

Innovations in Science, Technology, Engineering, and Math: NIST and US National Priorities

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Forensic Science Research Program

Providing research and measurement services such as validated test methods, Standard Reference Materials, and Reference Data.

Forensic Science Research Program

National Call



The need for objective, numerical and statistically valid criteria

Forensic Science Research Program

To address that call:

- We provide access to research, measurement science, and standards that make the forensic science community more successful
- We form the best teams to develop solutions to complex forensic science problems
- We create opportunities for success at NIST through trusted and reliable partnerships
- We connect NIST scientists with forensic practitioners to better use the full range of competencies that make NIST a unique agency

But



NBS Early Days of Forensic Science

The nation's first crime lab: from 1913 until 1932, National Bureau of Standards (NBS) expertise in firearms and document identification helped solve hundreds of crimes.

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

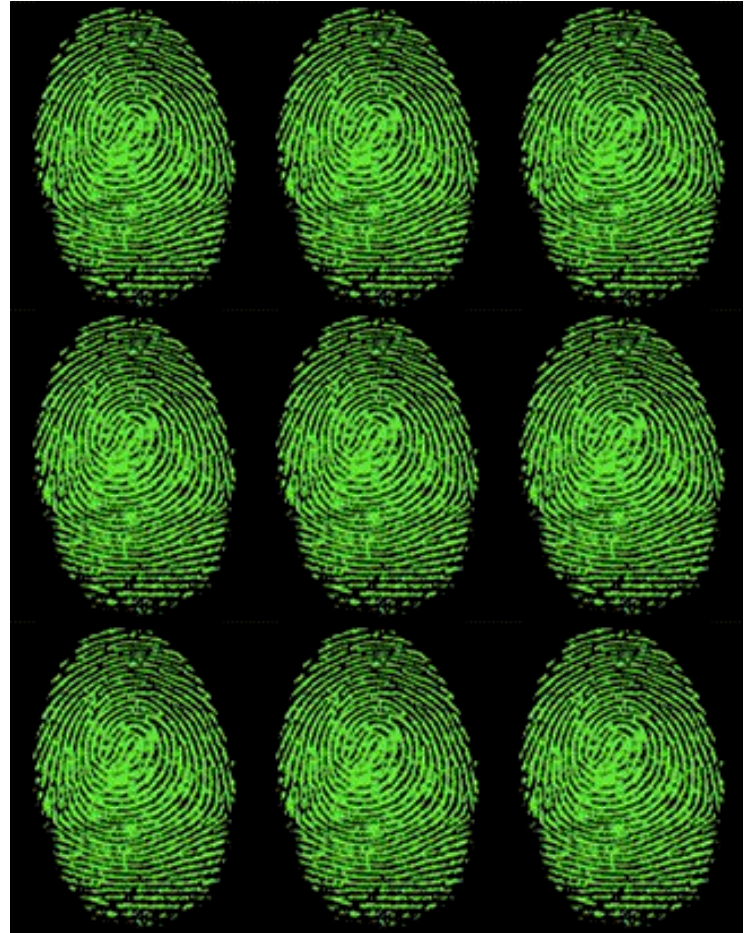
The Lindbergh kidnapping: In 1935, Souder's testimony on handwriting samples was key to convicting Richard Hauptmann in the kidnapping and murder of Charles Lindbergh's son.



Wilmer Souder
NBS scientist, 1913-1954

History of Forensics at NIST

1966: The FBI turned to NBS for scientific and technical support for its first computerized scanning protocol to read and record fingerprint characteristics.



Forensics at NIST

2001 World Trade Center - support New York City's Office of the Chief Medical Examiner during the identification effort

2002 D.C. Sniper – support another federal agency; x-ray the tree stump used for target practice

2014 Digitally map 3D replicas of the ballistic evidence in the President John F. Kennedy Assassination.



Forensic Science Research Program

Consists of:

1. Digital
2. DNA
3. Firearms
4. Statistical Methods

Forensic Science Research Program

4 Focus Areas

1. Digital:

- Human Identity - Biometric pattern matching technologies
- Computer Technology – NSRL, CFTT, Mobile devices

2. DNA: Interpretation of complex DNA mixtures, SRMs, Testing and validation of new STR typing kits, Rapid DNA Typing

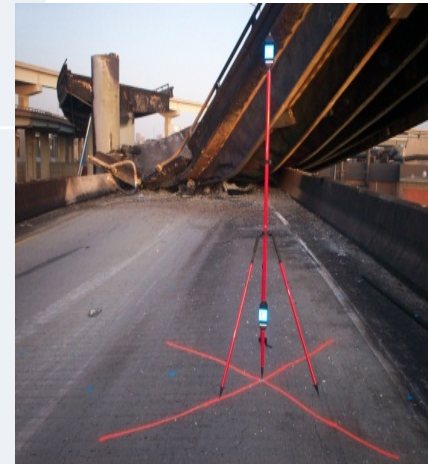
Forensic Science Research Program

4 Focus Areas

- 3. Firearms:** An open-access research database of bullet and cartridge case reference data, Estimating error rates, Congruent Matching Cell methodology
- 4. Statistical Methods:** Statistical measure of the uncertainty of the decisions made on the friction ridge evidence

