Making Sense of DNA Backlogs — Myths vs. Reality

by Mark Nelson
About This Report

Federal funding made available by the National Institute of Justice through the DNA Initiative helped state and local governments significantly increase the capacity of their DNA laboratories between 2005 and 2008. At the same time, the demand for DNA testing continues to outstrip the capacity of crime laboratories to process these cases.

The bottom line: Crime laboratories are processing more cases than ever before, but their expanded capacity has not been able to meet the increased demand.

Definitions of backlogs

There is no industry-wide agreement about what constitutes a backlog; the National Institute of Justice defines a backlogged case as one that has not been tested 30 days after submission to the crime laboratory. Many crime laboratories, however, consider a case backlogged if the final report has not been provided to the agency that submitted the case. Which definition one uses naturally affects the count of cases backlogged.

In addition to the definition of a backlog, identifying the type of backlog is also important. This report reviews the two types of DNA backlogs found in crime laboratories: Those of forensic evidence (also called backlog of DNA cases) and the backlog of DNA samples taken from convicted offenders and/or arrestees pursuant to state statutes. This report also reviews untested forensic DNA evidence in storage in law enforcement agencies.

Nailing down exact numbers of backlogged cases is complicated by the dynamic nature of the business. Backlogs are not static. In many laboratories, new DNA submissions come in at a rate faster than case reports go out. This means that the backlog of cases pending analysis will increase. This does not mean that older cases will not be tested. Laboratories generally require more serious cases to be worked first, and the oldest cases in a backlog to be addressed before newer ones.

Why demand is increasing

The demand for DNA testing is rising primarily because of increased awareness of the potential for DNA evidence to help solve cases. The demand is coming from two primary sources: (1) the increased amount of DNA evidence that is collected in criminal cases and (2) the expanded effort to collect DNA samples from convicted felons and arrested persons.

All states and the federal government have laws that require collecting DNA from convicted offenders. The federal government also requires collecting DNA from arrestees, and there is a growing trend among states to pass legislation to collect DNA samples from arrestees.

Using federal funds to reduce backlogs

Federal funds have been used to purchase automated workstations and high-throughput instruments, hire new personnel and validate more efficient procedures. Without this funding, the backlog picture would be much worse.

NIJ has several programs to help laboratories address their workload. Some programs address overall DNA backlog reduction; others are specifically for testing samples from convicted offenders and arrestees. Some funds are used by
laboratories for in-house processing of cases. Other funds are used by laboratories to outsource the work. NIJ also funds basic research and development to enhance testing processes.

Until laboratories can meet the rising demand for DNA services and until their capacity to process samples is greater than the demand, backlogs will continue to exist and increase in proportion to the demand for services.
Making Sense of DNA Backlogs — Myths vs. Reality

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We have all seen the headlines: Thousands of rape kits in law enforcement agencies are untested; crime laboratories that have substantial backlogs of DNA cases waiting to be analyzed.

Delays in submitting evidence to a forensic laboratory as well as delays in analyzing the evidence result in delays in justice. In worst-case situations, delays can result in additional victimization by serial offenders or in the incarceration of individuals who have not committed the crime they are accused of or charged with.

Policymakers ask why DNA backlogs persist even after the federal government has provided hundreds of millions of dollars to eliminate the backlog. This is a fair question; to answer it requires understanding both what a backlog is and how backlogs can be reduced. This report addresses that question and the answers to it.

**What is — and is not — a backlogged case?**

There is no industrywide definition of a backlog. Some laboratories consider a case backlogged if the DNA has not been analyzed in 90 days. Others consider a case backlogged when the DNA has not been analyzed and the final report has not been sent to the agency that originally submitted the DNA. NIJ defines a backlogged case as one that has not been tested 30 days after it was submitted to the laboratory.

Crime laboratories have two kinds of DNA backlogs, and each has its own particular issues:

1. **Casework backlogs.** This type of backlog consists of forensic evidence collected from crime scenes, victims and suspects in criminal cases and submitted to a laboratory. Processing this type of evidence is time-consuming because the evidence must be screened to determine if, and what kind of, biological materials are present before DNA testing can even begin. Some of these samples can be degraded or fragmented and can contain DNA from multiple suspects and victims.

