NIST Panel Discussion

John M. Butler
NIST Fellow & Special Assistant to the Director for Forensic Science

Mark D. Stolorow
Director of OSAC Affairs
Presentation Plan

• John
  – NIST history with NIJ
  – Recent efforts with NCFS, OSAC, and research

• Mark (OSAC)
  – Provided Questions 1-6

• John (NCFS and research)
  – Provided Questions 7-9

• Q&A (~45 minutes)
NIST’s Early History in Forensic Science Research

• **1913** - Wilmer Souder was asked to calibrate some precision measuring devices sent to him by famed handwriting expert Albert Osborn.

• By the 1930s – Souder was recognized as a pioneer researcher in questioned documents, handwriting, typewriting, ballistics, and firearms.

• Souder was instrumental in setting up the FBI Laboratory, which opened in 1932

*NIST began work with fingerprints in the 1960s and with DNA in the 1990s*
<table>
<thead>
<tr>
<th>Year</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>Law Enforcement Standards Laboratory (LESL) formed within the National Bureau of Standards (NBS), part of the U.S. Department of Commerce; <strong>Jacob Diamond</strong> is first director; fully funded by the National Institute of Law Enforcement and Criminal Justice (predecessor to NIJ)</td>
</tr>
<tr>
<td>1979</td>
<td><strong>Lawrence Eliason</strong> becomes second director of LESL</td>
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<tr>
<td>1988</td>
<td>The name of NBS is changed to the National Institute of Standards and Technology (NIST)</td>
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<td>1991</td>
<td>LESL becomes OLES within the NIST Electronics and Electrical Engineering Laboratory</td>
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<tr>
<td>1994</td>
<td><strong>Kathy Higgins</strong> becomes the third director of OLES</td>
</tr>
<tr>
<td>2008</td>
<td><strong>Mark Stolorow</strong> becomes the fourth director of OLES</td>
</tr>
<tr>
<td>2011</td>
<td>During NIST re-organization, OLES is moved under the Associate Director of Laboratory Programs and name is changed to the Law Enforcement Standards Office within the <strong>Special Programs Office (SPO)</strong>; direct NIJ funding stopped; NIST forensic science research funded directly from Congress</td>
</tr>
<tr>
<td>2013</td>
<td>OLES formally dissolved and SPO Forensic Science Program formed</td>
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</tbody>
</table>
John Butler personal experiences with NIJ

- **1993-1995**: graduate student support for research conducted at FBI Laboratory Forensic Research Unit on capillary electrophoresis for DNA analysis (resulted in a 254-page dissertation that pioneered the method used around the world today); $70k

- **1995-1997**: NIJ funds provided some assistance for development of the NIST website on DNA markers (STRBase)

- **1997-1999**: GeneTrace Systems (Alameda, CA) rapid DNA analysis using mass spectrometry (received 2 NIJ grants)

- **1999-2011**: supplemented forensic DNA reference material development and supported continued research and evaluation of forensic DNA methods and markers at a level of ~$1M per year

- **Has assisted with NIJ research proposal reviews in the past (most recently in June 2012)**
Opening Statement of my 2010 Book “Fundamentals of Forensic DNA Typing”

NIJ funding has supported almost all of my 150 publications and three of my five textbooks on DNA.

This work was funded in part by the National Institute of Justice (NIJ) through interagency agreement 2008-DN-R-121 with the NIST Office of Law Enforcement Standards. Points of view in this document are those of the author and do not necessarily represent the official position or policies of the U.S. Department of Justice. Certain commercial equipment, instruments, and materials are identified in order to specify experimental procedures as completely as possible. In no case does such identification imply a recommendation or endorsement by the National Institute of Standards and Technology nor does it imply that any of the materials, instruments, or equipment identified are necessarily the best available for the purpose.
NCFS and OSAC: U.S. Efforts to Strengthen Forensic Science

