

# **Expanding Social Science Research to Examine the Impacts of Forensic Science on the Criminal Justice System**

November 10, 2020  
1:00 – 3:00 p.m.



**NIJ**

# Expanding Social Science Research to Examine the Impacts of Forensic Science on the Criminal Justice System:

The Next Chapter of the NIJ Social Science Research on Forensic Science Portfolio:  
Moving from DNA to a Systems Approach to Forensic Science

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# Expanding Social Science Research to Examine the Impacts of Forensic Science on the Criminal Justice System

## Presenters:

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**Kevin J. Strom, PhD**

Director, Center for Policing Research & Investigative Science, RTI International

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Research Forensic Scientist, Associate Director of NIJ Forensic Technology Center of Excellence (FTCoE), RTI International



# The Unrealized Promise of Forensic Science

James Anderson, Carl Matthies, Sarah Greathouse & Amalavoyal Chari

November 10, 2020



Justice Policy Program

# Forensic Science Very Promising in Theory (I)

- Criminal Justice System as system
- Forensic scientific evidence is additional source of information

# Forensic Science Very Promising in Theory (II)

- Objective and scientific – sometimes more accurate
- Independent of other information
- Errors should be uncorrelated with other errors
- Loosely coupled



# Forensic Science Very Promising in Theory (III)

- Key assumptions to realize promise
  - Scientific
  - Independent/loosely coupled

# How Does it Work in Practice?

- Sparse literature but consistent findings:
  - Used in  $< 1\%$  of cases (Parker, 1963)
  - Little role despite availability (RAND/Greenwood, 1975)
  - Rarely used (Peterson et al. 1984, 1987)
- Has its use increased, and if so how?

# What Did We Do?

- Mixed-method study in five jurisdictions
  - Sacramento County, CA, Sedgwick County, KS, Allegheny County, PA, Bexar County, TX, and King County, WA.
  - Interviews with detectives, forensic labs, prosecutors
  - Collected random sample of 1000 reported crimes in each jurisdiction to determine effect of forensic science (2007-2009)
- Analysis of national crime lab data
- Experimental survey of prosecutors and criminal defense attorneys to understand effect of forensic evidence on plea bargaining process

# Five Jurisdiction Study-Interviews

- Interviews revealed that development of forensic evidence was not independent of other evidence
- Case status drove analysis of forensic evidence
- If no *other* evidence, little forensic analysis
- If case was going to trial, more analysis

# How Often is Forensic Evidence Collected and Analyzed?

Site	Homicide		Rape		Aggravated Assault		Robbery		Burglary	
	Evidence Collected	Evidence Analyzed	Evidence Collected	Evidence Analyzed	Evidence Collected	Evidence Analyzed	Evidence Collected	Evidence Analyzed	Evidence Collected	Evidence Analyzed
Sacramento		87.1±7.3	91.8±3.4	74.5±13.2	52.4 ±4.8	9.4±1.2	54.5±2.5	3.5±0.5	30.0±7.8	0.4±0.6
San Antonio		84.4±9.5	—	—	43.5±16.1	10.7±3.3	15.0±5.8	0.5±0.9	4.6±1.5	0.6±0.9
Seattle		17.1±13.8	60.1±4.0	8.7±3.3	17.4±6.3	0.9±0.9	13.4±0.6	0.7±1.3	18.5±4.3	1.2±1.2
Wichita		65.9±6.3	81.9±9.1	30.2±4.0	80.7±5.8		51.0±7.9		37.9±11.6	1.1±1.0

# At What Stage Did Forensic Analysis Occur?

	Prior to arrest			Prior to plea bargain			Prior to trial		
	Request	Complete	Probative	Request	Complete	Probative	Request	Complete	Probative
Trace analysis	0.1%	0.0%	0.0%	1.5%	0.9%	0.0%	3.9%	2.0%	0.0%
Drug analysis	1.0%	0.4%	ND	1.3%	0.9%	ND	1.4%	0.8%	ND
DNA analysis	3.5%	2.5%	1.7%	7.0%	6.8%	6.0%	22.4%	21.8%	19.9%
Firearms /toolmark analysis	3.9%	3.2%	2.5%	9.1%	8.1%	4.2%	24.6%	23.2%	16.0%
CODIS search	2.2%	2.2%	1.4%	6.6%	6.6%	3.4%	10.6%	10.6%	1.7%
NIBIN search <sup>b</sup>	3.2%	3.2%	0.4%	6.2%	6.2%	1.1%	16.8%	16.8%	2.5%

# When is Analysis Occurring?

- Forensic evidence is rarely analyzed prior to an arrest (<12% in every category of crime)
  - Detectives not using forensic evidence to identify suspects
- Forensic evidence is often not analyzed until the eve of trial
- Additional information advantage of forensic science not being utilized
- Reduces independence of forensic science if inconsistent result will lead to lost case

# How Long is Analysis Taking?

## Average Analysis Time in Days

	Allegheny	King	Sacramento	Bexar	Sedgwick	Overall
Hair	237	.	55.5	92.27	.	88.82
Fibers	.	.	30	85.88	.	74.7
FTIR	.	55.5	8.56	159.2	.	61.5
SEM_EDX	299.11	.	52.44	41.06	.	75.7
Fit match	39	.	.	59	.	52.33
Serology Screen	124.16	108.71	.	22.46	.	64.03
Blood pattern interpretation	.	209	.	.	.	209
YSTR	.	39	.	8	.	28.67
GC_MS	.	55.5	10.66	.	47.69	14.57
Drug ID	115.57	.	.	3	34.83	71.8
STR	88.09	105.11	290.24	55.12	66.56	135.2
Test fire	288	233.75	89.69	244.89	26.72	162.95
Comparison scope	200.52	247.86	104.5	272.88	44.17	171.37
Notes: Averages are calculated conditional on analysis being completed within the time frame covered by the study						



# Why is Analysis Occurring so Late in Criminal Justice Process?

- Shortage of forensic lab resources – required triage
- Forensics were viewed as means of strengthening already strong cases
- Also viewed as means to meet unrealistic jury expectations

# Compare to Theory

- Rarely being used to identify suspects
- Rarely being used in charging
- In rare cases where it is used at all, often being used to meet unrealistic jury expectations
- Creates incentives for misconduct

# Lawyers Agree that Forensic Evidence Matters to Plea Bargaining

- Experimental survey study showed that strength of forensic evidence affected acceptance of plea bargains in expected way
- Correlations between strong forensic evidence and convictions

# Forensic Lab Efficiency

- Fee-based laboratories have higher productivity
- Laboratory management systems also associated with increased productivity

# Conclusions

- Theoretical promise of forensic science remains unrealized (still)
- Limited and late use of forensic evidence undermines key theoretical benefits of additional information and independence
- Quicker turnaround is probably a necessary condition for earlier use
- Fee-based labs appeared to have greater productivity
  - Might also lead to more efficient triage system



Justice Policy Program



# Sexual Assault Kit Processing as a Challenge and Opportunity in Sexual Assault Reform

Kevin J. Strom, PhD

# Background

Sexual Assault Kit (SAK): Set of items used by medical personnel for the preservation of physical evidence collected from a person following an allegation of sexual assault

Unsubmitted SAKs that accrue in U.S. law enforcement agencies subject of increasing attention over past decade, as have untested SAKs pending analysis in crime laboratories.



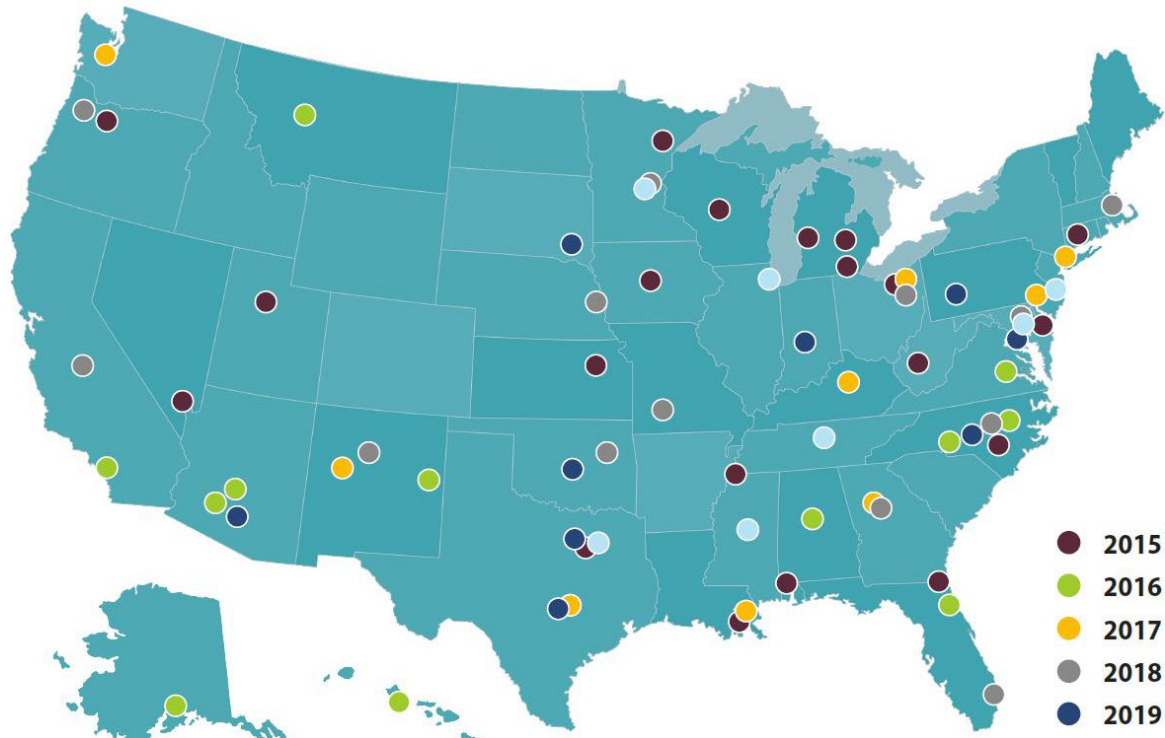


# Why Unsubmitted SAKs Accumulated

- DNA testing did not previously exist
- No policy regarding SAK submission and testing
- No funding to test all SAKs
- Benefit to investigations unclear
- Insufficient staffing to investigate and prosecute all cases
- Victim-blaming and misinterpreting signs of trauma