2. **Convicted offender and arrestee sample backlogs.** By 2009, the federal government and all 50 states had passed bills requiring collection of DNA from offenders convicted of certain crimes. In addition, the federal government and many states had also passed legislation to allow collection from people who are arrested for certain crimes.

The processing of convicted offender and arrestee samples involves the DNA testing of the samples and the subsequent review and upload of the resulting DNA profiles into the national DNA database, called CODIS (Combined DNA Indexing System), which is operated by the FBI. (See sidebar “What Is CODIS?”)

Delays in processing convicted offender and arrestee samples may occur at several stages along the way: the analysis, the review or the uploading into CODIS.
Because DNA samples taken from convicted offenders and arrestees are always collected on a standard, consistent medium (usually a paper product), they are significantly easier and faster to analyze than casework samples. The standardized collection methods used in each state for convicted offender and arrestee samples makes it possible to use automated analysis on robotic platforms that can process approximately 96 samples and controls simultaneously. In addition, the laboratory does not need to “find” the DNA, unlike the forensic casework samples.

Evidence collected from crime scenes and stored in law enforcement evidence rooms waiting to be sent to a laboratory for analysis is not defined as a crime laboratory backlog. Some of the headlines about backlogs refer to rape kits being stored in law enforcement evidence rooms. NIJ considers untested evidence awaiting submission to laboratories to be a separate and different problem from backlogs in crime laboratories. Federal programs to reduce backlogs in crime laboratories are not designed to address untested evidence stored in law enforcement agencies. Untested evidence in law enforcement custody becomes part of a crime laboratory backlog only when law enforcement agencies submit the evidence to a crime laboratory. (See page 4, “Untested Evidence in Law Enforcement Custody” for further discussion.)

**Why do backlogs continue to be a problem?**

Consider exhibit 1, “DNA Casework: Supply, Demand, Backlogs” and the story it tells about DNA backlogs in the nation’s publicly funded crime laboratories.

Each of the three graphs depicts DNA backlogs at a particular moment in time. Although the studies do not share a single
methodology (survey response rates differ, for instance), each portrays the same pattern: as new cases received by DNA laboratories continue to outpace the ability of laboratories to complete these cases, backlogs persist. Taken together, these data depict increasing laboratory capacity but also growing backlogs.

Today’s crime laboratory backlog consists of recent cases, not older cases; the backlogged cases from 2004 — when Congress passed the legislation that created the DNA Initiative — have been analyzed.

The bottom line: Crime laboratories have significantly increased their capacity to

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**Exhibit 1. DNA casework trends: Supply, demand, backlogs**

The 2005 graph is based on information from the BJS report “Census of Publicly Funded Forensic Crime Laboratories.” In that report, 124 of 187 laboratories that self-identified as handling forensic DNA contributed data. The 2007 graph is based on data reported by 153 of 154 laboratories in the study “2007 DNA Evidence and Offender Analysis Measurement: DNA Backlogs, Capacity and Funding.” Data for 2008, reported by applicants for NIJ’s 2009 DNA Backlog Reduction Program, come from 109 applicants representing 160 DNA laboratories. (State laboratory systems with multiple DNA labs or consortium applications representing more than one laboratory were asked to provide data for all labs included in the application.)

Year-end backlog numbers were computed from the information reported by laboratories: the number of cases they had at the beginning of the year plus the number of new requests they received during that year minus the number of those requests that were completed that year.

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**Sources:**


work cases, but they are not able to eliminate their backlogs because the demand outstrips the increased capacity.

Why is demand increasing?

Demand for DNA testing is rapidly increasing for many reasons:

**Increasing Awareness**—Knowledge of the potential of DNA evidence to solve cases has grown exponentially in recent years, not just among professionals in the criminal justice system but also among the general public.

