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REPORT FORENSIC SCIENCE

Fiscal Year 2014
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DNA Analysis, Capacity Enhancement
and Other Forensic Activities

By Gerald LaPorte, Heather Waltke and Charles Heurich

NIJ

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FISCAL YEAR 2014 FUNDING FOR DNA ANALYSIS, CAPACITY ENHANCEMENT AND OTHER FORENSIC ACTIVITIES

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Overview

The National Institute of Justice (NIJ) — the research, development and evaluation arm of the U.S. Department of Justice (DOJ) — is dedicated to improving the understanding of crime and justice issues through science. Since 2008, NIJ has received annual appropriations for the purposes of various DNA and other forensic science activities. This report serves to highlight activities funded under the Department of Justice Appropriations Act of 2014.¹ These purposes include support for DNA analysis and laboratory capacity enhancement as well as for forensic research, development and evaluation. These activities directly support NIJ's efforts to improve the quality and practice of forensic science. Each year, NIJ considers how to allocate these funds based on the needs of the forensic science community, the demand to increase capacity and reduce the backlog of DNA evidence awaiting testing in laboratories, NIJ Technology Working Group recommendations,² results from studies and new findings, and strategic priorities and perspectives for each of the NIJ forensic science programs.

As the federal government's lead agency for forensic science research and development and for the administration of programs to facilitate training, the improvement of crime laboratory efficiency, and the reduction of laboratory evidence backlogs, NIJ has a

prominent role in directing efforts to address the needs of the forensic science community. Assessing the needs of the forensic science community is based on gathering information from various sources, such as working groups and reports like *Strengthening Forensic Science in the United States: A Path Forward*, issued by the National Research Council of the National Academies in 2009. As an additional source of information, in 2013, the Department of Justice, in partnership with the National Institute of Standards and Technology (NIST), established the National Commission on Forensic Science (NCFS) to enhance the practice and improve the reliability of forensic science.³ This unique partnership draws upon each agency's core strengths to promote scientific validity, reduce fragmentation and improve federal coordination of forensic science. In addition to the promotion of validity and reliability of forensic sciences, the goals of the Commission articulate the necessity of identifying and assessing other needs of the forensic science community that strengthen its disciplines and meet the increasing demands generated by the criminal and civil justice systems at all levels of government.

Strengthening Forensic Science

Over the past two decades, NIJ has invested substantial resources in DNA research and development, and is now realizing the cumulative impact of these investments. DNA technology has revolutionized the ability for law

enforcement to solve crimes — as DNA technology has advanced and improved, there has been a change in how the public views the potential for wrongful convictions, how cases are investigated, how forensic evidence is interpreted, and how forensic scientists convey their findings in the criminal justice system. A sustained effort through research and development is the driving force behind the enhancement of laboratory capacity, the solving of crimes, the exoneration of the innocent, and the strengthening of the reliability of forensic science. NIJ is committed to a strategic approach that recognizes the role of research and development as a long-term solution while also addressing the immediate needs of the forensic science community. Since 2009, NIJ has supported the forensic science community with more than \$825 million awarded under various DNA capacity and other forensic science programs. This report will highlight the impact these efforts have had on the criminal justice system.

Grants, Contracts and Interagency Agreements

The FY 2014 Department of Justice Appropriations Act included \$117 million in appropriations “for a DNA analysis and capacity enhancement program and for other local, state and federal forensic activities, including the purposes authorized under section 2 of the DNA Analysis Backlog Elimination Act of 2000 [the Debbie Smith DNA Backlog Grant Program].”⁴ From the appropriation, \$104.3 million was available to NIJ to award grants, contracts and interagency agreements in three broad categories to support:⁵

- Research, Development, Testing and Evaluation
 - Research and Development in Forensic Science for Criminal Justice Purposes
 - OIFS Graduate Research Fellowship for science, technology, engineering and mathematics recipients
 - Forensic Technology Center of Excellence
 - Reimbursable interagency agreements with federal partners⁶
- Direct Funding for, or in Support of, State and Local Police Departments and Crime Laboratories