Source: Campbell et al., 2016; Strom and Hickman, 2010

# BJA's National Sexual Assault Kit Initiative (SAKI)

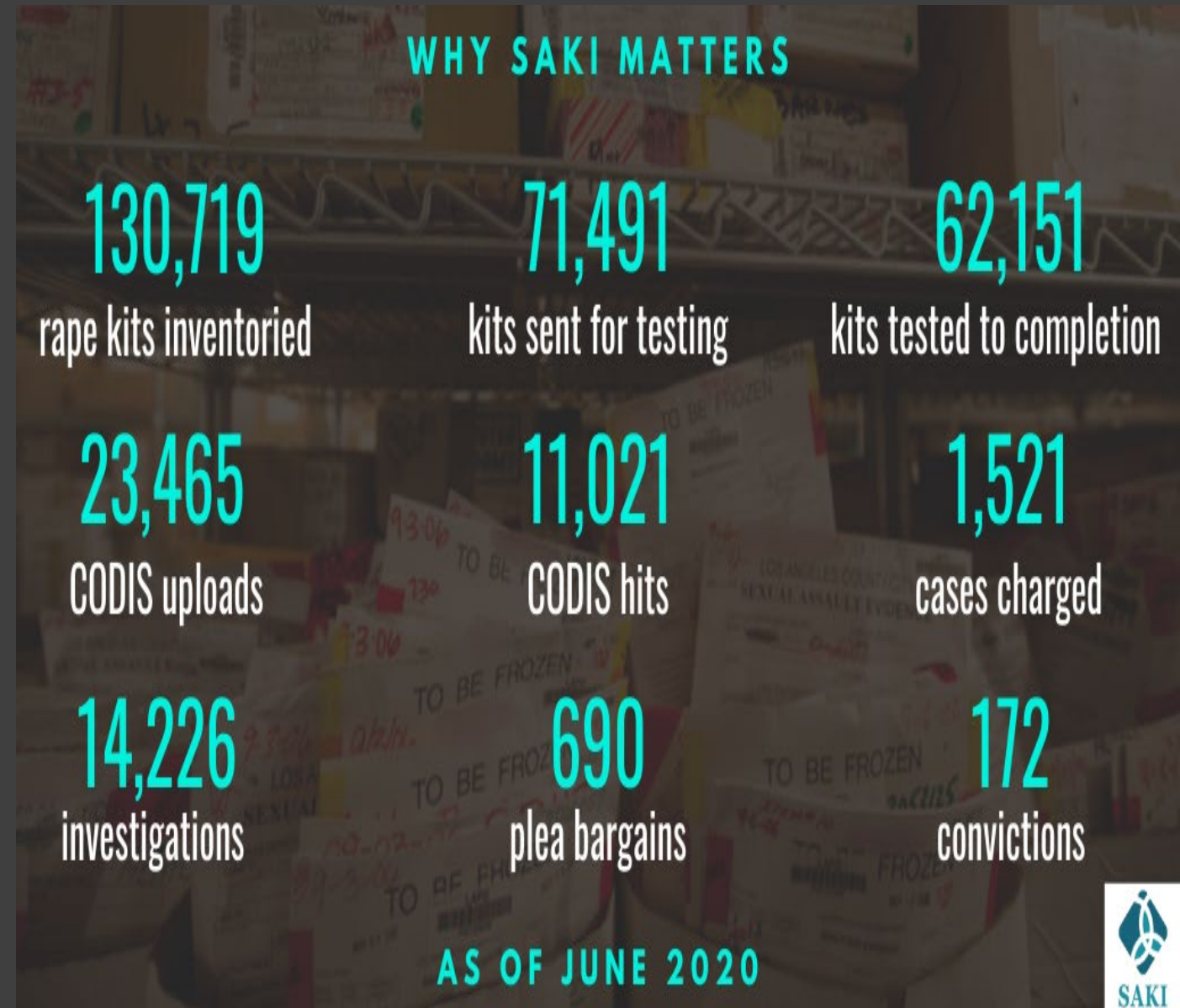


- In FY2015, 20 jurisdictions were selected to receive SAKI funding. BJA funded 12 new jurisdictions in 2016, 9 new in 2017, 13 new in 2018, 10 new in 2019, and 7 new jurisdictions in 2020.
- There are currently 71 SAKI Grantees Sites
  - 25 statewide sites
  - 3 multi-county site
  - 13 county-level sites
  - 29 city-level sites
- Total funding awarded to date:  
~\$220 million

# National Impact of SAKI

Under SAKI, jurisdictions must:

- Inventory all unsubmitted SAKs
- Conduct an investigative case review associated with each unsubmitted SAK
- Create DNA testing plan
- Track sexual assault evidence
- Provide effective communication with survivors of sexual assault



# Why is it important to test unsubmitted SAKs?

- Apprehend violent offenders
- Justice for victims
- Hold offenders accountable
- Populate CODIS
  - Case connectivity
  - Lawfully owed DNA
- Research
  - Serial offenders
  - Cross-over offending
  - Reasons SAKs were not submitted for testing

# Impact: Crossover and Serial Offending

## Cuyahoga County, OH

- Coded 433 sexual assaults between March 1992 and September 2014 – 53% were connected to serial sex offenders
  - 53 kit-to-kit serial sex offenders
  - 192 kit plus criminal history offenders
- Results
  - Most serial sex offenders do not appear to consistently stick to a certain “type” of victim or offending pattern
  - Of the 53 serial sex offenders
    - 56.5% only sexual assaulted strangers
    - 28.3% sexually assaulted at least 1 stranger and at least 1 nonstranger
    - And 15.1% only assaulted nonstrangers

Lovell, R., Luminais, M., Flannery, D. J., Overman, L., Huang, D., Walker, T., & Clark, D. R. (2017). Offending patterns for serial sex offenders identified via the DNA testing of previously unsubmitted sexual assault kits. *Journal of criminal justice*, 52, 68–78.



# NIJ Sexual Assault Kit Processing Efficiency





# Background

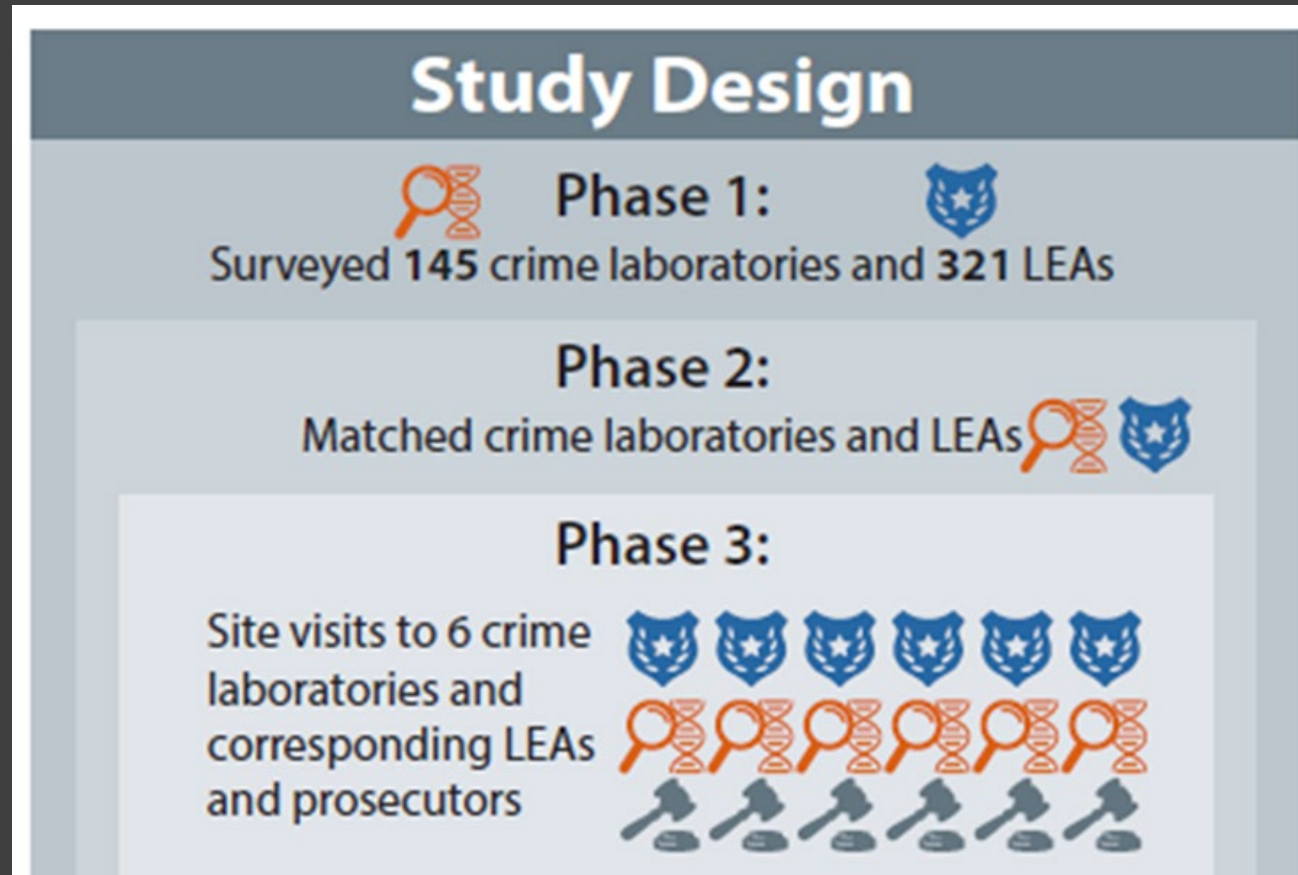
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NIJ-funded project to determine whether specific policies or characteristics of a jurisdiction result in more efficient processing outcomes.

Goal: Conduct research to identify the most efficient practices for addressing the submission of SAKs in LEA's and the testing of SAKs in crime laboratories.



