NIST
National Institute of Standards and Technology
U.S. Department of Commerce

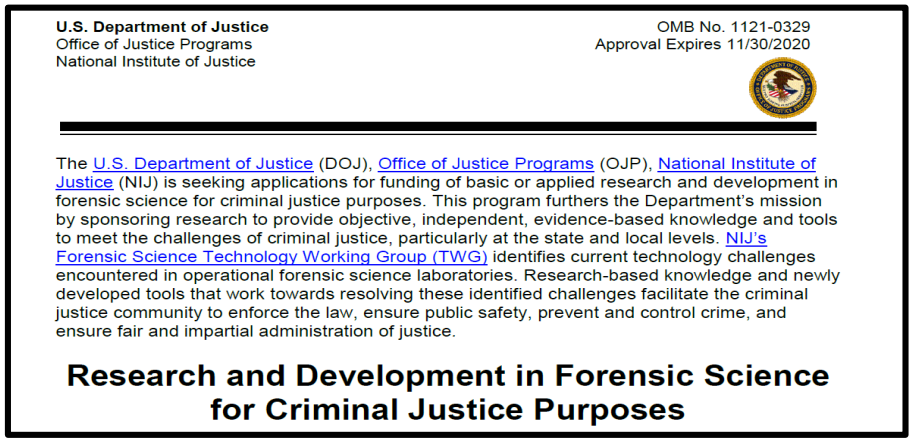
FORENSICS @ NIST | #NISTForensics

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.

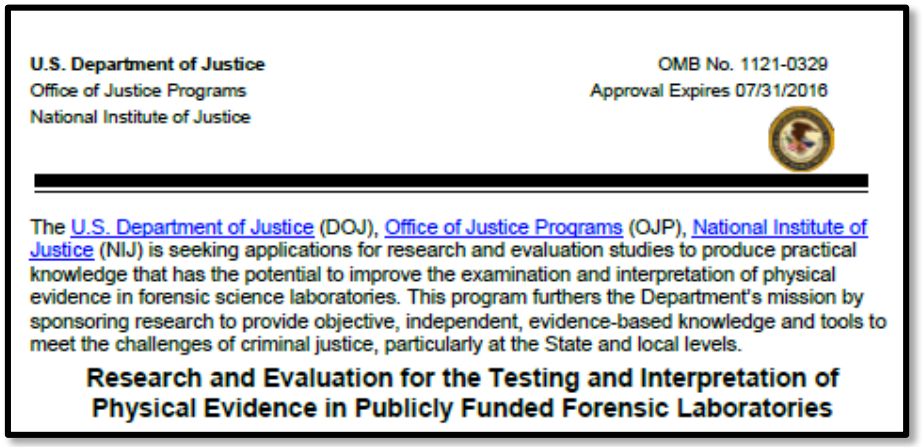


U.S. Department of Justice
Office of Justice Programs
National Institute of Justice

OMB No. 1121-0329
Approval Expires 11/30/2020

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



U.S. Department of Justice
Office of Justice Programs
National Institute of Justice

OMB No. 1121-0329
Approval Expires 07/31/2016

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

Over $265 million in Forensic Science R&D

Projects Funded by NIJ Awards

- Fiscal Year 2018
- Fiscal Year 2017
- Fiscal Year 2016
- Fiscal Year 2015
- Fiscal Year 2014
- Fiscal Year 2013
- Fiscal Year 2012
- Fiscal Year 2011
- Fiscal Year 2010
- Fiscal Year 2009
- Fiscal Year 2008

