Forensic Science Activities at NIST

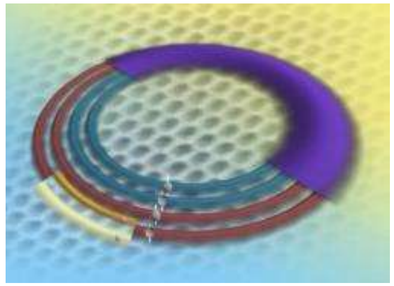
Willie E. May, Under Secretary of Commerce for Standards and Technology & NIST Director

National Commission on Forensic Science
December 7, 2015

NIST's Mission is to:

promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

- **The development and maintenance of standards provides the first and primary reason for NIST's existence. This standards work must keep abreast with the expansion of the frontiers of science"**
- **Our deep and broad research expertise and competencies support expanding standard needs as well as technological innovation – e.g., new materials, advanced clinical diagnostics and therapies, advanced communications, Forensic Science, etc.**



Nanomanufacturing: New measurement tools for advanced materials manufacturing

Cybersecurity: Improved response to cyber threats

Advanced Communications: Testbeds, quality control, interoperability for next-generation communications

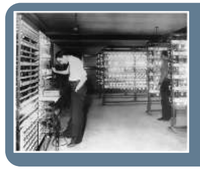
- **Our non-regulatory status enables our important role as a convener to facilitate collaborations between industry and government**

Since our inception as NBS, in addition to maintaining the more traditional National Physical Measurement Standards, we have also focused a significant portion of our research and measurement services activities on addressing contemporary societal needs.

1901

Supporting the Industrial Revolution

Interoperability of fire hose screw threads



Light bulb standards

Standards for Irons and Steels

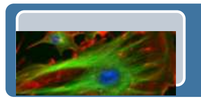
Working with ICC to reduce railway accidents

2015

Advanced communications

Advanced manufacturing

Advanced materials



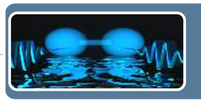
Biosciences

Cyber-physical systems

Cybersecurity

Disaster resilience

Forensic science



Quantum science

History of Forensics at NIST

The nation's first crime lab:

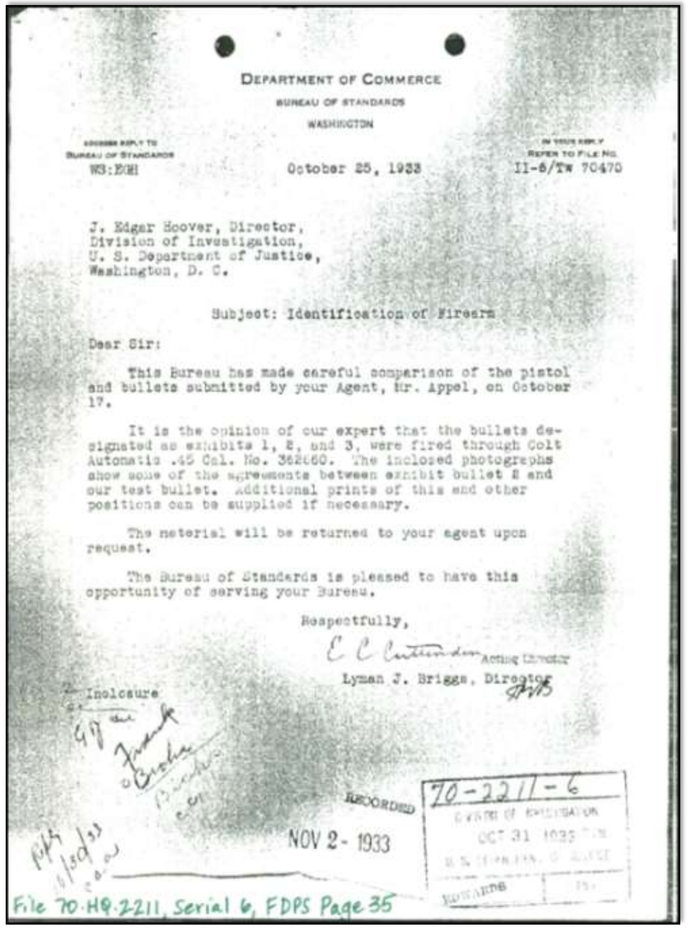
From 1913, NIST has supported forensic science and functioned as the *de facto* crime lab until 1932