**Property Crimes**—The number of property crimes being sent for DNA testing is skyrocketing, and property crimes are considerably more common than violent crime. (Most laboratories require violent crime cases to be worked before property crime cases.)

**Scientific Advances**—Thanks to scientific advances, we can test smaller DNA samples than ever before, such as for example, “touch DNA” samples, which occur when DNA is transferred by the simple touching of an object. This has led to more requests for DNA testing of guns (to find out who may have handled the weapon) and the swabbing of steering wheels from stolen cars to try to identify the last driver of the car.

**Cold Cases**—Many older and unsolved cases from the “pre-DNA” era are being reopened and subjected to DNA testing with the hope of solving them.

**Post-Conviction Testing**—Numerous older, pre-DNA cases that resulted in a conviction have been reopened so DNA testing can be done.

Crime laboratory backlogs are not static: The numbers are in constant flux as (1) laboratories increase their capacity by improving processes, getting additional or newer and faster equipment and hiring new staff, (2) more jurisdictions pass legislation to collect DNA from arrestees and (3) laboratories receive more and more requests for DNA analysis or lose trained DNA analysts.

Do the data in exhibit 1 mean that the problem of casework backlogs is getting worse instead of better? The answer is “yes” and “no.” Exhibit 1 shows that casework backlogs are increasing, but only in proportion to the increased demand for service. Crime laboratories have significantly increased their capacity to work DNA cases, but they have not been able to reduce backlogs because the increase in demand is outpacing the increases in capacity.

The good news is that thousands more cases were solved in 2008 than in 2005 as laboratories processed more DNA cases and the resulting profiles were uploaded into CODIS.

Untested evidence in law enforcement custody

The issue of untested evidence in law enforcement agencies was first measured in an NIJ-funded study published in 2009. A nationwide sample of more than 2,000 agencies found that in 2007, 14 percent of unsolved homicide cases (an estimated 3,975 cases) and 18 percent of unsolved rape cases (an estimated 27,595 cases) contained forensic evidence that was not submitted by law enforcement agencies to a crime laboratory for analysis. Serological/biological evidence and DNA were the most common forms of forensic evidence associated with these cases. Results also indicated that 23 percent of...
all unsolved property crimes (an estimated 5,126,719 cases) contained unanalyzed forensic evidence.

There are many reasons why a law enforcement agency might not submit forensic evidence to a crime laboratory for analysis. For example, subsequent investigation may show that the evidence is not probative, charges might have been dropped in the case, the case might be unfounded or a guilty plea may have already been taken.²

More research is needed to completely understand how law enforcement agencies decide to submit or not submit evidence to a laboratory, what proportion of open cases could benefit from forensic testing and how cases should be prioritized for testing.

There are several implications to the findings from the study of law enforcement forensic evidence not submitted to a laboratory:

- Law enforcement personnel may benefit from improved training on the benefits and use of forensic analysis.
- Many law enforcement agencies lack information management systems to track forensic evidence.
- There is a need for more standardized policies for evidence retention.

Submitting untested evidence in law enforcement custody for analysis could have a serious impact on DNA backlogs in crime laboratories if the evidence were suddenly submitted to a crime laboratory all at once. It would cause huge spikes in the workload and immediately drive up backlogs.

A better approach would be for investigating officers to carefully review the untested evidence and the case files to determine if forensic analysis is needed and if the laboratory would need additional elimination samples to identify suspects. Evidence may not need to be submitted, for example, in cases that have been adjudicated (either by trial or plea bargain) and in those cases where the victim has withdrawn the criminal complaint or the prosecutor has refused to file charges.

Open, active cases where the analysis of the evidence may provide important investigative leads to solve the case should be given the highest priority for submission to a crime laboratory. Evidence should be submitted gradually over time rather than all at once.

What is NIJ doing to deal with DNA backlogs?

Congress has provided hundreds of millions of dollars to reduce DNA backlogs in crime laboratories and grow the FBI’s national DNA database, called CODIS. (See sidebar “What Is CODIS?”) NIJ distributes the money through several programs that address different aspects of the backlog issues. These programs are making a big difference.