Awards Related to: Forensic Research and Development

Number of Awards: 702

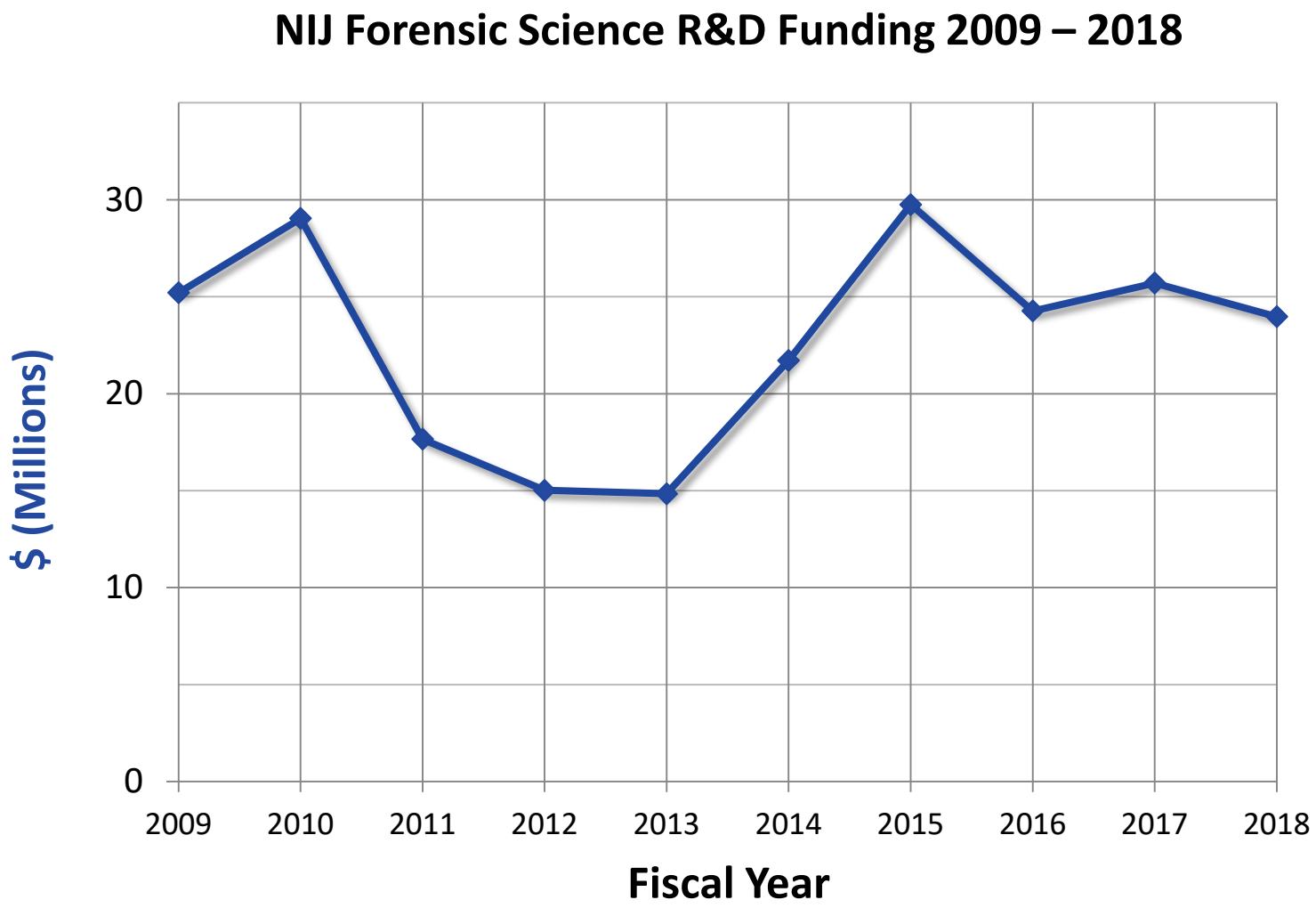
Total Amount Awarded: $265,070,924

Show 25 entries Filter: ◂ Previous Next ▸

Award Title	Awardee	Award Number	Amount	State	Status	Fiscal Year
Physics and Statistical Models for Physical Match Analysis Utilizing 3D Microscopy of Fracture Surfaces	Iowa State University of Science and Technology	2018-R2-CX-0034 (0)	$681,664	IA	Open	2018
Physical Characteristics of Spatter Stains on Textiles: Influence of Impact Surface Texture, Blood Drop Volume and Blood Drop Velocity	North Carolina State University	2018-R2-CX-0033 (0)	$272,463	NC	Open	2018
Development of CFAST Based Fire Simulation Toolkit for Fire Investigators	Southwest Research Institute	2018-R2-CX-0032 (0)	$487,386	TX	Open	2018
Evaluation of Terrestrial and Aerial Remote Sensing with Small Unmanned Aircraft Systems (SUAS) for Forensic Crime-Scene Reconstruction	Kansas State University	2018-R2-CX-0031 (0)	$91,416	KS	Open	2018
Autosomal DNA-STR Profiling of Directly Captured Spermatozoa from Post-Coital (3-10 Days) Cervico-Vaginal Samples	University of Central Florida Board of Trustees	2018-NE-BX-0001 (0)	$600,704	FL	Open	2018