From 1932, National Bureau of Standards (now NIST) expertise in firearms and document identification helped solve hundreds of crimes.

Wilmer Souder helped the Division of Investigation (now the FBI) establish its crime lab in 1932.

In 1935, Souder's testimony on handwriting samples was key to convicting Richard Hauptmann in the kidnapping and murder of Charles Lindbergh's son. *(Federal Kidnapping Act)*

Souder became an expert in the following disciplines: ID of questioned documents, handwriting, typewriting, bullets, cartridge cases, firearms



DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON

WS:EOH October 25, 1933 11-6/TW 70470

J. Edgar Hoover, Director,
Division of Investigation,
U. S. Department of Justice,
Washington, D. C.

Subject: Identification of Firearm

Dear Sir:

This Bureau has made careful comparison of the pistol and bullets submitted by your Agent, Mr. Appel, on October 17.

It is the opinion of our expert that the bullets designated as exhibits 1, 2, and 3, were fired through Colt Automatic .45 Cal. No. 362860. The inclosed photographs show some of the agreements between exhibit bullet 2 and our test bullet. Additional prints of this and other positions can be supplied if necessary.

The material will be returned to your agent upon request.

The Bureau of Standards is pleased to have this opportunity of serving your Bureau.

Respectfully,

E C Crittenden Acting Director
Lyman J. Briggs, Director

2 Inclosure

RECORDED NOV 2 - 1933

70-2211-6

File 70-HQ-2211, Serial 6, FDPS Page 35

1933 Letter from NBS Director Lyman J. Briggs to FBI Director J. Edgar Hoover, reports on ballistics analysis that confirms evidential bullets match a specific Colt .45 revolver.

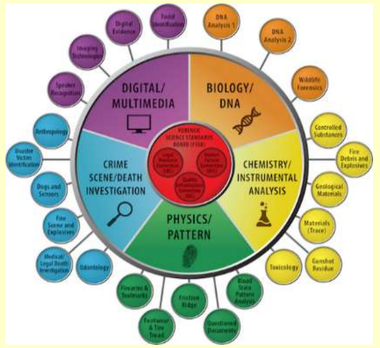
NIST Forensic Science Efforts

Partnership with Department of Justice

National Commission on Forensic Science (NCFS)

Department of Justice FACA
co-led by NIST
setting policy

Organization of Scientific Area Committees (OSAC)



NIST-administered
>540 members of the community
establishing standards and best practices

NIST Internal Research Programs

NIST FORENSIC SCIENCES

~$7.5M/year invested

International Symposium on Forensic Science Error Management

432 participants (11 countries)

Challenge Going Forward – Is the Science Sound?

1) **Topical Area?**
- DNA, Digital, Toxins

2) **How well can it be measured?**
- Accuracy, Precision, Specificity, Limit of detection, etc

3) **What does the measurement mean** (interpretation)**?**
- Precedence for the method (Is this an established method or is it new?)
- Admissibility (A decision for the courts)

NIST research efforts focus on items 1&2 in six areas.
- are these the most urgent ?