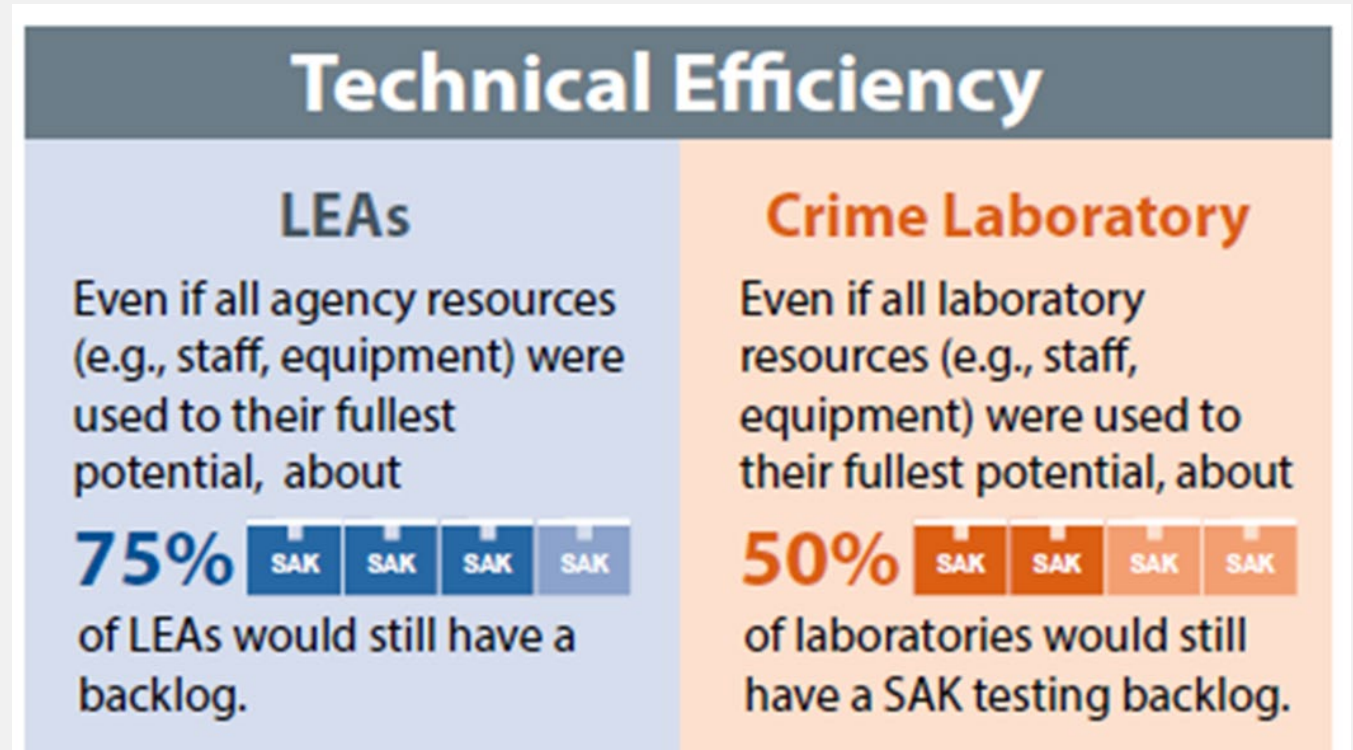
# Mixed-Methods Study



Study examined intra and interagency dynamics associated with SAK processing efficiency in a linked sample of crime laboratories (n=145) and LEA's (n=321).



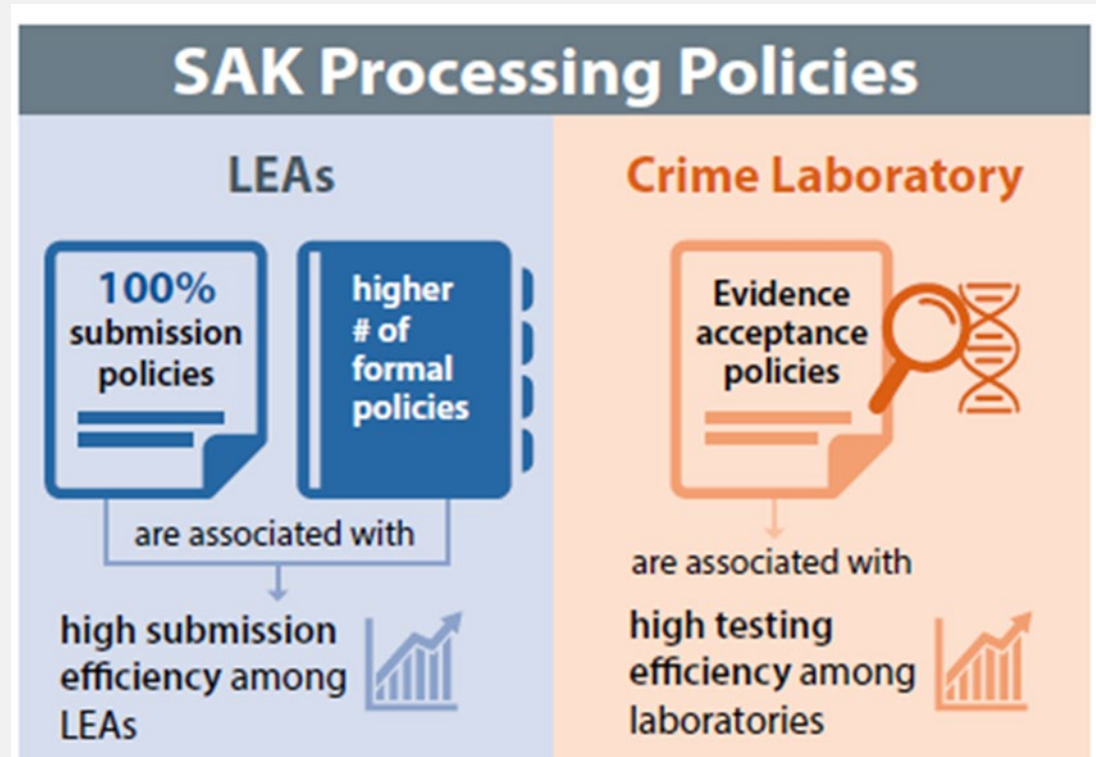
**Results:** Findings show that backlogs can be explained by the combination of technical inefficiencies and lack of resources.



**Results:**  
Jurisdictions  
cannot create  
sustainable SAK  
processing  
without investing  
in LEA and crime  
laboratory staff.



**Results:** Agency policies directly affect partner agencies and should not be created in a silo.



# Recommendations



Invest in staff hiring and retention



Develop a system-wide process map



Develop interagency multidisciplinary policies

# More Information

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Strom, K. J., Hendrix, J. A., Parish, W. J., Melton, P. A., & Feeney, H. (2020). Estimating crime laboratory efficiency in the testing of sexual assault kits. *Journal of Forensic Sciences*, 65(5), 1497-1506.

<https://doi.org/10.1111/1556-4029.14490>

Hendrix, J. A., Strom, K. J., Parish, W. J., Melton, P. A., & Young, A. R. (2019). An examination of sexual assault kit efficiencies among a nationally representative sample of law enforcement agencies. *Criminal Justice Policy Review*, 1-21.

<https://doi.org/10.1177/0887403419884730>



**Forensic Technology**  
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A program of the National Institute of Justice



# The Impact of Research and Technology Dissemination Through the Forensic Technology Center of Excellence 2016-MU-BX-K110

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Donia Slack, M.S., RTI International  
November 10, 2020

# Disclaimer

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The Forensic Technology Center of Excellence (FTCoE), led by RTI International, is supported through a Cooperative Agreement from the National Institute of Justice (NIJ), Office of Justice Programs, U.S. Department of Justice (2016-MU-BX-K110). The opinions, findings, and conclusions or recommendations expressed in this presentation are those of the author(s) and do not necessarily reflect those of the Department of Justice. Any products and manufacturers discussed are presented for informational purposes only and do not constitute product approval or endorsement by the U.S. Department of Justice.



# The Forensic Technology Center of Excellence and RTI

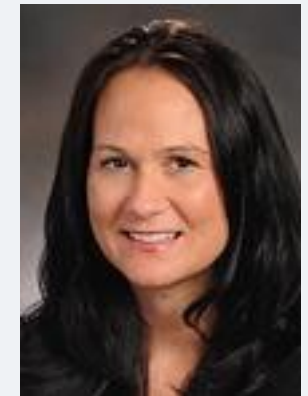
- The Forensic Technology Center of Excellence is a program of the National Institute of Justice
  - Office of Investigative and Forensic Sciences (OIFS)
- Instituted in 2007 and administered by RTI International since 2011, The FTCoE has reached tens of thousands of criminal justice practitioners by providing unbiased dissemination and evaluation of forensic technologies, best practices, and policies



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Senior Director of the  
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**Nicole Jones;** Associate  
Project Director; Director of  
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and Implementation



# Five goals of the FTCOE

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1. To provide scientific and technical support to NIJ's research and development efforts
2. To facilitate demonstration, transfer, and adoption of appropriate technology into practice by crime laboratories, forensic service providers, law enforcement, and other criminal justice agencies
3. To provide technology assistance, information, and support to law enforcement and other appropriate criminal justice agencies
4. To develop and provide access to resources for research, education, and best practices in the forensic science and criminal justice community
5. To develop and implement strategic plans to evaluate the impact of NIJ's forensic science investments on the criminal justice system

# The FTCoE provides scientific and technical support to the NIJ's R&D efforts by facilitating transfer and adoption of technology into the criminal justice system

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## Advancing Technology

The FTCoE places promising technical innovations in the hands of forward-thinking practitioners, stakeholders, and policy makers.

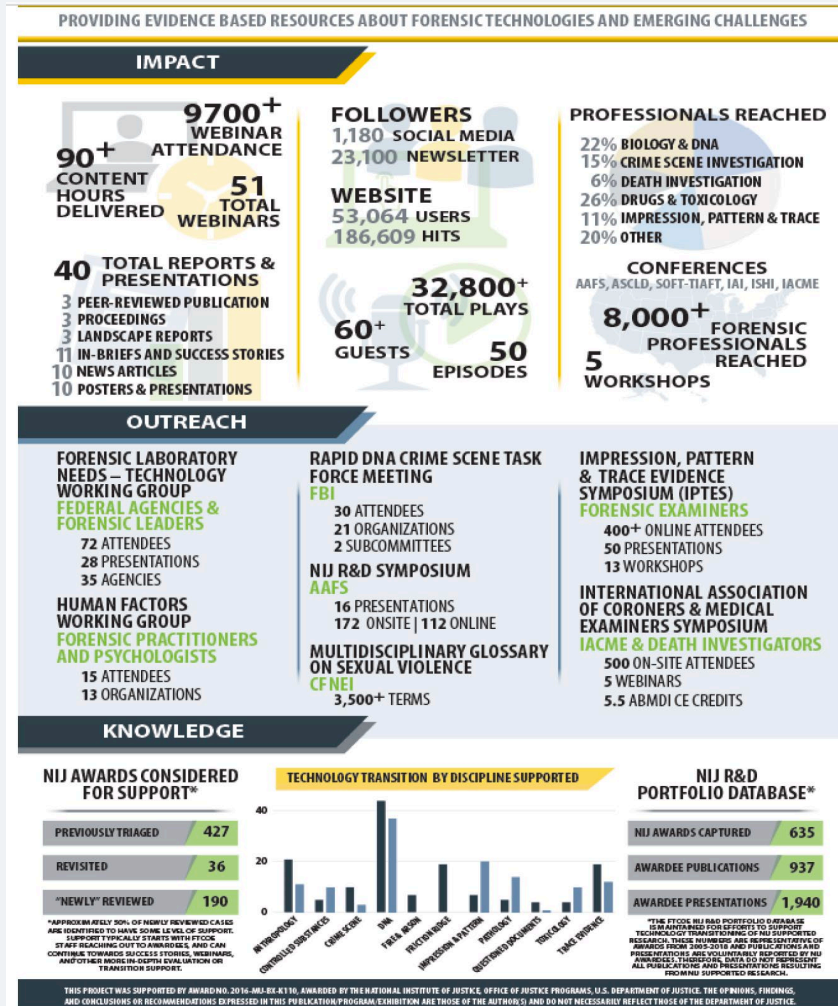
## Sharing Knowledge

The FTCoE provides knowledge transfer and integration which bridges the gap between the scientific and criminal justice communities.