https://www.nij.gov/funding/awards/pages/awards-list.aspx?tags=Forensic%20Research%20and%20Development

Post 2009 NAS Report: Forensic Science R&D



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

Title	Award Number (IAA)	PI	Year Applied	Amount
Establishing a National Firearms and Toolmark Statistical Background Population for Calculation of Error Rates	2016-DNR-6257	Alan Zheng	FY 2018	$550,615
Quantitative Measures for Footwear Impression Comparisons	DJO-NIJ-17-R0-0202	Martin Herman	FY 2017	$598,315
A Metrology Foundation for 3D Ballistics Imaging	2016-DNR-6257	Michael Stocker	FY 2016	$534,500
Firearm Toolmark Population Statistics for Objective Identification and Error Rate Estimation	2016-DNR-6257	Alan Zheng	FY 2016	$367,863
Reference Ballistic Toolmark Database for Research and Development of Identification Systems and Confidence Limits	2013-R2R-4843	Alan Zheng	FY 2013	$534,093

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

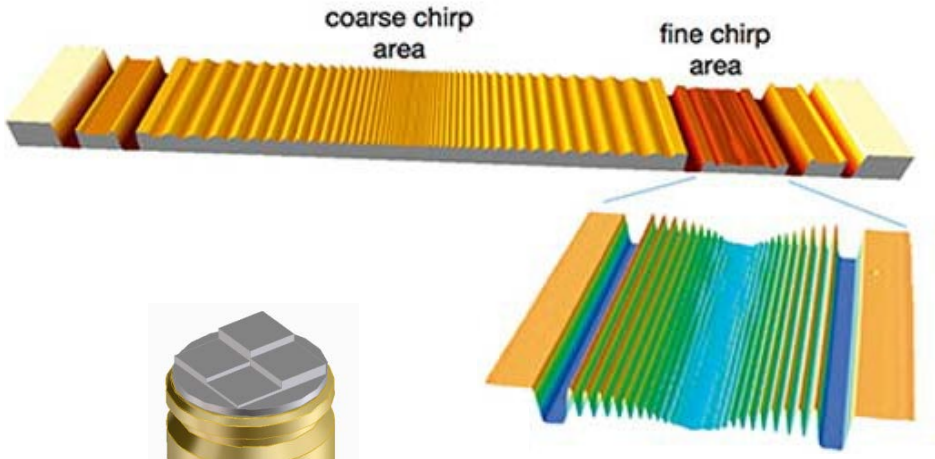
https://tsapps.nist.gov/NRBTD/

A Metrology Foundation for 3D Ballistics Imaging

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

Tasks include:

