

Forensic Science Assessments A Quality and Gap Analysis

National Commission on Forensic Science
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AAAS Project Staff

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Scientific Responsibility, Human Rights and Law Program
American Association for the Advancement of Science



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Laura and John Arnold Foundation

Project Advisory Committee

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Project Forensic Science Fields

- **Fire Investigation**
- **Latent Fingerprint Analysis**
- **Firearms and Tool Marks**
- Bitemark Analysis
- Trace Evidence—Hair Analysis
- Bloodstain Pattern Analysis
- Footwear and Tire Tracks
- Digital Evidence
- Trace Evidence- Fibers
- Trace Evidence- Paint and other coatings

Project Lineage

- 2006 Congressional Appropriation
- ↓
- The National Academies- National Research Council
- ↓
- The White House Office of Science and Technology Policy (OSTP)
National Science and Technology Council Committee on Science
- ↓
- Subcommittee on Forensic Science (SoFS)
- ↓
- Research, Development, Testing and Evaluation (RDT&E)
- ↓
- American Association for the Advancement of Science (AAAS)

Project Overview

- Project will evaluate the scientific foundation the forensic community relies on to support their practices and, where the scientific underpinning of these practices falls short, recommend areas requiring further study
- This “gap analysis” will produce a research agenda to:
 - Serve as the basis for arriving at forensic methods that will inspire greater confidence in our criminal justice system
 - Encourage basic scientists outside the forensic community to pursue the research topics presented in the reports and funding agencies to support these scientists
- Audience: Scientists (both forensic and non-forensic), legislators, legal and law enforcement communities, and public

Planned Process for Preparing and Disseminating Reports

- Each working group will produce a report setting forth its findings and recommendations
- AAAS has commissioned a writer to produce a “plain English,” jargon-free version of each report
- The technical report and the more accessible version will be accompanied by a AAAS press release highlighting its findings and recommendations
- Each report will be posted on the AAAS website along with a PowerPoint presentation that highlights key points
- AAAS will host webinars associated with the release of each individual report, accessible to all stakeholders
- AAAS will convene briefings for Members of Congress and their staff when project is completed

Phase 1 Working Groups

Fire Investigation Working Group	Firearms and Tool Marks Working Group	Latent Fingerprint Analysis Working Group
<p>Jose Almirall, Ph.D (Chair) (Chemistry) Florida International University</p>	<p>Tom Busey, Ph.D (Chair) (Cognitive Psychology/Human Factors) Indiana University</p>	<p>John Black (Forensic Science) Black & White Forensics, LLC.</p>
<p>Hal Arkes, Ph.D (Cognitive Psychology/Human Factors) Ohio State University</p>	<p>Bruce Craig, Ph.D (Statistics) Purdue University</p>	<p>Anil Jain, Ph.D (Biometric Engineering) Michigan State University</p>
<p>John Lentini, CFI, D-ABC (Forensic Science) Scientific Fire Analysis, LLC.</p>	<p>Chittaranj Sahay, Ph.D (Manufacturing Engineering/Metrology) University of Hartford</p>	<p>Jay Kadane, Ph.D (Statistics) Carnegie Mellon University</p>
<p>Frederick Mowrer, Ph.D (Fire Protection Engineering/Fire Science) California Polytechnic State University</p>	<p>Christopher Schuh, Ph.D (Materials Engineering) MIT</p>	<p>William Thompson, J.D., Ph.D. (Chair) (Human Factors) University of California, Irvine</p>
<p>Janusz Pawliszyn, Ph.D (Analytical Chemistry) University of Waterloo</p>	<p>Robert Thompson (Forensic Science) NIST</p>	

Working Group Meetings

- **Latent Fingerprint Analysis (Meeting: July 9, 2015)**
 - Prior to the in-person meeting, the Working Group Chair suggested that the quality of the Working Group's review of the literature might be enhanced if they were allowed to:
 - Frame the relevant questions themselves
 - Make a global assessment of how well those questions were addressed by the existing literature and what gaps exist
 - As a result, the original fifteen questions from the updated bibliography were combined to focus on six questions critical to evaluating the scientific basis of the field