- National Academy of Sciences (NAS) report issued in Feb 2009
- White House Subcommittee on Forensic Science (SoFS) operated from July 2009 to Dec 2012

DOJ/NIST Partnership (announced Feb 2013)

1. NCFS (National Commission on Forensic Science)
   - First meeting held February 3-4, 2014 in Washington DC

2. OSAC (Organization of Scientific Area Committees)
   - 542 members named; first public meetings held in Feb 2015
Co-lead with DOJ

National Commission on Forensic Science

NIST Point-of-Contact (POC): John Butler

A federal advisory committee for the U.S. Department of Justice

http://www.justice.gov/ncfs

Organization of Scientific Area Committees

POC: Mark Stolorow & John Paul Jones

NIST-administered effort dedicated to identifying and developing technically sound, consensus-based documentary standards and guidelines

http://www.nist.gov/forensics/osac/

NIST Forensic Science Research Program

POC: Sue Ballou

SIX FOCUS AREAS

1. Ballistics and Associated Tool Marks
2. Digital and Identification Forensics
3. Forensic Genetics
4. Toxins
5. Trace
6. Statistics

http://www.nist.gov/forensics

NIST Forensic Science Center of Excellence (to be awarded FY15)
Please explain how OSAC is structured, its purpose, goals, and expected outcomes?

- **Structure**: 1 governing board, 3 resource committees, 24 subcommittees organized into 5 scientific area committees.

- **Purpose**: to provide quality standards and guidelines for the forensic science community.
  - Initial gathering of forensic standards and guidelines currently has 718 entries (http://www.nist.gov/forensics/osac/standards-guidelines-catalog.cfm)

- **Goals**: implementation of quality standards and guidelines to strengthen the practice of forensic science, enforced by accreditation bodies.

- **Expected outcomes**: to identify and develop technically sound, consensus-based documentary standards and guidelines.
Organization of Scientific Area Committees

OSAC

Functional Organization Chart

Practice-focused

542 members and >1200 affiliates as subject matter experts participating in 24 subcommittees, 5 scientific areas, 3 resource committees (legal, quality, human factors), and 1 governing board (Forensic Science Standards Board)

http://www.nist.gov/forensics/osac/index.cfm

Initial membership finalized Dec 22, 2014
Organization of Scientific Area Committees (OSAC)

Forensic Science Standards Board (FSSB)

Legal Resource Committee (LRC)

Quality Infrastructure Committee (QIC)

Human Factors Committee (HFC)

collaborative group of 542 forensic practitioners & other experts

Bottom portion (subcommittee membership) announced Oct 29 & Dec 22, 2014

SAC = Scientific Area Committee
Sub = Subcommittee

>1200 additional applicants who can assist with task group efforts as OSAC affiliates
# Understanding the OSAC Levels

## Forensic Science Standards Board (FSSB)
- Set policy, rules, priorities for OSAC
- Manage OSAC Registry of Approved Standards and Approved Guidelines

## Legal Resource, Quality Infrastructure, Human Factors Committees
- Provide advice across all forensic science and discipline committees

## Scientific Area Committees
- Manage work within a scientific area (harmonize/leverage across related disciplines)
- Adopt and approve scientific area standards, (e.g., terminology, reporting requirements, conclusion statements)

## Discipline Specific Subcommittees (Working Groups)
- Identify and develop (with an SDO or the canvass method) standards & guidelines for discipline
OSAC Scientific Area Committee Public Meetings
held February 16-17, 2015 in Orlando, FL

1 of 30 presentations that can be downloaded

Priority Action Report
Friction Ridge Subcommittee
SAC Physics/Pattern
Melissa R. Gischo
February 17, 2015

- This friction ridge subcommittee presentation contains 27 slides
- Reviews subcommittee leadership, membership, priority topics, and task groups

https://workspace.forensicosac.org/kws/public
How does NIST see NIJ fitting in relation to the new OSAC/NIST structure? How are the roles of NIST/NIJ distinct?