## Addressing Challenges

The FTCoE supports the NIJ's research and development (R&D) portfolios, and transitions research into the hands of practitioners.

# Impact of Research and Technology Dissemination Topics of Interest



- Evaluation of the impact of forensic science investments on the criminal justice system:
  - Advancing DNA Efficiencies
    - Lean Facility Design for Optimizing Space
    - Lean Six Sigma for Laboratory Processes
    - Improvement Grants Return on Investment
    - Rapid DNA Implementation
  - Addressing Management Challenges
    - Cost-benefit Analyses
    - Workforce Calculator
  - Sharing Knowledge
    - Workforce Resiliency
    - Juror Comprehension
  - Current Projects

# Expanding Beyond Theory – Advancing DNA Efficiencies (con't)

## Lab Design Efficiencies Implemented

- In 2013, NIST published the “White Book, Forensic Science Laboratories: Handbook for Facility Planning, Design, Construction and Relocation”
  - Guidance for “Lean Facility Design (LFD)” thinking for lab management, planning, architecture, and engineering for publicly funded forensic facilities
- The FTCoE worked with the Midwest Forensics Resource Center (Ames Laboratory) and the Brazos Group to develop guidelines, checklists, and evaluate key outcomes of the LFD process
- The FTCoE also performed a needs assessment at the Broward County Sheriff’s Office (BSO) using the process map and checklist

## LFD Needs Assessment Checklist

### Lean Facility Design Process Checklist

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>❑ When selecting team members consider the following: Champion, Project Mgr., SMEs, Facilities Mgr., EH&amp;S, QA/QC.</li><li>❑ Identify Roles/Responsibilities (White Book, pg. 3): Include SMEs as part of review process at all levels.</li><li>❑ Conduct a System Gap Analysis (identify current issues).</li><li>❑ Map key work processes.</li><li>❑ Identify customer satisfaction, productivity &amp; quality metrics methodology: items per analyst, cases per analyst, turn-around time (TAT); use more statistical terms like “95% completed within xx days.”</li><li>❑ Survey <u>internal</u> &amp; <u>external</u> customer to see if their needs are being met: (White Book, pg. 8).</li><li>❑ Visit other labs for ideas; what to do and what not to do.</li><li>❑ Amenities: break room, gym, lactation room, parking, bathrooms, lockers, mock scene room, lobby, displays.</li><li>❑ Establish future projection plan, 5, 10, 20 years out:<ul style="list-style-type: none"><li>– project the staffing level (White Book, pg. 14)</li><li>– project the case load</li><li>– project the future area demographics</li><li>– project the future goals</li><li>– identify known future technologies</li></ul></li><li>❑ Identify funding source(s).</li><li>❑ For designing a new lab, use input from other laboratories and design guidelines (White Book, pg. 16–24).</li><li>❑ Select delivery method (White Book, pg. 44).</li></ul> | <ul style="list-style-type: none"><li>❑ Identify contractors using guidelines (White Book, pg. C-1–C-2, 35). Consider previous experience.</li><li>❑ Write RFP using Internet example or input from other labs.</li><li>❑ Consider A&amp;E teams with previous crime lab experience.</li><li>❑ Select A&amp;E team based on qualifications, reputation, past experience, bid &amp; ability to communicate effectively: (White Book, pg. 17).</li><li>❑ Check LEAN techniques: Gemba (work area), Polayoke, (prevention techniques), Muda (waste), Work Flow, Cycle Time reduction &amp; 5S: Sort, Set, Shine, Standardize &amp; Sustain.</li><li>❑ Review design for accuracy and completeness (White Book, pg. 18).</li><li>❑ When make agreements, consider <u>majority</u> or <u>consensus</u> decisions.</li><li>❑ Review construction documents (White Book, pg. 22–24).</li><li>❑ Evaluate 3-D mock-ups for Design for Repair (DFR)/Design for Maintenance (DFM), functionality, performance, placement.</li><li>❑ Develop move plan (White Book, pg. 33–40); ensure Certificate of Occupancy is issued prior to move-in.</li><li>❑ Shut down evidence intake ‘xx’ days prior to move; consider moving each section sequentially.</li><li>❑ Assign responsible team member to manage move plan; collect post-move metrics, compare to pre-move, and analyze findings; re-assess work processes and correct unproductive or negative impact.</li></ul> |
|---|---|

White Book: Forensic Science Laboratories: Handbook for Facility Planning, Design, Construction, and Relocation.

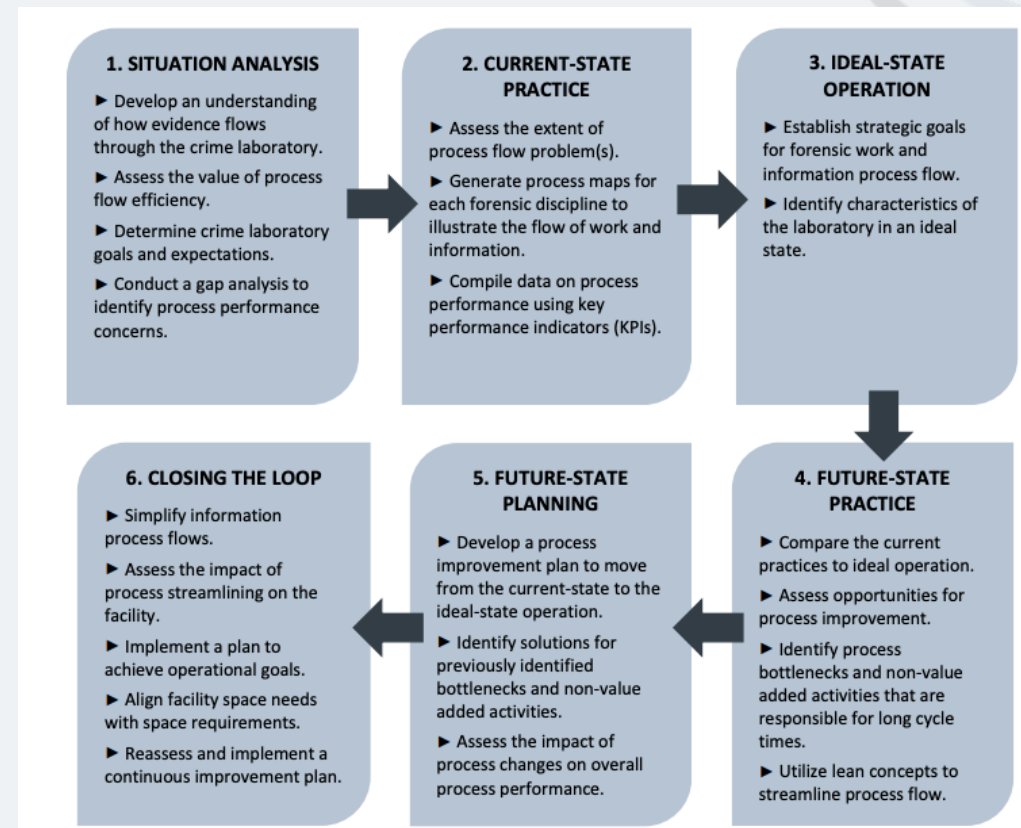


# Expanding Beyond Theory – Advancing DNA Efficiencies (con't)

## LFD Needs Assessment Outcome

- BSO completed the LFD assessment using the roadmap and checklist
- Results indicated that issues that were identified were related to available space within the current facility
- LFD led to the realization that a new facility would realize the best return on investment
  - Assessment allowed for BSO to begin the process of procuring bids from architectural firms
- Short-term solutions included:
  - Cloud options implemented for several current programs
  - Interagency communication gaps were improved
  - New management staffing was implemented to improve bottlenecks at the reporting stage

## LFD Needs Assessment Methodology



# Expanding Beyond Theory – Advancing DNA Efficiencies

## Placing processes into crime laboratories

- In collaboration with our partners at West Virginia University College of Business and Economics, their Lean Six Sigma Green Belt Certification Program for Forensic Professionals was evaluated for short and long-term impacts
- Course was taught by Tim Kuperschmid, LSS Black Belt, Chief of Laboratories at the NYC OCME

## Tangible efficiencies outcomes

### PROGRAM SUMMARY

- 16 2-hour-long live webinars from March to August – DMAIC process
- Individual and Group Participants – real lab projects
- One Day F2F Class in September: Leading Change workshop + presentations

#### 2016

16 participants  
13 Green Belt Certified  
9 Crime Labs/Projects  
AZ, CO, ID, IL, MD, MS,  
MT, SC and VA  
3 did not complete

#### 2017

14 participants  
12 Green Belt Certified  
6 Crime Labs/ Projects  
AZ (2 orgs), PA, TX, WV  
and Costa Rica  
2 did not complete  
(same people as 2016)

#### 2018 IN PROGRESS

16 participants  
8 Crime Labs/Projects  
AR, AZ, GA, MO, PA,  
VA (2 orgs), Costa Rica  
and Colombia  
Striving for 100%  
retention!!!

# Expanding Beyond Theory – Advancing DNA Efficiencies (con't)

## Lab Processes Implemented and Evaluated

- Evaluating the biology system process
- Toxicology review process
- Cause of administrative errors in case files
- Reduce turnaround time for toxicology samples
- Process for converting paper archives to digital
- Evaluating review procedure in toxicology
- Changing timesheets from paper to digital
- Decrease turnaround time of DNA Analysis
- Evaluating technical review process for DNA Analysis
- Improve the data analysis process of the blood sample testing for alcohol

## Performance Metrics

- Was the project implemented as planned?
- Did the projects have unexpected/unintended effects, and why?
- Were the projects expanded to other areas of the lab and were there transferable skills and tools learned?
- What was the leadership response?
- What kind of challenges did you have?
- What was most and least useful about this program?
- What were the lessons learned from the participants that dropped out?

