing Innovation. In addition to the trainings, which help spread promising practices from the field, NIJ has launched a multiyear effort to build, evaluate and improve the effectiveness of cold case investigations (see sidebar on page 25, "Developing an Evidence-Based Model for Cold Case Units").

According to Charles Heurich, physical scientist in NIJ's Investigative and Forensic Sciences Division, the goal of the trainings is to have an "immediate and positive impact" on the people most affected — victims and their family members. "Cold case victims are often known as the 'forgotten victims,'"

Heurich explained. “But to their families and friends, they are never forgotten.”

“You are not just solving an old rape or murder case,” he said in September 2007 at a workshop in Scottsdale, Ariz. “You are bringing answers to families.”

The Cold Case Team

A theme that echoed at the training sessions was the high value of having a full-time cold case unit within a police department. Whether the unit is made up of one detective or, as is the case in New York City, 30 detectives, it is crucial to have officers dedicated to investigating and analyzing cold cases, experts agreed.

The specific makeup of the cold case team varies from agency to agency. The Kansas City (Mo.) Police Department’s cold case squad — formed in December 2002 — consists of an experienced homicide sergeant, six senior detectives and a reserve detective. Meanwhile, the Charlotte-Mecklenburg (N.C.) Police Department has two homicide detectives, one supervisor and one FBI agent on its cold case unit. It also has a civilian review team of six volunteers who organize, review and draft summaries of cases.

Regardless of makeup, a unit’s relationship with the department is critical, said Rockne Harmon, senior deputy district attorney (retired) in Alameda County, Calif. Buy-in from the top is essential when looking to establish or maintain a cold case unit. “If the commitment doesn’t come from the top, it doesn’t come,” he added.

Greggory LaBerge, director of the Denver Police Department Crime Laboratory, noted that actively engaging crime laboratory personnel and prosecutors in the process can substantially increase the success in investigating and analyzing cold cases.

Which Cold Case?

Many departments have dozens of unsolved cold cases. The Palm Beach County (Fla.) Sheriff’s Department alone identified

DEVELOPING AN EVIDENCE-BASED MODEL FOR COLD CASE UNITS

In 2007, NIJ funded the RAND Corp. to identify factors in current cold case investigations that improve the chances of solving the crime. RAND will conduct a national survey of police and sheriffs’ departments to determine what policies and procedures are most effective in solving cold cases. RAND will also select four jurisdictions with cold case units and examine 200 cases — open and closed — per agency. It will conduct a cost-benefit analysis of cold case investigation strategies and ultimately produce an evidence-based model program for cold case units.

225-250 cold cases for review. With so many, how does an agency determine which cases to reopen?

Checklists can help a department set priorities. Factors like statutes of limitation, availability of witnesses and victims, and whether any evidence exists are assigned a point value. Cases with high point totals are considered to have a high solvability rating and thus are reopened.

The Kansas City Police Department’s checklist is separated into three categories — evidence, witnesses and suspects — each with factors that have point values. For example, evidence factors include whether the murder weapon was recovered, fingerprints were recovered and DNA analysis was requested. The factors add up to give the total “solvability” points. Such criteria and tools can help investigators whittle a large number of unsolved cases down to a more manageable number.

Asking Questions

Experts agree that once a cold case has been identified and selected for investigation, a number of questions should be considered:

- **Victim.** What were the circumstances surrounding the victim’s death? Can a motive be established for the death?
- **Witnesses.** Were there witnesses? Can they be located? If so, are they still willing to assist in prosecution? As LaBerge told participants, reinvestigating a case may cause renewed psychological trauma to the victim’s family.

INVESTIGATIVE AND FORENSIC RESOURCES

Several tools are available to support cold case units in their work.

National Crime Information Center (NCIC): This online computer and telecommunications system contains millions of property and personal records from across the U.S. During an investigation, information that cannot be obtained from an online search of NCIC may be needed. In these cases, an offline search of the database can be requested. In an offline search, personnel from the FBI's Criminal Justice Information Services can search files on boats, guns, license plates, securities, missing persons, unidentified persons, sex offenders and wanted individuals. Possible uses of an offline search include placing an individual at the scene of a crime or miles away from the scene, substantiating or discrediting an alibi, and tracking the route of an individual. For more information, see <http://www.fbi.gov/hq/cjisd/ncic.htm>.

Integrated Automated Fingerprint Identification System (IAFIS): IAFIS is a national repository of criminal history, fingerprints and photographs as well as information regarding military and select civilian employees. Maintained by the FBI, IAFIS provides positive identification based on fingerprint data (10-print and latent) and tentative identification based on person descriptors. For more information, see <http://www.fbi.gov/hq/cjisd/iafis.htm>.

National Integrated Ballistic Information Network (NIBIN): Through NIBIN, the Bureau of Alcohol, Tobacco, Firearms and Explosives deploys Integrated Ballistic Identification System equipment to federal, state and local law enforcement agencies for use in imaging and comparing crime gun evidence. The equipment allows firearms technicians to get digital images and comparisons of the markings made by a firearm on bullets and cartridge casings. If a possible match emerges, firearms examiners compare the original evidence to confirm the match. For more information, see <http://www.nibin.gov>.

"A phone call from an investigator years later may not be a welcome event," he said. To help lessen the potential impact, a victim advocate accompanies Denver investigators on visits to the family.

- **Suspects.** Were any suspects identified? If so, where are they now? Has anything occurred in the suspect's life that might now cause someone to speak out?

- **Crime scene.** The original crime scene should be revisited, if possible, and attempts should be made to reconstruct the scene. Original crime scene reports, photographs, diagrams, etc., should be reviewed.
- **Physical evidence.** Physical evidence is likely the most important consideration in a cold case investigation, according to Sgt. John Jackson, supervisor of the Kansas City Police Department's cold case squad. Some questions to be considered, he said, include: What are the benefits of reexamining evidence with new technology not available at the time of the original offense? Is the evidence still available and intact? Is proper chain of custody documented for the evidence?

Investigators are urged to study original police reports, statements by witnesses or suspects, laboratory reports, autopsy reports, and other related documents and, if possible, to locate and re-interview original police officials and personnel involved in the case. Media could also be used as a resource for getting information out to the public.

'Working for the Victims'

A large portion of NIJ's cold case training is dedicated to sharing stories from the field — not only stories about solved cases, but also stories about unsolved cases. At each training, detectives from several units present the details of cold cases on which they are currently working. The goal is to help generate new investigative strategies or leads by reviewing the cases with fellow investigators ... and ultimately to help colleagues solve cases.

"We work for the victims," Jackson said. "We speak for the victims. That's why we do what we do."

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About the Author

Beth Schuster is the managing editor of the *NIJ Journal*. In June, she received a Gold Quill Award of Excellence from the International Association of Business Communicators.

For More Information

- To learn more about NIJ's regional cold case trainings and additional training resources, see <http://www.dna.gov/training>.

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