Strengthening Forensic Science

Establishing science-based methods since 1913

6 Focus Areas in Current NIST Research Efforts	
Forensic Genetics	Increased reliability of analysis of DNA samples
Ballistics and Associated Tool Marks	An objective, numerical and statistically valid criteria for identification of firearm and tool mark evidence
Digital and Identification Forensics	Reference data for personal computer software through the National Software Reference Library (NSRL) and the Computer Forensic Tool Testing (CFTT) program. Support for the FBI fingerprint database
Statistics	A long term program to build new methods suited to forensic problems in the specific use cases such as illicit drug analysis, pattern recognition, and trace evidence analysis
Toxins	Designer drugs, synthetic marijuana, and ricin are a few of the compounds requiring measurement research to establish validated analytical procedures
Trace	Development of objective measures for interpretation of evidence to promote standardization of trace evidence work across laboratories

Wilmer Souder, NIST forensic science pioneer

On-going research with toolmark imaging

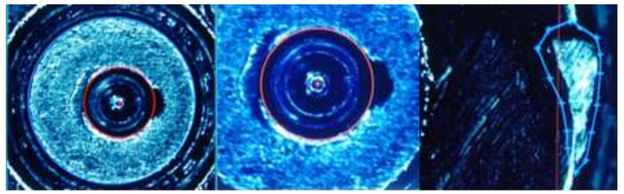
Ballistics and Toolmarks

5 Year Goal:

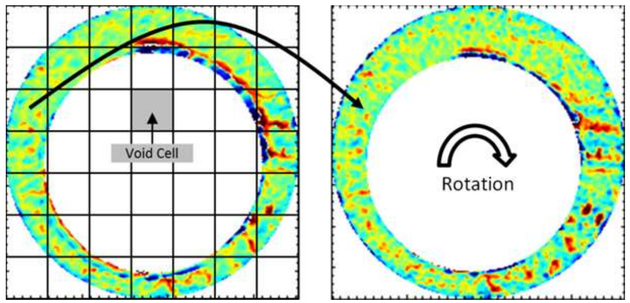
To produce scientifically valid and objective measurement methods with error rate reporting that ultimately support a conclusion of identification for ballistic evidence, including laying the groundwork for use in court proceedings.

Impact:

Research results have been adopted by crime labs and industry such as the FBI and Sensofar. State and federal crime labs are working to implement and validate recent advances in error rate reporting.



Credit: Theodore Vorbuger/NIST



NIST FORENSIC SCIENCES

Strengthening Forensic Science

NIST's New Forensic Science Center of Excellence

NIST funding of $20M over 5 years

Goals:

- **improve the statistical foundation for pattern evidence** (fingerprints, firearms, tool marks, etc.) **and digital evidence** (computer, video, and audio analyses)
- **develop education and training on probabilistic methods** for practitioners and other relevant stakeholders

Awardees:

Consortium led by **Iowa State** involving Carnegie Mellon, University of California-Irvine, and the University of Virginia

csafe

Center for Statistics and Applications in Forensic Evidence

Science Center of Excellence

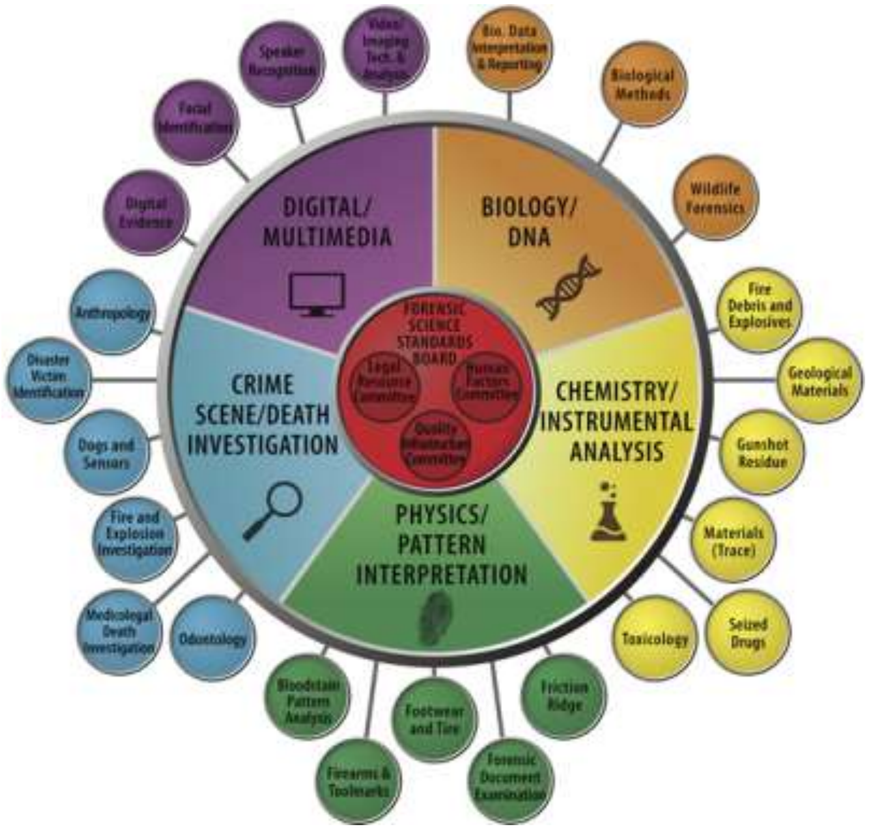
Kickoff Meeting held October 26-27, 2015 in Ames, IA