# Expanding Beyond Theory – Advancing DNA Efficiencies (con't)

## West Virginia State Police Crime Laboratory - Reducing Turnaround Time for DNA Analysis

- Laboratory had two separate units
  - Serology
  - DNA
- LSS principle of DMAIC was implemented
  - Define, measure, analyze, improve, control
- Changes made:
  - Direct sample transfer from serology to DNA section; regular huddle meetings, move to paperless casefiles, outsourced older but still active cases, added 3 additional positions

## Quantitative Results

- Year 1: the 17% reduction in TAT
- Year 2: Additional TAT reduction for a total of 48%
- Outsource of all SAKs
- Unnecessary tasks were halted
- Began tracking trends for yield lessons learned
- Moved onto a LSS project in the Drug Identification Section

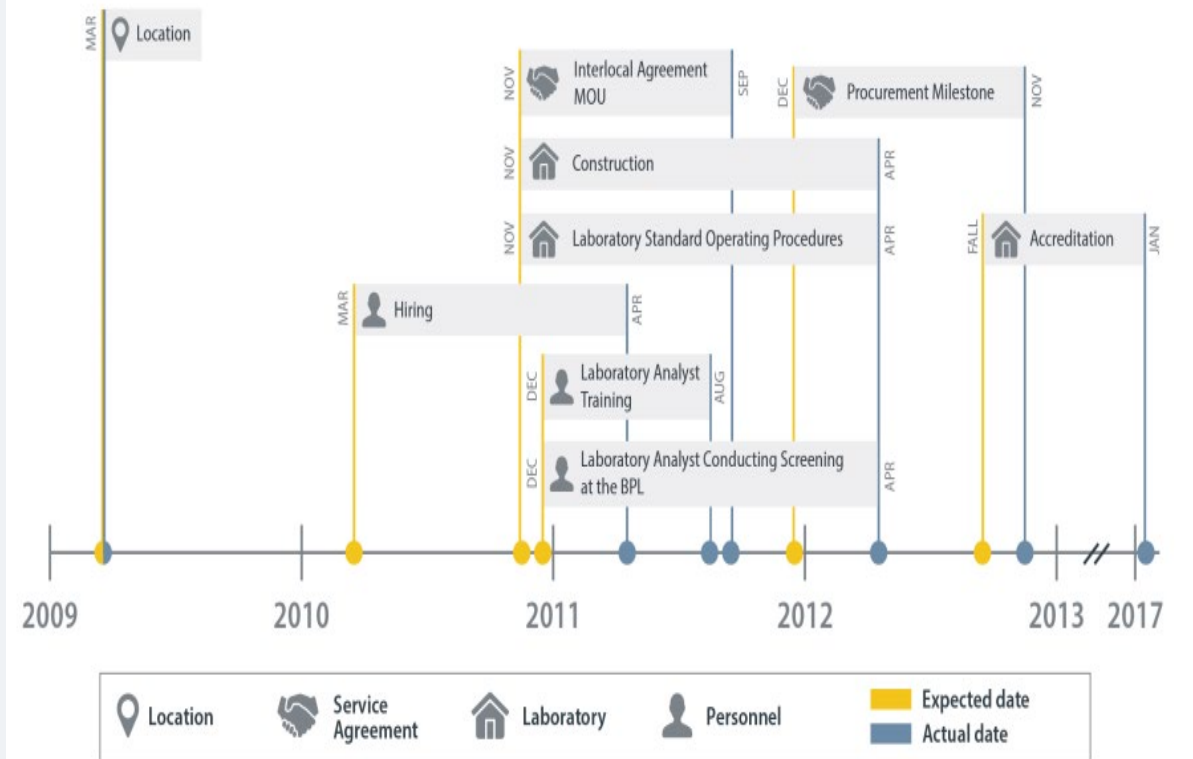


# Expanding Beyond Theory – Advancing DNA Unit Efficiencies

## Evaluating an NIJ Funded Forensic DNA Unit Efficiency Improvement Program Grant

- In 2009, the NIJ released a solicitation to help agencies to develop and implement programs to improve the capacity and efficiency of DNA units
  - “Forensic DNA Unit Efficiency Improvement”
- The FTCoE performed a program evaluation on the Palm Beach County Sheriff’s Office (PBSO) to demonstrate the ROI (2009-DN-BX-K261)

## Timeline and Milestones for PBSO



Open  
Access  
FSI  
Synergy

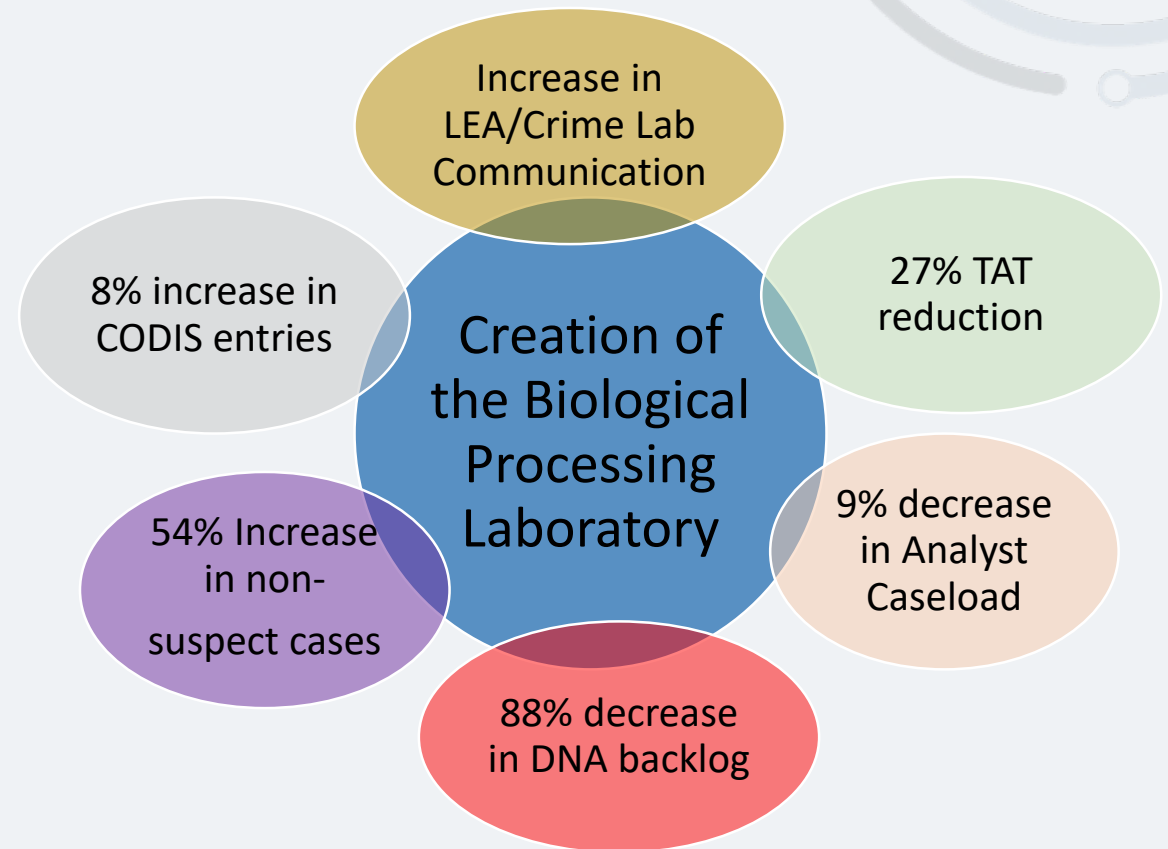


# Expanding Beyond Theory – Advancing DNA Unit Efficiencies (con't)

## Creation of a Biological Processing Lab

- In 2009, the PBSO FBU responded to the concerns of Palm Beach County LEAs regarding TAT
- NIJ funded the creation of the PBSO Biological Processing Lab (BPL), a prescreening laboratory managed by a city police agency independent of the PBSO
  - Serviced three surrounding LEAs
  - Prescreened crime scene evidence
- Project completed in 2012, first evaluation performed by RTI in 2009, and re-evaluated by RTI/FTCoE in 2018
- Lessons learned – Laboratories require time to fully implement processes before a thorough evaluation can be completed

## Quantitative Return on NIJ-funded Investment

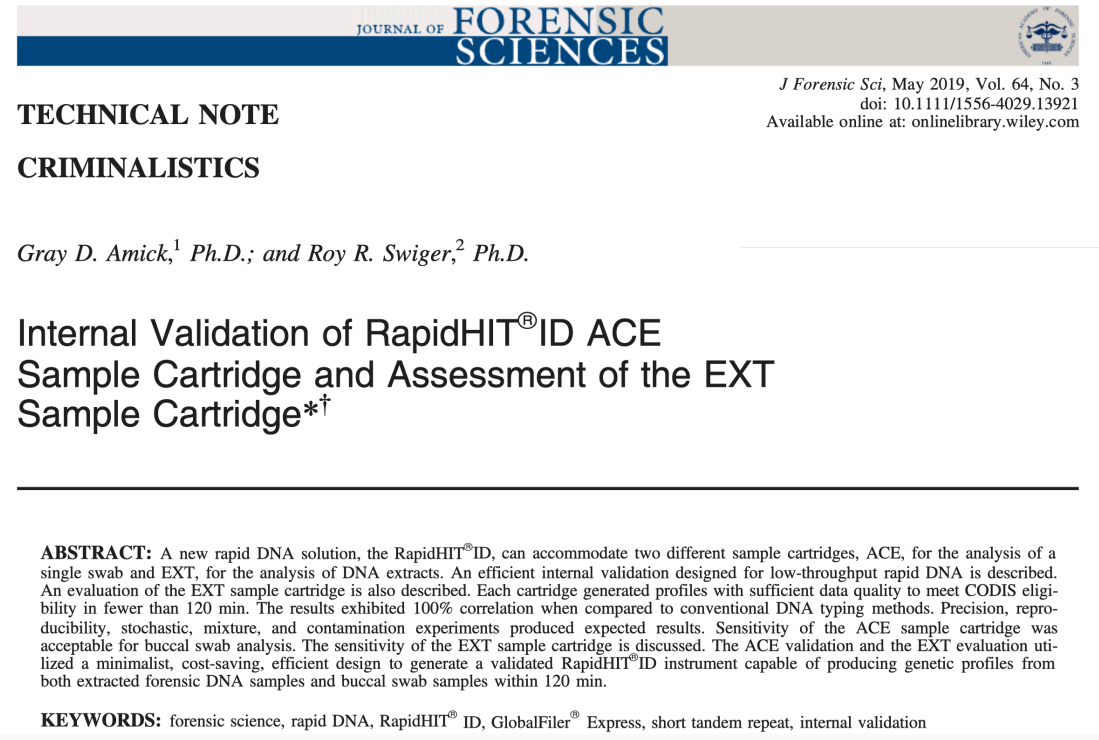


# Expanding Beyond Research – Advancing DNA Technologies

## Placing promising technical innovations in the hands of practitioners

- In 2017 Richland County Crime Lab expressed a desire to expand their Rapid DNA program into the booking environment
- The FTCoE supported the validation and proof-of-concept study of the RapidHIT ID placed in the Alvin S. Glenn Detention Center
- This study demonstrated that non-scientist operators could produce DNA profiles meeting QAS requirements for CODIS uploads
- Their Rapid DNA program has led to 69 profiles uploaded into CODIS, generating 3 CODIS hits

