A Review of NIJ and NIST Collaborative Research & Development Efforts

Gerry LaPorte
Director
Office of Investigative & Forensic Sciences
National Institute of Justice
NIJ: Office of Investigative & Forensic Sciences

- Lead federal agency for forensic science research and development as well as the administration of programs to improve laboratory efficiency, reduce backlogs, and provide technical assistance.
- NIJ administers two critical forensic science research and development solicitations.

The U.S. Department of Justice (DOJ), Office of Justice Programs (OJP), National Institute of Justice (NIJ) is seeking applications for funding of basic or applied research and development in forensic science for criminal justice purposes. This program furthers the Department’s mission by sponsoring research to provide objective, independent, evidence-based knowledge and tools to meet the challenges of criminal justice, particularly at the state and local levels. NIJ’s Forensic Science Technology Working Group (TWG) identifies current technology challenges encountered in operational forensic science laboratories. Research-based knowledge and newly developed tools that work towards resolving these identified challenges facilitate the criminal justice community to enforce the law, ensure public safety, prevent and control crime, and ensure fair and impartial administration of justice.

Research and Development in Forensic Science for Criminal Justice Purposes

The U.S. Department of Justice (DOJ), Office of Justice Programs (OJP), National Institute of Justice (NIJ) is seeking applications for research and evaluation studies to produce practical knowledge that has the potential to improve the examination and interpretation of physical evidence in forensic science laboratories. This program furthers the Department’s mission by sponsoring research to provide objective, independent, evidence-based knowledge and tools to meet the challenges of criminal justice, particularly at the State and local levels.

Research and Evaluation for the Testing and Interpretation of Physical Evidence in Publicly Funded Forensic Laboratories

#NISTForensics
Over $265 million in Forensic Science R&D

Post 2009 NAS Report: Forensic Science R&D

NIJ Forensic Science R&D Funding 2009 – 2018

Fiscal Year

$ (Millions)
Strengthening the Forensic Sciences

• NIJ and NIST have forged a critical research and development collaboration with the objective of strengthening the forensic sciences.

• Since 2009, NIJ has provided over $13 million in funding to NIST to support forensic science projects.
## Examples of Competitively Awarded Projects to NIST

<table>
<thead>
<tr>
<th>Title</th>
<th>Award Number (IAA)</th>
<th>PI</th>
<th>Year Applied</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Measures for Footwear Impression Comparisons</td>
<td>DJO-NJ-17-R0-0202</td>
<td>Martin Herman</td>
<td>FY 2017</td>
<td>$598,315</td>
</tr>
<tr>
<td>A Metrology Foundation for 3D Ballistics Imaging</td>
<td>2016-DNR-6257</td>
<td>Michael Stocker</td>
<td>FY 2016</td>
<td>$534,500</td>
</tr>
<tr>
<td>Firearm Toolmark Population Statistics for Objective Identification and Error Rate Estimation</td>
<td>2016-DNR-6257</td>
<td>Alan Zheng</td>
<td>FY 2016</td>
<td>$367,863</td>
</tr>
<tr>
<td>Reference Ballistic Toolmark Database for Research and Development of Identification Systems and Confidence Limits</td>
<td>2013-R2R-4843</td>
<td>Alan Zheng</td>
<td>FY 2013</td>
<td>$534,093</td>
</tr>
</tbody>
</table>
NIST Ballistics Toolmark Research Database (NBTRD)

Open-access research database of bullet and cartridge case tool mark data

Developed to:

• foster the development and validation of measurement methods, algorithms, metrics, and quantitative confidence limits
• improve the scientific knowledge base on the similarity of marks
• ease the transition to 3D surface topography data

https://tsapps.nist.gov/NRBTD/
NIST Ballistics Toolmark Research Database (NBTRD)

- Initiated by Interagency Agreement (IAA 2013-R2R-4843; PI Alan Zheng)
- Competitively reviewed and awarded by phased funding.
- Competitively renewed in 2016 and 2018
- Key central figure in recent 3D firearms imaging implementation w/ Cadre Forensics, FBI Lab & others

https://tsapps.nist.gov/NRBTD/
A Metrology Foundation for 3D Ballistics Imaging

Competitively reviewed and awarded via IAA (2016-DNR-6257; PI Michael Stocker)

Tasks include:

1. Develop protocols for calibration and process control
2. Design reference standards
3. Fabricate prototypes
4. Test and validate
5. Demonstrate implementation in commercial systems

Forensic Topography and Surface Metrology

- The congruent matching cells (CMC) method is used for firearm identification
- Error rates are estimated by modeling the results with theoretical distributions
- Models for one set of cartridge cases were successfully applied to a larger set
- After further study it should be possible to scale the method to real casework

NIST Applied Genetics Group (2016-DNR-6150)

- Efforts to assess Next Generation Sequencing (NGS) technologies for forensic DNA analysis
  - Evaluation of commercially available and beta version assays and software for NGS of forensic samples
  - Characterization of noise and artifacts in NGS workflows
  - Development of NGS nomenclature framework
    - Creation of STR sequence records for upload to NCBI
    - Development of user interface tools hosted by NIST

Battelle Releases Results of NIJ Study of MPS Forensic Methods

COLUMBUS, Ohio (June 26, 2017)—Massively parallel sequencing (MPS) technologies, also referred to as Next Generation Sequencing (NGS), just got a lot closer to implementation in crime labs. A Battelle study for the National Institute of Justice (NIJ) demonstrates that the technology provides the accuracy, reproducibility and sensitivity needed to support forensic investigations.
Evidence Management: Best Practices for Handling, Preservation, Retention & Tracking

- State of the Industry Report
  - Summary of survey of property and evidence (P&E) units.
  - Case studies of P&E rooms that have implanted new tracking technologies.
  - Summary of evidence retention legislation.
  - Summary of P&E room policies.
  - Recommendations and implementation strategy.
- Evidence Management Symposium
- Digital Evidence Preservation and Retention Recommendations Report
Human Factors Series in Forensic Sciences

• To convene a series of expert panels to examine human factors in forensic analyses and develop practice to reduce the likelihood of error.

• Project Objectives:
  – Conduct a scientific assessment of the effects of human factors on forensic analyses.
  – Review current practices.
  – Evaluate new/emerging methodologies, technologies, and standards.

• Upcoming Projects
  – Human factors in handwriting analysis (near completion)
  – Human factors in DNA mixture interpretation
  – Human factors in firearms examinations
Thank you!

Gerry LaPorte

gerald.laporte@usdoj.gov