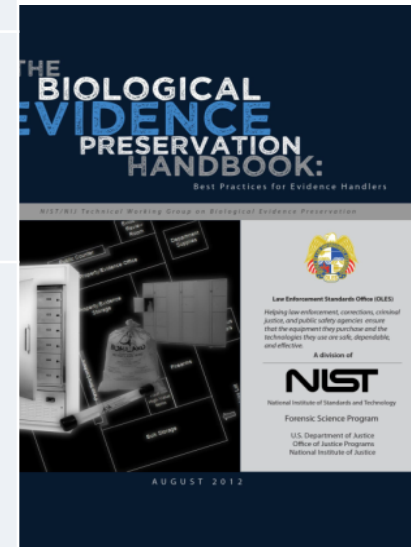
Laser Scanning and Photography of Crime Scenes

Project Background	<ul style="list-style-type: none">• Companies offer 360 degree laser scanning and photography of crime scenes• Need a traceable independent scale or artifact
Process	<ul style="list-style-type: none">• Determine accuracy, and possible factory traceability protocols for artifact developed• NIST's Dimensional Metrology Group developed a calibration scheme using a Leica target
Outcome/ Impact	<ul style="list-style-type: none">• Maintain calibration through NIST• Increased confidence in the system as it is used in crime scene reconstruction and preservation, and shooting scene reconstructions



Technical Working Group on Biological Evidence Preservation

Project Background	<ul style="list-style-type: none">• Direct request to develop best practices in evidence storage
Process	<ul style="list-style-type: none">• Working group met approx. quarterly to develop outputs specified during initial meetings
Outcomes/ Impact	<ul style="list-style-type: none">• Handbook published April 2013• http://www.nist.gov/oles/forensics/bioev.cfm• Report on Legislative Issues (in production)• Forensic Automated Identification Technology (AIT) Assessment (in publication)



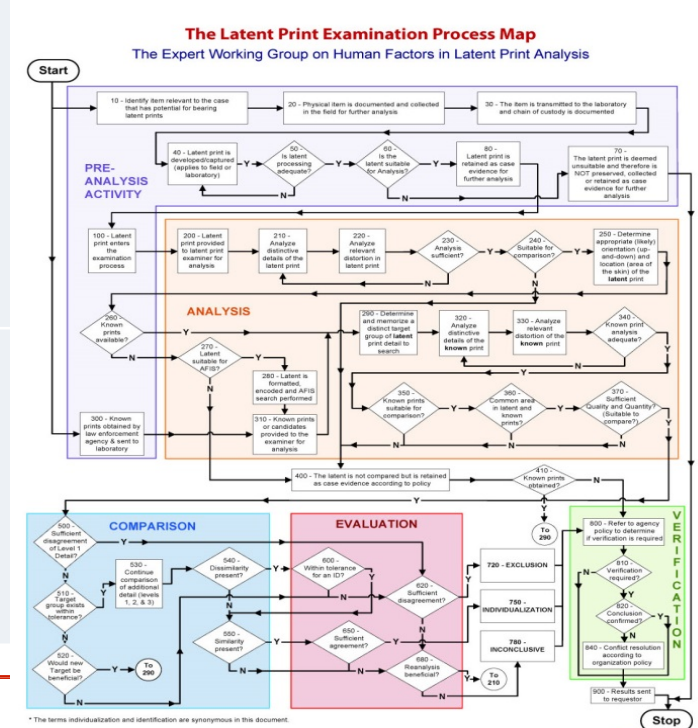
Standard Reference Material – Bullet and Casing

Project Background	<ul style="list-style-type: none">Establish standardization for network and entry activities to establish and maintain quality assurance
Process	<ul style="list-style-type: none">NIST developed manufacturing processes and measuring methods for the SRM's and determining validated QC scoresPartnered with ATF to assist in the entry and validation of benchmark network images
Outcome/ Impact	<ul style="list-style-type: none">Traceable method and SRM's used for Crime Laboratory quality programs.NIBIN units in crime labs have demonstrable data for lab accreditation.Better image acquisition



Human Factors Affecting Latent Prints

<p>Project Background</p>	<ul style="list-style-type: none"> Human factors analysis can be used to advance our understanding of the true nature of errors in complex work settings.
<p>Process</p>	<ul style="list-style-type: none"> Convened a working group on Latent Print Analysis – forensic examiners, statisticians, psychologists, researchers, legal scholars, subject matter experts
<p>Outcome/ Impact</p>	<ul style="list-style-type: none"> Published a 230 pg report with 34 recommendations to reduce error Created a Process Map translated in 3 languages



* The terms individualization and identification are synonymous in this document.

This diagram documents the steps of the ACE-V process as currently practiced by the latent print examination community. The numbers in each of the boxes correspond to "Steps" that are more fully described in the report. The purpose of this process map is to facilitate discussion about key decision points in the ACE-V process.

Expert Working Group on Human Factors in Latent Print Analysis, *Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach*, U.S. Department of Commerce, National Institute of Standards and Technology, 2012

NIST
 CLUES
 NIJ

<http://www.nist.gov/ceprints-022112.dlm>

Forensic Science Center of Excellence (COE)

Support NIST's efforts to strengthen forensic science to improve evidence interpretation and reporting.

Focus – Probabilistic Methods

1. pattern recognition
2. digital evidence

Thank You!

Questions?

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