## Tangible criminal justice outcomes



**JOURNAL OF FORENSIC SCIENCES**

**TECHNICAL NOTE**

**CRIMINALISTICS**

*Gray D. Amick,<sup>1</sup> Ph.D.; and Roy R. Swiger,<sup>2</sup> Ph.D.*

**Internal Validation of RapidHIT® ID ACE Sample Cartridge and Assessment of the EXT Sample Cartridge\*†**

**ABSTRACT:** A new rapid DNA solution, the RapidHIT® ID, can accommodate two different sample cartridges, ACE, for the analysis of a single swab and EXT, for the analysis of DNA extracts. An efficient internal validation designed for low-throughput rapid DNA is described. An evaluation of the EXT sample cartridge is also described. Each cartridge generated profiles with sufficient data quality to meet CODIS eligibility in fewer than 120 min. The results exhibited 100% correlation when compared to conventional DNA typing methods. Precision, reproducibility, stochastic, mixture, and contamination experiments produced expected results. Sensitivity of the ACE sample cartridge was acceptable for buccal swab analysis. The sensitivity of the EXT sample cartridge is discussed. The ACE validation and the EXT evaluation utilized a minimalist, cost-saving, efficient design to generate a validated RapidHIT® ID instrument capable of producing genetic profiles from both extracted forensic DNA samples and buccal swab samples within 120 min.

**KEYWORDS:** forensic science, rapid DNA, RapidHIT® ID, GlobalFiler® Express, short tandem repeat, internal validation

# Addressing Management Challenges – FORESIGHT Evaluation



## Project FORESIGHT

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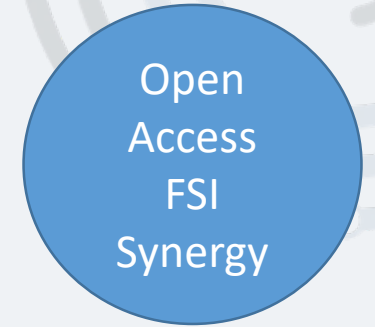
- Project FORESIGHT is a business-oriented self-evaluation that provides laboratory managers with actionable insights into the performance of their laboratories in comparison to similar labs
- Developed and managed by FTCoE Partner, Dr. Paul Speaker, WVU College of Business and Economics
- Funded by NIJ (2008-DN-BX-K223; 2010-D1-BX-K016)
- Synthesizes operational opportunities for improvement in budget, personnel, and/or laboratory management

## Seven Key Performance Areas

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- Relative Volume and Activity
- Cost
- Personnel Productivity
- Risk/Quality
- Turnaround Time
- Backlog

# Addressing Management Challenges – FORESIGHT Evaluation – ROI from Processing the Backlog of Untested SAKs



- The FTCOE and WVU evaluated the ROI at the jurisdictional level (net benefits to society relative to the investment)
- Previous cost-benefit studies analyze data across multiple jurisdictions across the country
  - Costs range from \$23 - \$980 per kit
  - FORESIGHT controls for economies of scale
- For smaller jurisdictions, the cost expenditures reach \$1,842
- Regardless of expenditures, ROI for these labs is above 5,000%
- With perfect economies of scale, the societal ROI is 64,529% (for jurisdictions able to process 6,250/year)



# Addressing Management Challenges – FORESIGHT Evaluation – Hidden Cost of the Opioid Crisis

- Current financial considerations of the impact of the opioid crisis are severely underestimated
- Cost to the criminal justice system is estimated at \$8 billion
  - \$270 Million borne by crime labs
- FORESIGHT data indicate costs differ across different analytical processes
- Expenditure rates are not aligned with projected 3% annual rate

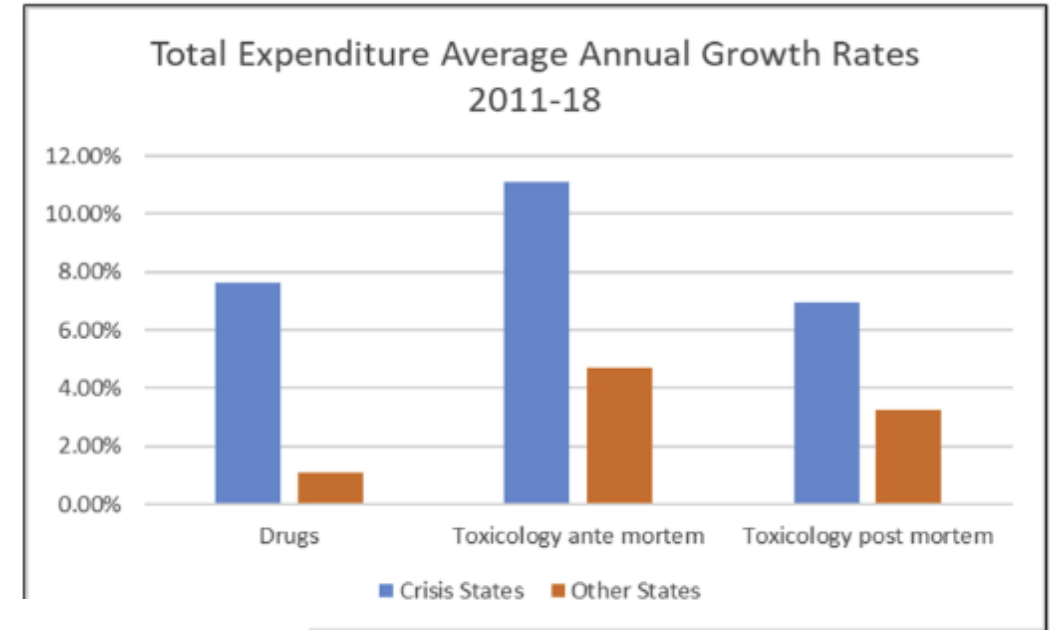


fig. 7. Average annual growth rates in total expenditures.

Forensic Science International: Synergy 1 (2019) 227–238



Contents lists available at ScienceDirect

Forensic Science International: Synergy

journal homepage: <https://www.journals.elsevier.com/forensic-science-international-synergy/>



The hidden costs of the opioid crisis and the implications for financial management in the public sector<sup>☆</sup>

Ropero-Miller Jeri D.<sup>a, \*</sup> Paul J. Speaker<sup>b, \*</sup>

<sup>a</sup> Chief Scientist for Applied Justice Research, RTI International, USA

<sup>b</sup> John Chambers College of Business & Economics, West Virginia University, USA



# Addressing Challenges – Optimizing a Sustainable Workforce

## Workforce Calculator

- FTCoE & Project FORESIGHT developed a workforce calculator, now in second-year testing, to determine resources needed (such as full-time equivalents) for laboratories to best serve their communities based on the following inputs:
  - Type of jurisdiction (metro, regional, statewide)
  - Crime Rates (violent and property)
  - Population size served

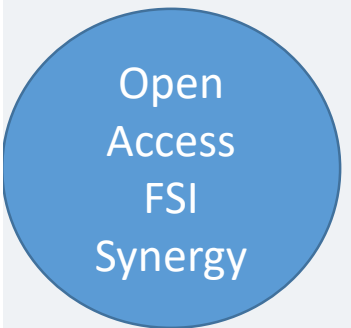
Answer each of the following to estimate your workforce needs. Use the up and down arrows to select jurisdiction type, state of operation, and state crime rates (note that the worksheet "Crime Rates by State" has the most recent data for your state). Enter the population served by your laboratory in numeric format only. For the anticipated caseload in each area of investigation, enter the number of cases for one year (leave blank if you are not supporting a particular area of investigation).

Jurisdiction: state, metro, or regional			<input type="text"/>
(note: if a regional lab has a city with a population above 100,000, then select metro)			
State			<input type="text"/>
State crime rate (violent)			<input type="text"/>
State crime rate (property)			<input type="text"/>
Population served			<input type="text"/>
	Area of Investigation	Caseload	FTE
	Blood/Breath Alcohol		na
	Crime Scene Investigation		na
	Digital		na
	DNA Casework		na
	DNA Database		na
	Document Examination		na
	Drugs--Controlled Substances		na
	Evidence Handling/Processing		na
	Explosives		na
	Fingerprint Identification		na
	Fire Analysis		na
	Firearms & Ballistics		na
	Gun Shot Residue		na
	Marks & Impressions		na
	Serology/Biology		na
	Toxicology ante mortem		na
	Toxicology post mortem		na
	Trace Evidence		na
TOTAL Laboratory Personnel			0.00



# Sharing Knowledge – Workforce Resiliency

- Seven archived webinars hosted on the FTCoE website
  - Vicarious Trauma Toolkit (OVC)
  - Stress, Vicarious Trauma, and Resiliency for Forensic Science Professionals (NIJ Funded survey)
- Four Just Science Podcast episodes
  - Applied Leadership for Resiliency in CSIs
  - Building Workforce Resiliency
- One Peer-reviewed Literature Review
- More to come in 2021!



# Sharing Knowledge – Juror Comprehension

- The community has been striving to institute reforms in the way conclusion testimony is delivered in court
- The FTCoE performed a comprehensive literature review, taking into account cognitive psychology studies to present recommendations for future research
- The FTCoE also presented tactics and visual aides proven to help jurors interpret subject matter expert testimony on a Just Science Podcast episode

## 2018 IPTES: JUST A JUROR'S PERCEPTION

### JUST A JUROR'S PERCEPTION

In episode three of the IPTES season, Just Science interviews Dr. Alicia Wilcox from Husson University and Heidi Eldridge from RTI International. Our guests discuss how visual aid and other tactics have been proven to help jurors interpret subject matter expert testimony. Listen and find out what Jurors say is effective in communicating forensic evidence in court.