- DNA Capacity Enhancement and Backlog Reduction Program
- Solving Cold Cases With DNA
- DNA Arrestee Collection Process Implementation Program
- Technical Assistance
 - National Missing and Unidentified Persons System
 - Other training and technical assistance

Of the \$104.3 million, approximately 74 percent went directly to support publicly funded crime laboratories, law enforcement agencies and police departments to reduce the number of forensic DNA and DNA database samples awaiting analysis, to solve cold cases using DNA evidence, and to support the identification of missing persons. Approximately 21 percent funded DNA and other forensic sciences research and development, and 5 percent funded technical assistance to enhance the use of DNA and other forensic sciences in the criminal justice system. (See Figure 1, Distribution of Funds.)

1. Research, Development, Testing and Evaluation

NIJ affirms that scientific advancements and technological breakthroughs are essential to the continued growth and strengthening of the forensic sciences. Since 2009, guided by its core team of staff scientists, NIJ’s funding has supported more than 300 research and development awards related to forensic science, totaling more than \$125 million. These projects have resulted in more than 290 scientific publications, 760 presentations and 90 technical reports.

Research and Development in Forensic Science for Criminal Justice Purposes

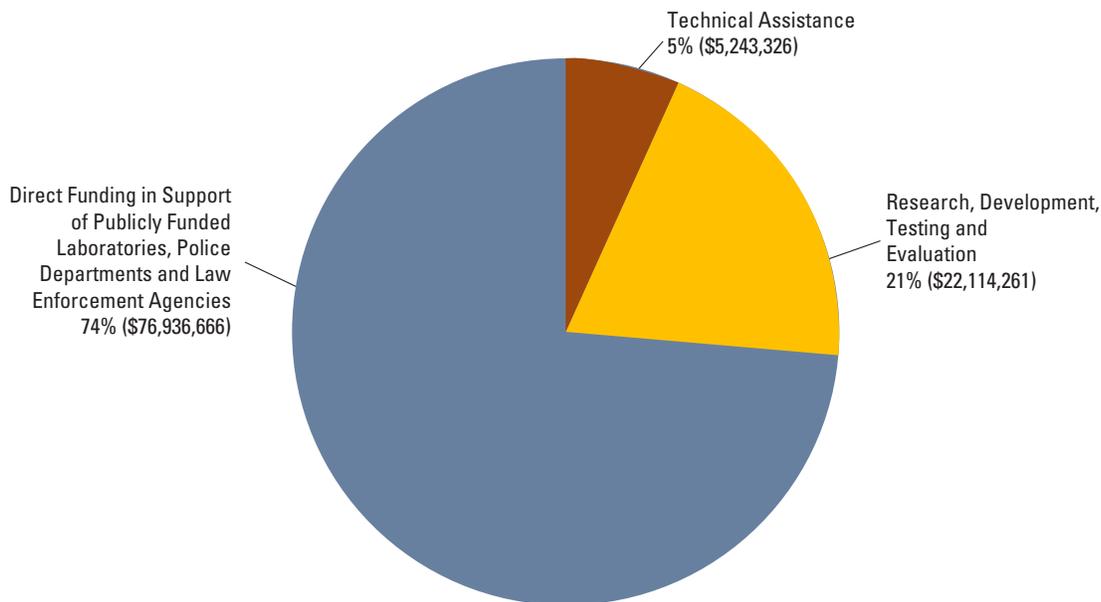
In 2009, NIJ announced the creation of a Fundamental Forensic Science Research program⁷ to supplement NIJ’s existing research and development program, with a specific focus on improving the understanding of the accuracy, reliability and measurement validity of forensic science disciplines. Proposals supported through this program were designed to expand the scientific bases of forensic methods, develop quantifiable measures of the

reliability and accuracy of forensic analyses, and facilitate a greater understanding of human factors that may affect forensic analyses and interpretation of results. In 2011, to further support research in the physical, life and cognitive sciences underlying the forensic science disciplines, NIJ created the Basic Scientific Research solicitation⁸ while focusing its applied research and development mission in a separate, concurrent solicitation.⁹ The difficulty of distinguishing truly basic scientific research from early-stage applied research in the inherently applied field of forensic sciences resulted in the receipt of fewer high-quality basic research proposals than anticipated.