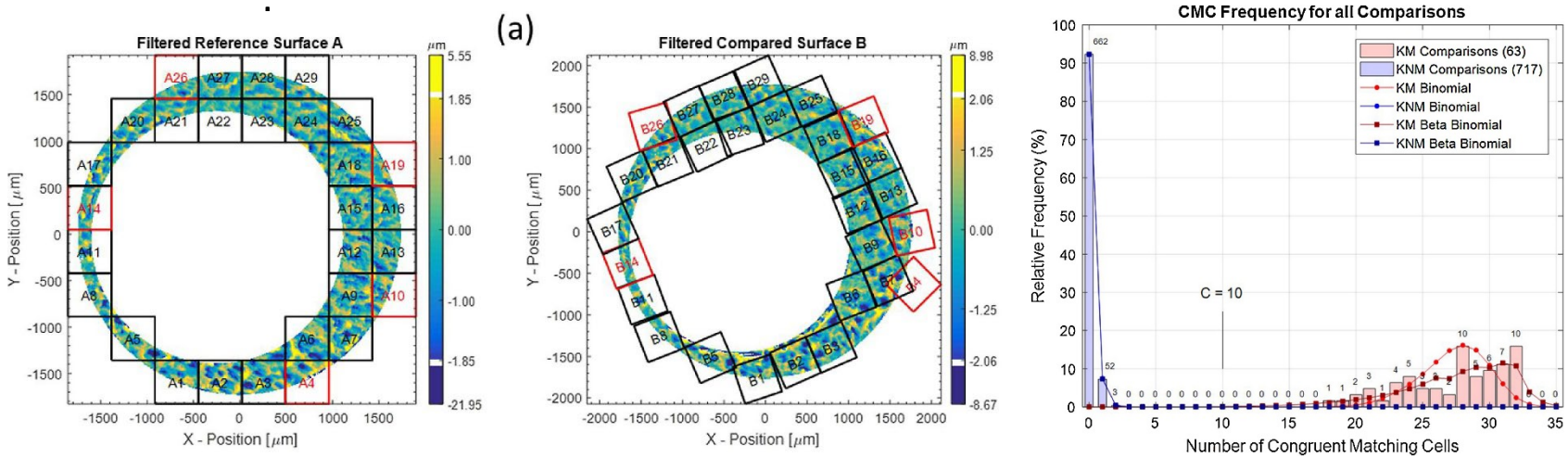
1. Develop protocols for calibration and process control
2. Design reference standards
3. Fabricate prototypes
4. Test and validate
5. Demonstrate implementation in commercial systems



https://www.nist.gov/programs-projects/forensic-topography-and-surface-metrology

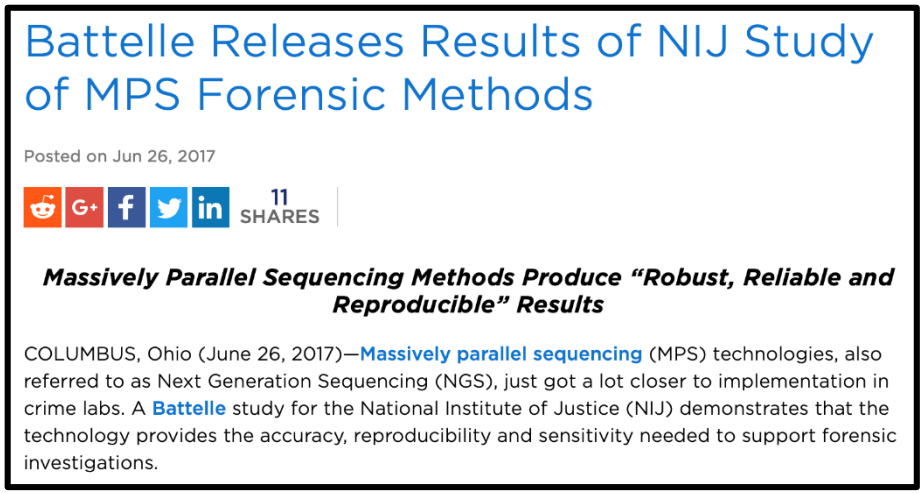
Forensic Topography and Surface Metrology

- 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



Song, J. , et al. (2018), Estimating error rates for firearm evidence identifications in forensic science, FSI, 284: 15-32. doi.org/10.1016/j.forsciint.2017.12.013

NIST Applied Genetics Group (2016-DNR-6150)



Battelle Releases Results of NIJ Study of MPS Forensic Methods

Posted on Jun 26, 2017

11 SHARES

Massively Parallel Sequencing Methods Produce "Robust, Reliable and Reproducible" Results

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.

- 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

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