1. DNA Backlog Reduction Program. This is NIJ’s largest funding program. It provides direct grants to accredited public sector DNA laboratories. The program’s short-term goal is to reduce the backlog of untested cases by providing crime laboratories with funds to work more cases. The crime laboratories can either outsource backlogged cases to private laboratories or test more cases in-house.

The long-term goal is to build the capacity of crime laboratories by providing funds to purchase high-throughput instruments capable of processing multiple samples

Myth — Backlogs are a onetime event. As long as one chips away at the backlog of untested cases, it will eventually go away.

Reality — Backlogs are not a onetime event. They are dynamic and subject to the law of supply and demand. They may go down, but they may go up.
at the same time, automated robotic systems and laboratory information management systems to manage the data generated more efficiently. Funds can also be used to validate newer, more efficient laboratory procedures and hire additional personnel.

NIJ’s DNA Backlog Reduction Program has helped crime laboratories nationwide to reduce backlogs by 135,753 cases. It has also helped state and local DNA laboratories significantly increase their capacity to work cases between 2005 and 2008. (See exhibits 2 and 3.)

Without federal funds, there is no doubt many laboratories would not have been able to increase beyond the capacity they had in 2005.\(^3\)

Federal funds have been used to purchase automated DNA extraction robots, high-throughput genetic analyzers, expert systems to assist in the analysis of DNA profile data, and laboratory information management systems to collect, process and assimilate case data. Funds have also been used to hire and train personnel and renovate laboratory space to increase efficiency.

The degree of reliance on federal funding reported by many laboratories suggests a critical need for state and local governments to seriously evaluate investment in their own forensic crime laboratories. Without a commitment to find permanent funding solutions for crime laboratories, it is likely that laboratory dependence on federal grants will continue.

2. Convicted Offender and Arrestee Backlog Reduction Programs. The software available in CODIS allows DNA analysts to automatically check unsolved case DNA profiles against profiles of convicted offenders and arrestees stored in CODIS. When a match is made, investigators get a lead as to the potential perpetrator of an unsolved crime.

### Exhibit 2. Funding for DNA Backlog Reduction Program

<table>
<thead>
<tr>
<th>Year</th>
<th>Funding Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>$66,567,851.00</td>
</tr>
<tr>
<td>2005</td>
<td>$48,440,841.00</td>
</tr>
<tr>
<td>2006</td>
<td>$55,412,877.00</td>
</tr>
<tr>
<td>2007</td>
<td>$44,239,199.00</td>
</tr>
<tr>
<td>2008</td>
<td>$53,245,922.00</td>
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<tr>
<td>2009</td>
<td>$62,271,832.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$330,178,522.00</strong></td>
</tr>
</tbody>
</table>

### Exhibit 3. Number of cases tested with federal funds

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Cases Funded</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>29,414</td>
</tr>
<tr>
<td>2005</td>
<td>19,369</td>
</tr>
<tr>
<td>2006</td>
<td>16,057</td>
</tr>
<tr>
<td>2007</td>
<td>9,278</td>
</tr>
<tr>
<td>2008</td>
<td>30,350</td>
</tr>
<tr>
<td>2009</td>
<td>31,285</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>135,753</strong></td>
</tr>
</tbody>
</table>

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**Myth** — If we test every single backlogged case in one huge effort, then we will solve the backlog problem and will never have to deal with it again.

**Reality** — DNA backlogs will exist until the supply (capacity of the nation’s crime laboratories to test cases) surpasses demand (new service requests).
Delays and backlogs in testing convicted offender and arrestee samples and uploading their DNA profiles into CODIS limit the potential to identify suspects and may result in additional victimization by repeat offenders. Delays in uploading DNA profiles from both casework and convicted offender and arrestee samples give law enforcement fewer opportunities to get a match, identify and arrest a culprit, and prevent a future crime.

Exhibit 4 shows the status of backlogs in convicted offender and arrestee samples between 2007 and 2008.