In 2014, a strategic decision was made to invite both areas of research through a single solicitation, thereby eliminating the ambiguity of whether an application qualified as basic or applied research. This allowed for a larger and more diverse pool of proposals for peer review and allowed NIJ to facilitate a more streamlined and efficient mechanism for internal proposal review.

Although NIJ has mission-specific research goals, the agency has a more limited source of funding for research and development projects than other federal agencies like the National Science Foundation (NSF) and the

Figure 1. Distribution of Funds¹⁰



Categories of support		
74%	Direct Funding in Support of Publicly Funded Laboratories, Police Departments and Law Enforcement Agencies	
	<ul style="list-style-type: none"> ■ DNA Capacity Enhancement and Backlog Reduction Program ■ Solving Cold Cases With DNA Funding Program ■ DNA Arrestee Collection Process Implementation Grants Program 	
5%	Technical Assistance	
	<ul style="list-style-type: none"> ■ National Missing and Unidentified Persons System ■ Other Training and Technical Assistance 	
21%	Research, Development, Testing and Evaluation¹¹	
	<ul style="list-style-type: none"> ■ Research and Development in Forensic Science For Criminal Justice Purposes ■ Graduate Research Fellowship Program in Science, Technology, Engineering and Mathematics ■ Forensic Technology Center of Excellence ■ Reimbursable agreements with federal partners 	

National Institutes of Health (NIH), which already invest substantially in broad-ranging basic scientific research. To capitalize on these existing federal resources, in 2014, NIJ built upon a memorandum of understanding with NSF and established a reimbursable agreement allowing NIJ to cofund NSF projects of mutual interest that are focused specifically on strengthening forensic sciences. It also affords NIJ access to existing, time-tested NSF programs and expertise. In particular, in 2014, NIJ and NSF cosponsored the initiation of an Industry/University Cooperative Research Center (I/UCRC) for forensic science research.¹²

NIJ made 47 awards totaling \$17,203,742.*

- Research and Development in Forensic Science for Criminal Justice Purposes solicitation, <https://www.ncjrs.gov/pdffiles1/nij/SL001082.pdf> (PDF, 31 pages)
- Research and Development in Forensic Science for Criminal Justice Purposes Awards (go to www.NIJ.gov and search keywords “Forensics Funding History”)

Graduate Research Fellowship in Science, Technology, Engineering and Mathematics (GRF-STEM)

As an applied science, forensic science requires a constant influx of talented researchers interested in bringing their expertise to bear on current forensic science problems. In recognition of the crucial role that education plays in the long-term development of a scientific human infrastructure, NIJ has embarked on an initiative to increase support to researchers newly engaged in work relevant to the forensic sciences. Although NIJ has maintained a Graduate Research Fellowship (GRF) program for decades, it had been underused by students in the natural sciences and engineering, a fact that was especially noticeable in recent years in relation to NIJ’s investments in investigator-driven research and development awards.

To correct this imbalance, in FY 2014, NIJ established a separate Graduate Research Fellowship in Science, Technology, Engineering and Mathematics (GRF-STEM) program to specifically support and engage new or up-and-coming researchers in STEM fields who are contributing to forensic science, public safety and criminal justice research. With improved fellowship packages to become competitive with other federal agencies’ programs, and with increased outreach efforts to promote the program more broadly, NIJ aims to expand the program significantly in the near future. In the first year of the new GRF-STEM program, NIJ made three awards totaling \$86,489 to support the activities of three fellows.