Forensic Science International: Synergy 1 (2019) 24–34



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Forensic Science International: Synergy

journal homepage: <https://www.journals.elsevier.com/forensic-science-international-synergy/>



Juror comprehension of forensic expert testimony: A literature review and gap analysis

Heidi Eldridge

RTI International, 3040 E. Cornwallis Rd., Research Triangle Park, NC, 27709, USA



Open  
Access  
FSI  
Synergy

# Coming Soon!

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## Impact Evaluations

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- Field Identification Drug Officer Program
  - FIDO programs in Phoenix and Utah
  - TAT, efficiency, productivity
  - Scalability across other labs
- Mobile Drug Testing to Aid in Substance Abuse Response
  - Evaluation of a mobile drug testing lab in Florida in response to COVID-19
  - Lessons learned will be evaluated for applicability across other jurisdictional needs

## Cost Benefit Analyses

---

- Cost Benefit of ME/C Outsourcing
  - Cost-benefits of using the approach of outsourcing will be evaluated and field practices will be reviewed
- Direct to DNA Cost Benefit Analysis
  - Direct-to DNA approaches with respect to testing and analysis will be evaluated. This will be in consideration of recent legislation
- ROI from reducing TAT for processing DUI-Drug Cases
  - The economic impact of the increase in DUI-drug driving and the costs associated with the crime labs will be evaluated

# Coming Soon!

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## Criminal Justice Related Reports

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- Lawfully Owed DNA
  - The challenges of the CODIS database not being inclusive of DNA profiles obtained from convicted offenders, and in relevant states, arrestees will be discussed. Barriers and successful case studies will be presented.
- Forensic Genetic Genealogy Report
  - The technology of FGGS will be reviewed, and detailed guidance will be provided based on individual state laws concerning third-party doctrine. Best practices in relation to working collaboratively with crime labs and LEAs will be presented.

## Community Outreach

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- Just Science Podcast Seasons
  - IAI Case Studies
    - Psychopathy and Criminal Behavior
    - Jodi Arias Case
    - Grim Sleeper Serial Killer
- Webinars
  - New Mexico Decedent Image Database Series
    - Accessing, utilizing, and measuring database data
- Apps
  - SAFER Recommendation App
  - Trace Evidence Collection App
- Events
  - NIJ's R&D Symposium and Poster Session (Virtual)

# Community Engagement and Collaboration

## OPPORTUNITIES FOR NIJ GRANTEE COMMUNITY SUPPORT

Driving forensic research to practice is a community effort. Support from practitioners, vendors, and other stakeholders help researchers develop value-adding innovation. Please consider how you may be able to assist NIJ grantees with specific needs to advance their work.

Partnerships between laboratories and researchers help drive new technologies and processes into practice. Additional resources to connect to partners include:

NIJ's "Connecting Researchers with Forensic Laboratories" Page: this is a list of forensic laboratories who are open to working with forensic research grantees. If you are an operational forensic laboratory who is interested in connecting with and supporting researchers, please contact [grants@ncjrs.gov](mailto:grants@ncjrs.gov) to be added to the list.

The Laboratories and Educators Alliance Program (LEAP) is a joint effort between the American Society of Crime Lab Directors (ASCLD) and the Council of Forensic Science Educators (COFSE). The goal of this effort is to facilitate collaborative research between academia and forensic science laboratories. Please check the LEAP map for participating universities and forensic laboratories, or to add yourself to the list.

Search:

GRANT	AFFILIATION	DISCIPLINE	CONTACT	NEED
2017-DN-BX-0164/2019-DU-BX-0023	George Washington University	DNA	lbume@rti.org	Seeking to connect with different academic and industry stakeholders to gain consensus on their needs, requirements, and decision making parameters for several technological aspects of a DNA diagnostic kit.
2013-DN-BX-K033	Virginia Commonwealth University	DNA	lbume@rti.org	Seeking to connect and form strategic partnerships and alliances with interested agencies and/or crime labs to help fine-tune the

<https://forensiccoo.org/grantee-needs/>



# Forensic Technology

## CENTER OF EXCELLENCE

A program of the National Institute of Justice



# Thank you!

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Donia Slack  
dslack@rti.org



# Expanding Social Science Research to Examine the Impacts of Forensic Science on the Criminal Justice System:

The Next Chapter of the NIJ Social Science Research on Forensic Science Portfolio:  
Moving from DNA to a Systems Approach to Forensic Science

## Presenters:

**Jonathan McGrath, PhD**  
**MSFS**

Senior Policy Analyst  
NIJ Office of Investigative  
and Forensic Sciences  
(OIFS)  
Washington, DC

**Eric Martin**

Social Science Analyst  
Technology and Standards  
Division NIJ Office of Research,  
Evaluation, and Technology  
(ORET)  
Washington, DC



**NIJ**



# NIJ Office of Investigative and Forensic Sciences (OIFS)

- **Lead federal agency for forensic science research and development** and administration of programs to improve laboratory efficiency, reduce backlogs, and provide technical assistance
- **MISSION: Improve the quality and practice of forensic science** through innovative solutions that support research and development, testing and evaluation, technology, information exchange for the criminal justice community.

# NIJ Office of Research, Evaluation and Technology (ORET)

- **Encourages and supports, research, development and evaluation to further the understanding of:**
  - Causes and correlates of crime and violence
  - Methods of crime prevention and control
  - Criminal justice system responses to crime and violence
- **Contributes to the improvement of the criminal and juvenile justice systems**
- **Three major programs:**
  - Social science research and evaluation
  - Technology solutions to criminal justice challenges
  - Performance standards and testing equipment



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# SSRFS Portfolio

## NIJ Journal Article (2015)

<http://www.nij.gov/journals/Pages/welcome.aspx>

- **Wave 1 (2005-2007)** Basic questions
- **Wave 2 (2007-2009)** Emerging issues
- **Wave 3 (2010-2013)** Focused on findings of the NAS report Strengthening Forensic Science in the United States: A Path Forward



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# SOCIAL SCIENCE RESEARCH ON FORENSIC SCIENCE: THE STORY BEHIND ONE OF NIJ'S NEWEST RESEARCH PORTFOLIOS

BY KATHARINE BROWNING

In 2005, NIJ began funding social science research on issues relating to forensic science, initiating an entirely new line of research.



The last few decades have seen numerous exciting technological advances in the forensic sciences. But actually using these new forensic technologies to catch and convict perpetrators and clear the innocent is much more complicated than it looks on TV. This is where social science comes in.

Only through social science research — studying how human beings can and should use these new technologies — can we ensure that our nation's criminal justice practitioners are maximizing the use of ever-evolving developments in the forensic sciences. A decade ago, NIJ began to study how new forensic technologies were actually being used in the investigation and prosecution of crime and how they could be used even more effectively.

This article looks at the evolution of NIJ's portfolio of social science research on forensic science and provides examples of some of the studies NIJ has funded along the way. We hope that this retrospective

# SSRFS Meeting

- Meeting convened to take stock of what the research portfolio has found and where it should go
- Consensus of participants was that:
  - Look beyond DNA
    - Ballistics
    - Cyber
    - Digital
  - Also look at forensic processing between police and crime labs



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National Institute of Justice

## **Social Science Research on Forensic Science Topical Working Group Meeting**

January 23-24, 2013  
Washington, DC

The opinions and conclusions expressed in this document are solely those of the authors and do not necessarily reflect the views of the U.S. Department of Justice.

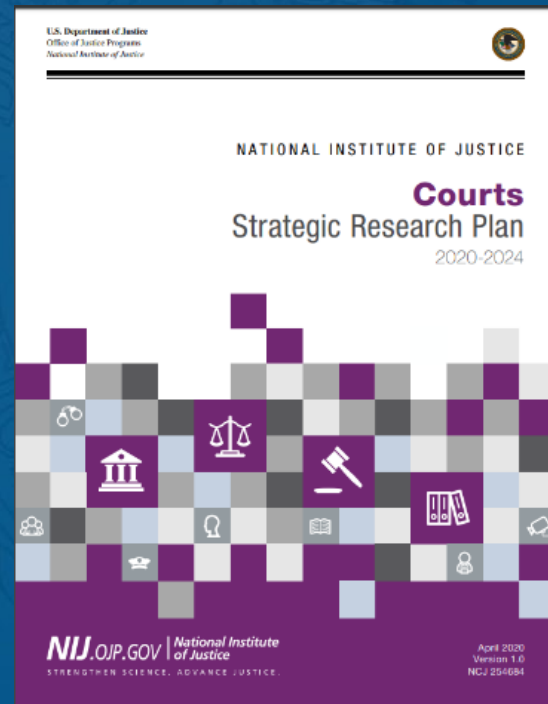
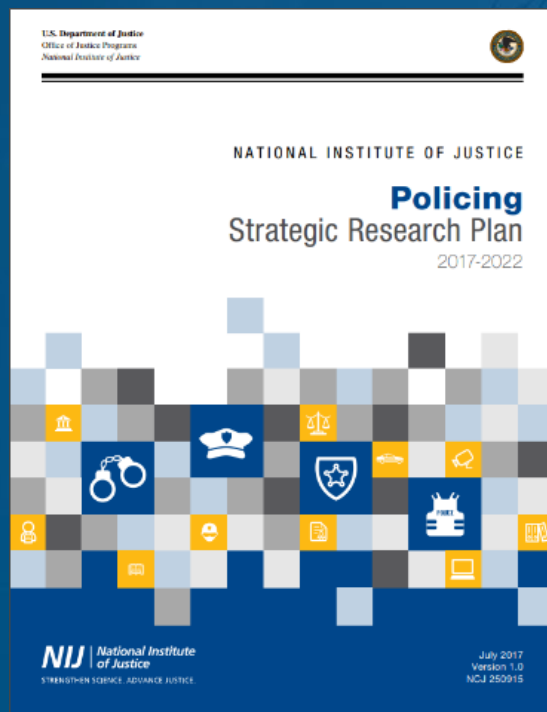
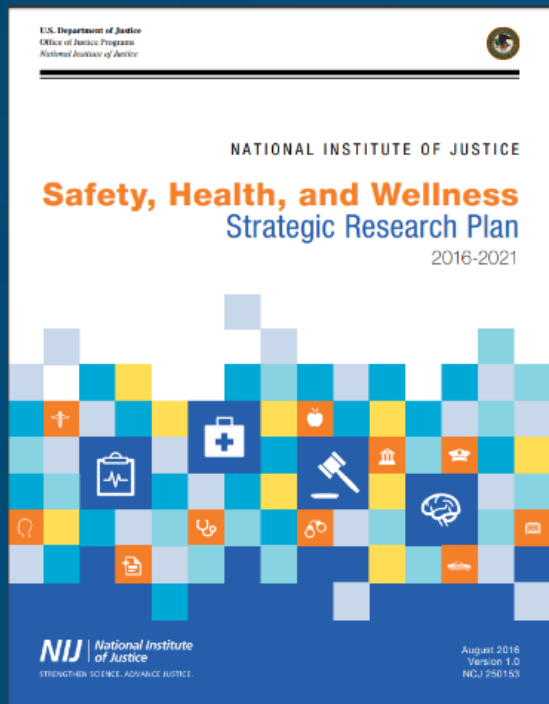
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# Major Findings from the SSRFS Portfolio