Exhibit 4 also shows that between 2007 and 2008 the submission of new DNA samples from convicted offenders and arrestees increased. At the same time, the number of samples processed and completed decreased. This decrease may result in a rise in the number of backlogged samples at year’s end. At least another year’s worth of data is required before any trends can be established regarding backlogs of convicted offender and arrestee samples. Even with another year of data, however, trends may be hard to establish because state legislatures continue to pass laws expanding the collection of DNA and uploading of the profiles into CODIS.

The lower turnaround time for arrestee samples is directly proportional to the fact that there were fewer samples being collected from arrestees during 2008 than

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**Exhibit 4. DNA database sample backlogs trends from 2007-2008**

<table>
<thead>
<tr>
<th></th>
<th>2007 Convicted Offenders</th>
<th>2008 Convicted Offenders</th>
<th>2008 Arrestees</th>
<th>2008 Totals (Convicted Offenders + Arrestees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning backlog January 1</td>
<td>841,847</td>
<td>426,620</td>
<td>28,544</td>
<td>455,164</td>
</tr>
<tr>
<td>New receipts</td>
<td>1,021,930</td>
<td>1,267,504</td>
<td>80,609</td>
<td>1,348,113</td>
</tr>
<tr>
<td>Completed samples</td>
<td>1,206,612</td>
<td>952,039</td>
<td>57,386</td>
<td>1,009,425</td>
</tr>
<tr>
<td>Average turnaround time</td>
<td>Not available</td>
<td>153 days</td>
<td>42 days</td>
<td>Not available</td>
</tr>
</tbody>
</table>

from convicted offenders. Some of the difference may also be due to requirements mandated by some states to process arrestee samples more quickly than offender samples.

NIJ offers two programs to help laboratories reduce the backlog of convicted offender and arrestee samples:

1. **Convicted Offender/Arrestee DNA Backlog Reduction Program.** Funds from this program are delivered in the form of grants to state agencies responsible for database sample analysis. Between 2005 and 2009, NIJ made more than $32 million available to the nation’s DNA database laboratories to reduce the backlog of convicted offender and arrestee samples. See exhibit 5.

2. **Convicted Offender/Arrestee Backlog Reduction Outsourcing Program.** Funds from NIJ’s Convicted Offender/Arrestee Backlog Reduction Outsourcing Program are delivered via federal contracts to pay vendors directly for samples residing in a state’s backlog. Exhibit 6 shows funding levels by year.

Since 2005, the two programs together have provided funds to help test more than 1.6 million convicted offender and arrestee samples and have made possible more than 56,000 reviews of profiles generated from this analysis. The result has been more than 15,000 CODIS hits.

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### Exhibit 5. Funding for in-house convicted offender/arrestee backlog reduction

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<thead>
<tr>
<th>Year</th>
<th>Funding Provided</th>
</tr>
</thead>
<tbody>
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<td>2006</td>
<td>$6,669,608</td>
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<td>$5,486,756</td>
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<td>2008</td>
<td>$6,022,421</td>
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<td>2009</td>
<td>$9,178,072</td>
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<tr>
<td>Total</td>
<td>$32,103,567</td>
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### Exhibit 6. Funding for outsourcing of convicted offender/arrestee backlog reduction

<table>
<thead>
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<th>Year</th>
<th>Funding Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
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</tr>
<tr>
<td>2006</td>
<td>$9,741,077</td>
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<tr>
<td>2007</td>
<td>$7,947,984</td>
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<tr>
<td>2008</td>
<td>$790,208</td>
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<tr>
<td>2009</td>
<td>$665,104</td>
</tr>
<tr>
<td>Total</td>
<td>$21,706,478</td>
</tr>
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</table>
Making Sense of DNA Backlogs — Myths vs. Reality

AN OVERVIEW OF DNA ACTIVITIES AT NIJ

Solving Cold Cases With DNA
NIJ has a program supporting the resolution of older cold cases using DNA technologies. For more information on this program visit http://www.dna.gov/solving-crimes/cold-cases.

Missing Persons
NIJ has funded the collection and analysis of DNA from cases involving missing persons and unidentified remains, and supports laboratories that perform this type of work. For more information on this program, visit http://www.dna.gov and click on the link for Identifying Persons and Victims.