- NIJ Graduate Research Fellowship Program in Science, Technology, Engineering and Mathematics solicitation, <https://www.ncjrs.gov/pdffiles1/nij/SL001079.pdf> (PDF, 24 pages)
- NIJ Graduate Research Fellowship Program in Science, Technology, Engineering and Mathematics awards (go to www.NIJ.gov and search keywords “Forensics Funding History”)

Forensic Technology Center of Excellence (FTCoE)

NIJ funds the FTCoE as part of its ongoing strategy to strengthen the reliability and efficiency of forensic evidence processing, including the evaluation of new methods and technologies that emerge as a result of research and development. Through this collaborative partnership between RTI International and its academic partners (Duquesne University, Virginia Commonwealth University, and the University of North Texas Health Science Center), the FTCoE supports NIJ’s research and development programs and provides testing, evaluation and technology assistance to forensic laboratories and practitioners in the criminal justice community. One primary goal of the FTCoE is the transition of forensic science technologies into practice to increase utility in labs as well as facilitating the effective use of new and innovative techniques and methods for processing and testing forensic evidence.

*Funding for research and development was supplemented from other NIJ resources in addition to the appropriation for DNA and other forensics.

Strategies in technology transition for labs include identification of sites for testing, evaluation and demonstration of tools and methods as well as the development of test and evaluation plans or protocols for specific technologies. Other tasks have included the development of a process for identification of criminal justice technology requirements and for technical assistance and related training plans. Further, as a means to facilitate access to the information generated from these efforts, the FTCoE has developed and hosted webinars, policy forums, curricula, seminars and workshops, both web-based and onsite, to allow practitioners a variety of options to access materials. Additional mechanisms have included a network of outreach and dissemination tools as well as various reports and articles pertaining to the forensic science community.

As part of NIJ's strategy, these efforts allow the FTCoE to assist in increasing the ability of state and local law enforcement to effectively and professionally serve the public in matters involving forensic science, crime and public safety. For example, in 2014, the FTCoE participated in numerous activities and supplied NIJ with deliverables to help further its strategy, including the development of its report on *NIJ Portfolio Management and Technology Transition Support*. The document was created by the FTCoE to understand further the utility of processes involved in developing and managing the NIJ forensic research and development portfolio as well as enabling the use of NIJ research and development technology solutions in the forensic science community.

For more information on this and other reports, workshops and educational opportunities, please visit www.forensiccoe.org.

2. Direct Funding for, or in Support of, State and Local Police Departments and Crime Laboratories

DNA Capacity Enhancement and Backlog Reduction Program

Approximately three-quarters of the DNA and other forensic sciences appropriation available for grants went directly to support of publicly funded crime laboratories, police departments or law enforcement agencies to

process cases and database samples submitted for DNA analysis, and to improve case-processing infrastructure by enhancing capacity.

The DNA Capacity Enhancement and Backlog Reduction program is a critical resource for laboratories. Laboratory capacity is enhanced with increased and improved automation, hiring of more personnel, use of overtime and improved testing procedures and methods, all of which this NIJ program supports; however, demand for DNA testing continues to outpace enhancements in capacity.¹³ This program makes awards to states and units of local government with existing crime laboratories to enhance DNA laboratory capacity and to reduce the number of forensic DNA and DNA database samples awaiting analysis using DNA technologies. At the same time, innovation through research and development is a driving force behind reducing the backlog of DNA evidence awaiting testing in labs and enhancing laboratory capacity, and NIJ is committed to a strategic approach that facilitates the use of research and development as a long-term solution to reducing these backlogs.

For example, states and units of local government may use this funding to process, record, screen and analyze forensic DNA and DNA database samples and to improve the infrastructure and analytical capabilities of their laboratories so they can process DNA samples more efficiently and cost effectively. This program contributes to these agencies' capacity to reduce the number of forensic DNA and DNA database samples awaiting analysis for potential inclusion in the Combined DNA Index System (CODIS).

Laboratories funded under the DNA Capacity Enhancement and Backlog Reduction program as it stands today, as of the reporting period ending December 31, 2013, reported processing more than 550,000 cases since 2005. From those cases, more than 247,000 DNA profiles have been uploaded to CODIS, resulting in more than 92,000 CODIS hits.¹⁴ In addition, more than 2,000,000 database (convicted offender and arrestee) samples have been uploaded, resulting in an additional 26,687 hits.