- **NIJ’s relationship to OSAC**: No formal relationship currently exists but the potential exists to create ties (e.g., future Federal funding administered through NIJ might be linked to compliance with OSAC standards as part of accreditation)

- **Distinct roles of NIJ and NIST**:
  - NIJ Office of Investigative and Forensic Sciences improves the quality and practice of forensic science through innovative solutions that support research and development, testing and evaluation, technology, information exchange and the development of training resources for the criminal justice community
  - NIST SPO Forensic Science Program strengthens the practice of forensic science through collaborating and conducting research, facilitating documentary standards development, producing quality reference standards and databases, convening symposia and training workshops, coordinating inter-laboratory studies and informing interagency forensic science policy recommendations

- **NIJ** uses open solicitations to fund extramural research; **NIST** works directly with the forensic science community to determine needs and then makes internal funding decisions to perform intramural research
Has the NIJ/NIST partnership informed the structure or mission of the OSAC effort? If so, how?

• OSAC effort is building on Scientific Working Groups (SWGs) formerly funded by NIJ, FBI, DEA and other agencies

• NIST/NIJ held a joint meeting on June 18, 2013 with the SWG chairs that assisted in the development of the eventual OSAC framework

• NIJ funded research could provide supporting data to validate or contradict existing guidelines, which would trigger re-drafting by OSAC
<table>
<thead>
<tr>
<th>Scientific Working Group (SWG)</th>
<th>Topic (Forensic Discipline)</th>
<th>Start</th>
<th>Sponsor</th>
<th>Website</th>
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<tbody>
<tr>
<td>1 SWGDAM</td>
<td>DNA</td>
<td>1988</td>
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<td>2 SWGMAT</td>
<td>Materials (Trace)</td>
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<td>3 SWGFAST</td>
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<td>4 SWGDRUG</td>
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<td>DEA</td>
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<td>5 SWGIT</td>
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<td>FBI OTD</td>
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<td>6 SWGDOC</td>
<td>Document Examination</td>
<td>1997</td>
<td>FBI</td>
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<tr>
<td>7 SWGDE</td>
<td>Digital Evidence</td>
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<td>8 SWGGUN</td>
<td>Firearms &amp; Toolmarks</td>
<td>1998</td>
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<td>9 SWGFEX</td>
<td>Fire Debris &amp; Explosives</td>
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<td>2002</td>
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<td>12 SWGDOG</td>
<td>Dog &amp; Orthogonal Detector</td>
<td>2004</td>
<td>FBI</td>
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<td>13 SWGGSR</td>
<td>Gun Shot Residue</td>
<td>2007</td>
<td>NIJ</td>
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<td>14 SWGANTH</td>
<td>Anthropology</td>
<td>2008</td>
<td>FBI</td>
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<td>15 SWGTOX</td>
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<td>2009</td>
<td>NIJ</td>
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<td>16 FISWG</td>
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<td>2011</td>
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<td>21 SWGSPEAKER</td>
<td>Voice Analysis</td>
<td>2012</td>
<td>FBI</td>
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Will the OSAC make recommendations on research needs in their areas?

- **Yes** – in the process of reviewing draft standards and guidelines, it is possible that each Scientific Area Committee will discuss research needs or discover gaps within the 24 forensic science disciplines currently represented in OSAC Standards development by members of OSAC will highlight research needs and inform the forensic science community in ways that NIJ will have the opportunity to ingest and use in setting research priorities to fund
If OSAC makes such recommendations, how will research requests from the OSAC and NIST be funded?

• While the focus of OSAC is on standards development not on research or research priorities, NIST is open to finding a way to have the research needs identified by OSAC summarized in an annual report as well as part of regular information sharing that occurs from public SAC meetings.

• Other opportunities to connect OSAC acquired knowledge with future NIJ research agendas can certainly be explored.
Will OSAC consider the results of any recent NIJ R&D efforts when setting standard practices?