Working Group Meetings

- **Fire Investigation (Meeting: July 20, 2015)**
 - Working Group members formulated their own set of questions covering both fire cause determination and fire debris analysis
 - The development of these questions was based partially on the original questions from the SoFS bibliography, but was also the product of what they as a group believed were the most critical issues in the field

Working Group Meetings

- **Firearms and Tool Marks (Meeting: August 20, 2015)**
 - Working Group members divided the articles from the bibliography into four categories:
 - Differentiability
 - Validation
 - Human Factors
 - Quantitative Studies
 - The fifth and final category, Research Needs and Agenda, would be written following completion of the analysis of those four categories

Project Milestones/Timeline & Challenges

- First priority was to select the first three fields and appropriate working group members
 - Forensic scientist selected first, with input from the Advisory Committee
 - Advisory Committee with Project staff compiled relevant scientific fields that should be represented on each WG and suggested potential members
 - Project staff researched various fields and came up with a list of potential nominees
- Managing 3 WG's concurrently has been challenging (14 members total)
 - In-person meetings were scheduled only when all (or majority) of WG members could be present; as a result, meetings were held later than planned
 - Each WG had its own "personality" and work style

- Peer Review of Reports: Technical and “Plain Language”
 - Advisory Committee and Selected Forensic Scientists
- Anticipated Schedule for Release of First 3 Reports
 - Latent Fingerprint Analysis & Fire Investigation: Late January 2016
 - Firearms and Tool Marks: Late February

Sample Table of Contents

- Cover
- Disclaimer
- Acknowledgements
- Table of Contents
 - Introduction
 - Methods at a Glance
 - Fire Investigation- A Primer
 - Conclusions and Recommendations
 - A. Fire Scene Investigation
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 - References
- Appendices
 - Working Group Roster
 - Working Group Bios
 - Methods in Detail
 - Bibliography
 - WG Questions that framed the Report
 - Project Advisory Committee and Staff

Forensic Science Assessments: A Quality and Gap Analysis

With funding from the [Laura and John Arnold Foundation](#), AAAS will conduct an analysis of the underlying scientific bases for the forensic tools and methods currently used in the criminal justice system. This project will evaluate the quality of the studies the forensic community relies on to support its practices and, where the scientific underpinning of these practices falls short, recommend a research agenda for the field.

About the Project

For many years, there have been claims that the forensic sciences are neither valid nor reliable and may not meet the admissibility standards established by the U.S. Supreme Court in its [1993 Daubert ruling](#). The claims were underscored in a 2009 report of the National Research Council that found that forensic science as currently practiced has “little systematic research to validate the discipline’s basic premises and techniques.” This report does not, however, specify what in the literature supports current forensic practice and what does not, nor does it provide a research agenda for moving forward. Several members of the recently-appointed [National Commission on Forensic Science](#) have commented on the need for further analysis.

AAAS will fill this void by conducting a quality and gap analysis of ten forensic disciplines (see below). Working groups will be appointed for each forensic field, and a distinguished Advisory Committee will advise on every aspect of the overall project. Reports will be issued for each of the fields specifying the quality of the existing literature and what research would strengthen the scientific foundation for that area. The project reports are expected to encourage basic research and contribute to improving the quality of forensic science used in the legal system. The project’s impact will be transformational for the criminal justice system, enabling the public to have confidence that the ability to convict the guilty and exonerate the innocent is enhanced.

Forensic Disciplines

1. Bloodstain Pattern Analysis
2. Digital Evidence
3. Fire Investigations--[view working group members](#) (meeting date: July 20, 2015)
4. Firearms and Toolmarks/Ballistics--[view working group members](#) (meeting date: August 20, 2015)
5. Footwear and Tire Tracks
6. Forensic Odontology - Bitemark Analysis
7. Latent Fingerprints--[view working group members](#) (meeting date: July 09, 2015)
8. Trace Evidence- Fibers
9. Trace Evidence- Hair
10. Trace Evidence- Paint & Other coatings

Advisory Committee

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Fire Investigations Working Group

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