In September 2014, NIJ convened a meeting with crime laboratory directors from various regions across the

United States to gather information on strengthening the DNA Capacity Enhancement and Backlog Reduction and Paul Coverdell Forensic Science Improvement Grants programs. The focus of this meeting was to facilitate discussions related to these two programs, which are considered to be two critical sources of funding for laboratory operations. As discussed in the report, the impetus of the meeting originated from internal discussions to develop new strategies for strengthening the DNA and Coverdell programs and to focus efforts on evaluating performance measures that accurately reflect the impact of the programs.¹⁵

Laboratory directors in attendance resoundingly voiced that this program was critical to their ongoing operations. Participants agreed that, without these funds, the ability to enhance capacity and reduce DNA backlogs would be compromised severely. The program also allows for training of lab personnel, which the directors also agreed is vital to retaining personnel and expanding the knowledge base of DNA analysts. The group also expressed the importance of measuring increased capacity, and not necessarily focusing performance metrics on backlog reduction at specific points in time, because a laboratory's "backlog" is constantly changing and highly dependent on the amount of evidence submitted. NIJ made 122 awards totaling \$71,578,465.

- DNA Capacity Enhancement and Backlog Reduction Program solicitation, <https://www.ncjrs.gov/pdffiles1/nij/SL001112.pdf> (PDF, 28 pages)
- DNA Capacity Enhancement and Backlog Reduction Program awards (go to www.NIJ.gov and search keywords "Forensics Funding History")

Solving Cold Cases With DNA

NIJ decided in FY 2013 to begin announcing requests for grant proposals for the Solving Cold Cases With DNA program and Using DNA Technology to Identify the Missing in alternate years. In addition to some similarities between cold cases and missing persons cases, the rationale for alternating these programs stems from several different reasons, and offering these programs every other year allows for a more competitive applicant pool. This also allows NIJ additional time to assess the

projects to make impactful changes to these programs if they are needed.

The Solving Cold Cases With DNA program makes awards to states and units of local government to identify, review and investigate Uniform Crime Report (UCR) Part 1 Violent Crime "cold cases" that have the potential to be solved using DNA analysis, and to locate and analyze the biological evidence associated with these cases. NIJ's goal is to make funding available to states and units of local government for projects that will address all three of the following purpose areas: case review, location of evidence, and DNA analysis of biological evidence.

The Solving Cold Cases With DNA program has been a tremendous success since its inception and has had an impact by giving law enforcement agencies resources focused specifically on cold case investigations. By using this additional funding, agencies have solved cases where all significant leads had previously been exhausted and investigations were at a standstill. In turn, the program can help give the public a greater sense of trust in law enforcement agencies and their dedication to solving all cases, regardless of age or complexity. Since 2005, more than 129,000 cases have been reviewed, resulting in more than 5,000 CODIS uploads and more than 1,900 CODIS hits, and more than 2,000 cases have been closed or solved due to work under this program. NIJ made 25 awards totaling \$4,742,222.

- Solving Cold Cases With DNA solicitation, <https://www.ncjrs.gov/pdffiles1/nij/SL001117.pdf> (PDF, 23 pages)
- Solving Cold Cases With DNA awards (go to www.NIJ.gov and search "Forensics Funding History")

DNA Arrestee Collection Process Implementation Grants Program

In 2014, NIJ issued a new solicitation that sought applications for funds to assist states having designated DNA database laboratories with the costs associated with the implementation of DNA arrestee collection processes, in keeping with the purposes of the Katie Sepich Enhanced DNA Collection Act of 2012 (Public Law 112-253), thereby helping to improve the capacity of

laboratories that conduct DNA analysis of DNA database samples. NIJ made two awards totaling \$615,980.