- It is expected and we hope so!

- OSAC has ~20% researchers in each subcommittee to help address this question
Are there any NIJ research projects that have (or has the potential to) change practice in forensic science?

- **Past**: new DNA methods for damaged samples using miniSTRs (NIST/NIJ interagency agreement)

- **Present**: NIST/NIJ Latent Print Examination and Human Factors report (NIST/NIJ interagency agreement)

- **Future**: Cadre Research TopMatch-GS 3D system
  - Website for more information: [http://www.cadreresearchlabs.com/?q=forensics](http://www.cadreresearchlabs.com/?q=forensics)

*We will defer to Gerry LaPorte from NIJ for other examples.*
New NIST-developed “miniSTR” Assays Enable Improved Recovery of Damaged DNA

At the request of the New York City Office of Chief Medical Examiner Forensic Biology Laboratory, a new DNA test (named “miniSTRs”) was developed at NIST to help identify victims of the WTC 9/11 terrorist attacks. The technology was transferred to Bode Technology Group and used on 20,000 badly damaged bone fragments recovered from WTC – yielding 20 % more information on the badly damaged DNA. miniSTRs were later commercialized by Applied Biosystems into the MiniFiler kit and they have made millions off of these kits.

miniSTRs enabled analysis of Romanov bone fragments
discovered in 2007 to help identify the two missing children

miniSTRs enabled analysis of King Tut’s family DNA
in 2009 from mummified remains more than 3500 years old

New miniSTRs adopted as part of new core markers in Europe in 2009 and soon to be in U.S. (FBI moving to 20 required markers in 2017)
U.S. is Moving to 20 Core Loci

<table>
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<th>Locus</th>
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<td>CSF1PO</td>
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<td>D5S818</td>
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<td>D8S1179</td>
<td>D13S317</td>
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<td>D16S539</td>
<td>D18S51</td>
<td>D21S11</td>
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<td>D2S441</td>
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<td>D2S1338</td>
<td>D10S1248</td>
<td>D12S391</td>
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<tr>
<td>D19S433</td>
<td>D22S1045</td>
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</tbody>
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**Letter to the Editor**

Selection and implementation of expanded CODIS core loci in the United States

“The CODIS Core Loci Working Group selected a consortium of 11 CODIS laboratories…these laboratories performed validation experiments…

With the assistance of the National Institute of Standards and Technology (NIST), the data generated through these validation studies were compiled, reviewed and analyzed.”

Three major reasons for expanding the CODIS core loci in the United States


- **To reduce the likelihood of adventitious matches** as the number of profiles stored at NDIS continues to increase each year

- **To increase international compatibility** to assist law enforcement data sharing efforts

- **To increase discrimination power to aid missing persons cases**
An Example of Direct Impact to Practice:
Latent Print Examination and Human Factors Report

- February 2012 report from the Expert Working Group on Human Factors in Latent Print Analysis
- Input from 64 contributors and 11 reviewers
- Provides 34 recommendations and detailed process maps
- Has directly influenced change in laboratory processes and reports from the FBI Laboratory and others

12 MB pdf file (249 pages) available from
http://www.nist.gov/forensics/publications.cfm
Other Recent NIST/NIJ Publications

http://www.nist.gov/forensics/publications.cfm

- Biological Evidence Preservation Handbook (2013)
- Forensic Lab Construction (2013)
- Crime Scene Investigation (2013)

Free pdf documents available

73 pages
NIJ award to NIST: 2010-DN-R-7121

98 pages
NIJ award to NIST: 2010-DN-R-7121

180 pages
NIJ award to NFSTC: 2007-MU-BX-K008
Recent Forensic Conferences Held at NIST in Collaboration with NIJ

Improving Biometric and Forensic Technology: The Future of Research Datasets
January 26-27, 2015