In 2007, NIJ launched the National Missing and Unidentified Persons System (NamUs). NamUs is the first national online repository designed to help medical examiners and coroners share information about missing persons and the unidentified dead. For more information on this program, or to report a missing person, visit http://www.namus.gov.

Post-Conviction Testing
Since the advent of forensic DNA analysis, a number of people convicted of crimes have been subsequently exonerated through DNA analysis of crime scene evidence that was not tested at the time of trial. To learn more about NIJ’s efforts to support post-conviction testing visit http://www.dna.gov/funding/postconviction.

Training
NIJ has supported the development of training for law enforcement officers, officers of the court and forensic DNA analysts. To review the portfolio of training opportunities, visit http://www.dna.gov/training.

Improving DNA Unit Efficiency
NIJ has supported the development of novel and innovative technologies towards improving the efficiency of DNA unit operations. To learn more about this program, visit http://www.dna.gov/funding/laboratory-efficiency.

Research and Development
NIJ uses novel ways to harness the tremendous growth in fields such as molecular biology, genetics and biotechnology, and direct it toward the development of highly discriminating, reliable, cost-effective and rapid forensic DNA testing methods. As a result, NIJ has developed technologies that have:

- Increased the success rate of the analysis of samples (such as skeletal remains) that are degraded, damaged, limited in quantity or otherwise compromised.
- Improved the examination of sexual assault evidence.
- Miniaturized the DNA testing process and made it field-portable.

For more information on NIJ’s DNA Research and Development Portfolio visit http://www.dna.gov/research.
Notes


Learn More

■ About benchmarking in forensic science laboratories:

■ About the FBI’s Combined DNA Index System (CODIS):

■ About untested evidence in law enforcement agencies:

■ About using DNA in property crimes:
About the National Institute of Justice

A component of the Office of Justice Programs, NIJ is the research, development and evaluation agency of the U.S. Department of Justice. The Institute’s mission is to advance scientific research, development and evaluation to enhance the administration of justice and public safety. NIJ’s principal authorities are derived from the Omnibus Crime Control and Safe Streets Act of 1968, as amended (see 42 U.S.C. §§ 3721–3723).

The NIJ Director is appointed by the President and confirmed by the Senate. The Director establishes the Institute’s objectives, guided by the priorities of the Office of Justice Programs, the U.S. Department of Justice, and the needs of the field. The Institute actively solicits the views of criminal justice and other professionals and researchers to inform its search for the knowledge and tools to guide policy and practice.

Strategic Goals
NIJ has seven strategic goals grouped into three categories:

Creating relevant knowledge and tools
1. Partner with state and local practitioners and policymakers to identify social science research and technology needs.
2. Create scientific, relevant, and reliable knowledge—with a particular emphasis on terrorism, violent crime, drugs and crime, cost-effectiveness, and community-based efforts—to enhance the administration of justice and public safety.
3. Develop affordable and effective tools and technologies to enhance the administration of justice and public safety.

Dissemination
4. Disseminate relevant knowledge and information to practitioners and policymakers in an understandable, timely and concise manner.
5. Act as an honest broker to identify the information, tools and technologies that respond to the needs of stakeholders.

Agency management
6. Practice fairness and openness in the research and development process.
7. Ensure professionalism, excellence, accountability, cost-effectiveness and integrity in the management and conduct of NIJ activities and programs.

Program Areas
In addressing these strategic challenges, the Institute is involved in the following program areas: crime control and prevention, including policing; drugs and crime; justice systems and offender behavior, including corrections; violence and victimization; communications and information technologies; critical incident response; investigative and forensic sciences, including DNA; less-lethal technologies; officer protection; education and training technologies; testing and standards; technology assistance to law enforcement and corrections agencies; field testing of promising programs; and international crime control.

In addition to sponsoring research and development and technology assistance, NIJ evaluates programs, policies, and technologies. NIJ communicates its research and evaluation findings through conferences and print and electronic media.