- DNA Arrestee Collection Process Implementation Grants Program solicitation, <https://www.ncjrs.gov/pdffiles1/nij/SL001115.pdf> (PDF, 25 pages)
- DNA Arrestee Collection Process Implementation Grants Program awards (go to www.NIJ.gov and search keywords “Forensics Funding History”)

3. Technical Assistance

National Missing and Unidentified Persons System (NamUs)

NamUs is a centralized national repository and resource center for locating and identifying missing persons and for unidentified decedent cases. NamUs is a free online system of databases that can be searched by medical examiners, coroners, law enforcement officials and the general public who are trying to resolve these cases. NamUs has become an integral case management system for these specialized user groups at the national level. In FY 2014, NIJ awarded \$3,500,000 to the University of North Texas Health Science Center (UNTHSC) to continue administration and management of NamUs.

Since its development in 2007, NamUs has helped to resolve nearly 400 unidentified person and 850 missing person cases. The NamUs Missing Person website alone has received almost 9 million visitors and approximately 21,000 missing person reports, and its Unidentified Person website has received almost 3 million visitors and almost 12,000 unidentified person reports, with new cases being added weekly.

- NamUs solicitation (issued in FY 2011), <https://www.ncjrs.gov/pdffiles1/nij/sl000951.pdf> (PDF, 18 pages)
- <https://www.NamUs.gov>

Summary

Since 2009, NIJ has remained committed to a strategy that couples rigorous research and development with capacity enhancement and technical assistance programs to serve the forensic science community. This approach not only provides the forensic science field with new tools,

techniques and evidence-based research but also assists directly with increasing the nation’s crime laboratory capacity through the adoption of new technologies, leading to reductions of evidence backlogs throughout the country. NIJ’s capacity building and technical assistance programs have contributed to hundreds of thousands of CODIS uploads, resulting in thousands of cases being closed or solved. Programs such as these provide an immediate impact for our nation’s forensic laboratories. Coupled with technical assistance to facilitate implementation of scientific advances, and the use of robust research and development to build a solid foundation, this comprehensive approach will create long-term success and ultimately improve public safety.

Endnotes

1. <https://www.congress.gov/113/plaws/publ76/PLAW-113publ76.htm>.
2. Learn more about NIJ Technology Working Groups at <https://www.NIJ.gov>, keyword “Forensic Science Technology Working Group.”
3. <http://www.justice.gov/ncfs>.
4. Public Law No. 113-76, 128 Stat. 5, 62-63.
5. The total amount available to NIJ for obligation for programs was reduced by assessments for management and administration and for costs such as peer review of grant applications.
6. NIJ maintains reimbursable agreements with the National Science Foundation (NSF) and the Defense Forensics & Biometrics Agency (DFBA) to fund research and development-related activities.
7. <https://www.ncjrs.gov/pdffiles1/nij/sl000878.pdf>.
8. <https://ncjrs.gov/pdffiles1/nij/sl000945.pdf>.
9. <https://ncjrs.gov/pdffiles1/nij/sl000944.pdf>.
10. Approximately \$1.73 million was used toward direct funding in support of publicly funded laboratories, police departments and law enforcement agencies, research, development technology and evaluation, and technical assistance in the form of activities such as the cost of printing and distributing forensic reports and handbooks, hosting and maintaining websites, supporting the National Criminal Justice Reference Service (NCJRS), and providing technical assistance to ensure awardee compliance with the National Environmental Policy Act (NEPA), among others.

11. Research, development, technology and evaluation programs in forensic science received an additional \$4.8 million from other funding sources within NIJ to supplement projects for research and development in forensic science.

12. <http://www.nsf.gov/pubs/2014/nsf14066/nsf14066.jsp>.

13. Nelson, Mark, Ruby Chase, and Lindsay DePalma, *Making Sense of DNA Backlogs, 2012 — Myths vs. Reality*, National

Institute of Justice, Washington, D.C., December 2013, NCJ 243347, <http://nij.gov/publications/pages/publication-detail.aspx?ncjnumber=243347>.

14. These data are based on metrics reported in semiannual grant progress reports.

15. <https://www.ncjrs.gov/pdffiles1/nij/grants/248540.pdf>.

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