CSAFE will focus on the following objectives:

- Bring together forensic practitioners and expert statisticians to **develop and apply statistical methods** to: latent prints, ballistics, tire marks, footwear, handwriting, bloodstain pattern, tool marks, computer and information systems, mobile devices, network traffic, social media, and GPS
- **Develop,** in collaboration with NIST scientists, **new methods for forensic evidence**
- **Develop new inference techniques that account for various sources of uncertainty**
- **Establish a sound base of interpretation for forensic evidence** in judicial settings
- **Educate and train forensic practitioners, judges and attorneys**, and the next generation of statisticians

Upcoming OSAC Events

(further updates by FSSB Chair at this meeting)



- **January 2016** – Second in-person meeting of OSAC subcommittees (Leesburg, VA)
- **February 22-23, 2016** – Second public meeting with presentations by SAC and subcommittee chairs in Las Vegas, NV as part of AAFS

January 2016 – first posting to OSAC Registry of Approved Standards (anticipated for 5 documents that have been out for public comment)

Follow-up to Highly Successful First International Symposium on Forensic Science Error Management (July 21-24, 2015)

- ***Proceedings being finalized***
  - plan to have out before Dec 31, 2015
- **Website**: http://www.nist.gov/director/international_forensics_home.cfm
  - **Talk slide PDFs** (85 available with 2767 slides): http://www.nist.gov/director/orals.cfm
  - **Recorded Keynote and Plenary Talks** (7 videos): http://www.nist.gov/director/recorded_symposium_sessions.cfm
- **Discussing potential 2nd meeting in May 2017** (stay tuned)

AAFS 2016 Plenary Session

Transformation: Embracing Change

An International Panel Discussion on the Impact of Recent Forensic Science Initiatives and the Response of the Global Community

Plenary Program Speakers

NCFS Co-Chair

Sally Q. Yates, JD
U.S. Department of Justice
Washington, DC

Gillian Tully, PhD
Forensic Science Regulator,
UK Home Office
UNITED KINGDOM

Alastair Ross, AM
National Institute of Forensic Science,
Retired
AUSTRALIA

Reinout Woittiez, PhD
Netherlands Forensic Institute
NETHERLANDS

NCFS Co-Chair

Willie E. May, PhD
National Institute of Standards and Technology
Gaithersburg, MD

Victor W. Weedn, MD, JD
AAFS President
George Washington University
Department of Forensic Sciences
Washington, DC

Moderator:
John M. Butler, PhD
NIST

NCFS Vice-Chair

Thank You for Your Attention

Questions / Discussion ?

Gaithersburg, MD
62 buildings; 578 acres

Boulder, CO
26 buildings; 208 acres