Forensic Optical Topography Meeting (with NIJ and RTI International)
March 17-18, 2015

http://www.nist.gov/forensics/conferences_and_events.cfm
Summarize the Mission, Goals, and Work of the National Commission on Forensic Science

- See following slides
National Commission on Forensic Science (NCFS)

www.justice.gov/ncfs

NCFS Leadership

Sally Q. Yates
Acting Deputy Attorney General
DOJ Co-Chair

Willie E. May
Acting Director of NIST
NIST Co-Chair

Nelson A. Santos
Vice-Chair (DOJ)

John M. Butler
Vice-Chair (NIST)

31 voting and 8 ex-officio members

Last meeting (5th): January 29-30, 2015
Next meeting (6th): April 30-May 1, 2015
Timeline for Commission Activities

- Announcement at AAFS 2013 meeting (February 21, 2013)
- Commission charter filed (April 23, 2013)
- Commission membership named (January 10, 2014)

Meetings held so far (first-term of Commission):
- First meeting (February 3-4, 2014)
- Second meeting (May 12-13, 2014)
- Third meeting (August 26-27, 2014)
- Fourth meeting (October 28-29, 2014)
- Fifth meeting (January 29-30, 2015)

Future meetings planned:
- Sixth meeting (April 30-May 1, 2015)
- Seventh meeting (August 10-11, 2015)
- Eighth meeting (December 7-8, 2015)
- Ninth meeting (March 21-22, 2016)
- Tenth meeting (June 20-21, 2016)

Federal Advisory Committees exist on a 2-year renewal cycle

The existing Commission charter expires April 23, 2015

DOJ plans to renew charter (and include digital evidence)
NCFS Meeting 5 Topics
January 29-30, 2015

• Subcommittee Reports & Work Product Discussion
  – Four final work products discussed; three were approved

• Update on Bureau of Justice Statistics law enforcement agency forensic unit survey plans (Speaker: Erica Smith)

• Panel on documentary standards
  – Speakers: Gordon Gillerman, Warren Merkel, Karen Reczek

• Panel on judicial training
  – Speakers: Katheryn Yetter, Judge Jeremy Fogel, Judge Mark Atkinson

• Presentation on accreditation and certification within the MDI community
  – Speaker: Steven Clark

## Current NCFS Subcommittees

http://www.justice.gov/ncfs/subcommittees

*where much of the Commission work occurs…*

<table>
<thead>
<tr>
<th>NCFS Subcommittee</th>
<th># Commissioners</th>
<th># Non-Commissioners</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Accreditation &amp; Proficiency Testing</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>2. Human Factors &amp; Cognitive Bias</td>
<td>5</td>
<td>13+1</td>
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<tr>
<td>3. Interim Solutions</td>
<td>12</td>
<td>2</td>
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<tr>
<td>4. Medico-legal Death Investigation</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>5. Reporting &amp; Testimony</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>6. Scientific Inquiry &amp; Research</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>7. Training on Science &amp; Law</td>
<td>8</td>
<td>6</td>
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</tbody>
</table>

*Most Commissioners are on multiple subcommittees*

57 non-Commissioners contributing to the process

Subcommittee products are discussed and voted on by the full Commission prior to be recommended to the Attorney General
From our perspective, some current primary challenges in forensic science:

1. DNA mixture interpretation
2. Growth in mobile & computer forensic needs
3. Keeping up with emerging synthetic drugs
4. Quantitative fingerprint evaluations and applying relevant statistics to other forms of pattern evidence

More critical thinking is needed in forensic science at the bench level and in management
Focus and Status

- This new Center of Excellence will focus on developing probabilistic methods to support the forensic science disciplines with a focus on Pattern Evidence and Digital Evidence.

- Center will also focus on developing training tools for practitioners and non-practitioners.

- Solicitation was open from August 19 to December 11, 2014.

- NIST plans to make the award soon (Spring 2015).

- For more information, see http://www.nist.gov/coe/forensics/


www.nist.gov/forensics

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