- DNA is most impactful in criminal cases:
  - Can identify more prolific offenders in property crimes
  - Many states starting to expand familial and partial match searches but many still lack definitive authorizations
  - Relationships between crime lab and police matter when it comes to reducing backlogs
- Potential of forensic evidence may not be fully realized
  - Often used to confirm suspects instead of identify them
  - Other types of forensics (ballistics) has major investigative potential that is underutilized
- In the court room, the expertise of the forensic tech matters in juror judgements



# NIJ Strategic Research Plans



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# Recent Solicitations/Awards – FY 2017 to FY 2020

- Research and Evaluation on **Drugs and Crime** (FY 2017 – FY 2020)

Case Western Reserve University - *Cuyahoga County, Ohio, Heroin and Crime Initiative: Informing the investigation and prosecution of heroin-related overdose*

U. of Pittsburgh - *Novel Quantitation Workflow for Improved Drug Surveillance*

U. of Alabama – Birmingham - *What You Can't Buy, Can't Kill You*

RTI - *Prevalence of Fentanyl and Its Analogues in a Court-Ordered Mandatory Drug Testing Population*

U. of Kentucky - *Wastewater Epidemiology To Examine Stimulant Trends (weTEST)*



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<https://nij.ojp.gov/topics/drugs>

<https://nij.ojp.gov/funding/opportunities/nij-2019-15283>

<https://nij.ojp.gov/funding/awards/2019-75-cx-0010>



# Recent Solicitations/Awards – FY 2017 to FY 2020

- Research and Evaluation on the **Administration of Justice** (FY 2019)  
*FIU - Improving Juror Comprehension of Forensic Testimony and Its Effects on Decision-Making and Evidence Evaluation*
- Research and Evaluation in **Safety, Health, and Wellness in the Criminal Justice System** (FY 2019)  
*U. of New Hampshire - A Study of Trauma and Resiliency Among Forensic Examiners Investigating Child Pornography*  
*RTI - Understanding Work-Related Stress among Medicolegal Death Investigators: A National Survey and Mixed-Methods Impact Study*
- Research and Evaluation on **Policing** (FY 2019, FY 2020)



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<https://nij.ojp.gov/funding/opportunities/nij-2019-15645>  
<https://nij.ojp.gov/funding/opportunities/nij-2019-15283>

<https://nij.ojp.gov/funding/opportunities/nij-2020-17297>

# NIJ Forensic Intelligence Model

- *“Integrating forensic evidence into the intelligence process is an evolutionary next step in reducing, disrupting, and preventing serial and organized violent crimes,”* said NIJ Director David Muhlhausen.
- *“NIJ is committed to examining and communicating the potential of forensic intelligence tools and models for law enforcement agencies across the United States.”*



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## Using Forensic Intelligence To Combat Serial and Organized Violent Crimes

Integrating forensic evidence into the intelligence process is an evolutionary next step in reducing, disrupting, and preventing violent crime.

October 21, 2020

By: [Basia E. Lopez](#)

[Jonathan G. McGrath](#)

[Veronica G. Taylor](#)

Long-established forensic techniques and advancements in forensic technologies are making a difference every day in criminal courts. Nascent successes in the implementation of these forensic technologies, as well as software and storage capabilities for large datasets and intelligence-led policing, show equal promise for improvements at the onset of investigations at the state and local levels.

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[Article Listing](#)

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[Corrections](#)

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[Crime Prevention](#)

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[Crimes](#)

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[Drugs and Crime](#)

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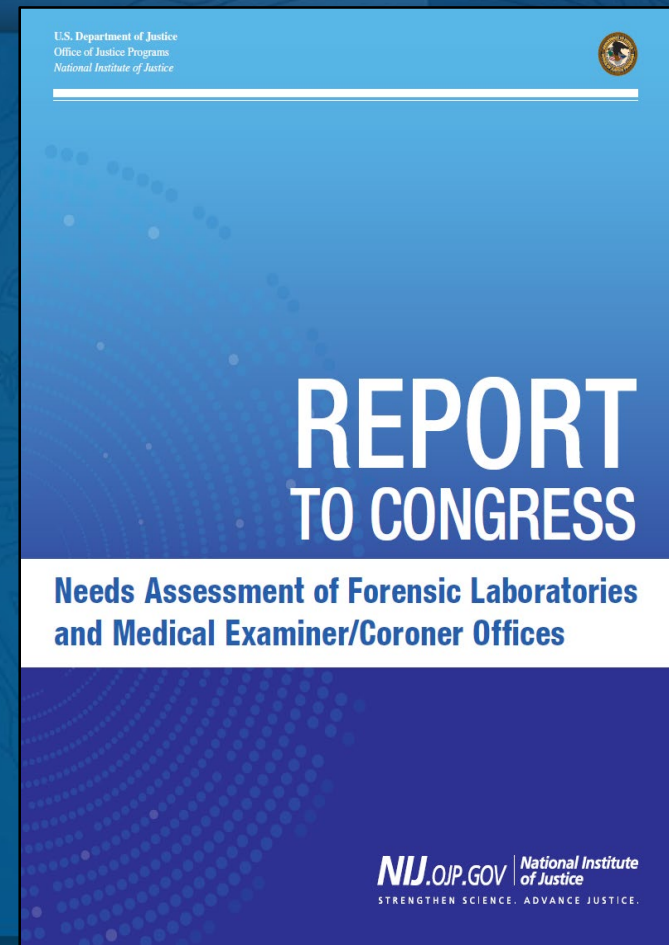


**NIJ**

<https://nij.ojp.gov/topics/articles/using-forensic-intelligence-combat-serial-and-organized-violent-crimes>

# Key Findings:

- Sufficient and consistent funding
- Strategic planning
- Address fluctuations driven by supply/demand of services
- Strengthen the workforce
- Increasing systems-based approaches and communications



<https://forensiccoe.org/improving-e1/>  
<https://www.justice.gov/olp/forensic-science#needs>

December 2019

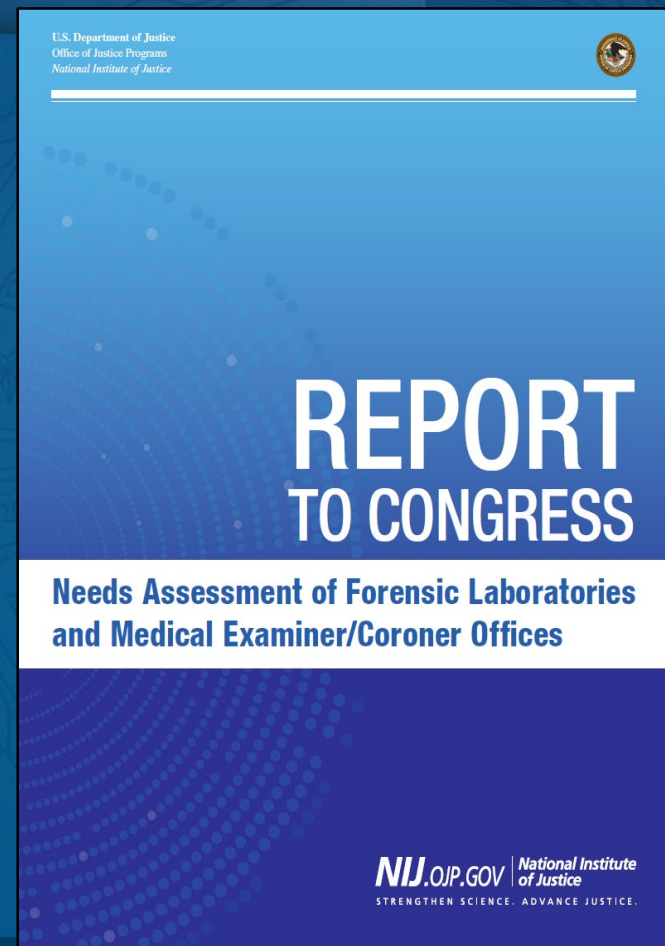
# Future Ideas:

- Systems-based Approaches and Coordination
- Standardization and Best Practices
- Workforce, Resources, Court Operations
- Organizational Structure or Approach
- Knowledge and Data Transfer and Info Sharing
- Technology Adoption
- Increased Research Participation



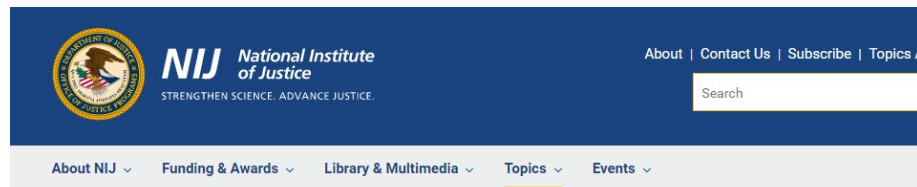
**NIJ**

<https://forensiccoe.org/improving-e1/>  
<https://www.justice.gov/olp/forensic-science#needs>



December 2019

# Make connections to improve research



## Connecting Researchers with Forensic Laboratories

April 27, 2020

NIJ encourages researchers to seek guidance from, or partner with, forensic practitioners. Such associations foster a greater understanding of the issues unique to the field of forensic science, and may strengthen the scope of the proposed research plan.

We encourage prospective research grant applicants to reach out to these labs to discuss preparing an application for open or future research solicitations.<sup>[1]</sup>

Current forensic research grantees may work with these labs to fine tune and ensure that their research products are well-suited for practitioner needs, or to build relationships in anticipation of transitioning research products to the field – potentially under the annual [Research and Evaluation in Publicly Funded Forensic Laboratories](#) solicitation.

The labs listed in the table below have expressed an interest in connecting with researchers:

*Note, there are no guarantees of placement or projects until awards are made.*

Show  entries

Search:

Laboratory	State	Area of Interest/Discipline	Contact(s)
------------	-------	-----------------------------	------------

### Get on the list

If you work in an operational forensic laboratory (including federal, state, local, private, or academic) and would like your contact information added to this list, please email [grants@ncjrs.gov](mailto:grants@ncjrs.gov).



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<https://nij.ojp.gov/topics/forensics/connecting-researchers-forensic-laboratories>



# *Thank you!*

## Q & A

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