STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD

Anne-Marie Mazza, Ph.D.
Director
Committee on Science, Technology, and Law
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The Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science or art.
THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

1863 - National Academy of Science
1916 - National Research Council
1964 - National Academy of Engineering
1970 - Institute of Medicine
CONGRESSIONALLY-MANDATED STUDY

• Under the Science, State, Justice, Commerce, and Related Agencies Appropriations Act of 2006, Congress authorized the National Academy of Sciences to conduct a study on forensic science, noting that
  – While a great deal of analysis exists of the requirements in the discipline of DNA, there exists little to no analysis of the remaining needs of the community outside of the area of DNA.
  – Therefore . . . the Committee directs the Attorney General to provide [funds] to the National Academy of Sciences to create an independent Forensic Science Committee.
  – This Committee shall include members of the forensics community and other scientists as determined appropriate.
COMMITTEE ON IDENTIFYING THE NEEDS OF THE FORENSIC SCIENCE COMMUNITY

- HARRY T. EDWARDS, (Co-Chair), Judge, U.S. Court of Appeals for the District of Columbia Circuit
- CONSTANTINE GATSONIS, (Co-Chair), Director, Center for Statistical Sciences, Brown University
- MARGARET A. BERGER, Suzanne J. and Norman Miles Professor of Law, Brooklyn Law School
- JOE S. CECIL, Project Director, Program on Scientific and Technical Evidence, Federal Judicial Center
- M. BONNER DENTON, Professor of Chemistry, University of Arizona
- MARCELLA FIERRO, Medical Examiner of Virginia (ret.)
- KAREN KAFADAR, Rudy Professor of Statistics and Physics, Indiana University
- PETE M. MARONE, Director, Virginia Department of Forensic Science
- GEOFFREY S. MEARNS, Dean, Cleveland-Marshall College of Law, Cleveland State University
- RANDALL S. MURCH, Associate Director, Research Program Development, Virginia Polytechnic Institute and State University
COMMITTEE ON IDENTIFYING THE NEEDS OF THE FORENSIC SCIENCE COMMUNITY (CONT.)

- CHANNING ROBERTSON, Ruth G. and William K. Bowes Professor, Dean of Faculty and Academic Affairs and Professor, Department of Chemical Engineering, Stanford University
- MARVIN SCHECHTER, Attorney
- ROBERT SHALER, Director, Forensic Science Program, Professor, Biochemistry and Molecular Biology Department, Eberly College of Science, The Pennsylvania State University
- JAY A. SIEGEL, Professor, Forensic and Investigative Sciences Program, Indiana University-Purdue University
- SARGUR N. SRIHARI, SUNY Distinguished Professor, Department of Computer Science and Engineering and Director, Center of Excellence for Document Analysis and Recognition (CEDAR), University at Buffalo, State University of New York
- SHELDON M. WIEDERHORN (NAE), Senior NIST Fellow, National Institute of Standards and Technology
- ROSS ZUMWALT, Chief Medical Examiner, Office of the Medical Examiner of the State of New Mexico
CONGRESSIONAL CHARGE TO COMMITTEE

• Assess present and future resource needs of forensic science community, including State and local crime labs, medical examiners, and coroners

• Make recommendations for maximizing use of forensic technologies and techniques to solve crimes, investigate deaths, and protect public

• Identify potential scientific advances that may assist law enforcement in using forensic technologies and techniques

• Make recommendations for programs that increase number of qualified forensic scientists and medical examiners available to work in public crime laboratories

• Disseminate best practices and guidelines concerning the collection and analysis of forensic evidence to help ensure quality and consistency in the use of forensic technologies and techniques

• Examine role of forensic community in homeland security mission

• Examine interoperability of Automated Fingerprint Information Systems

• Examine additional issues pertaining to forensic science
COMMITTEE HEARD FROM

- American Academy of Forensic Sciences
- American Association for the Advancement of Science
- American Society of Crime Laboratory Directors
- American Society of Crime Laboratory Directors - Laboratory Accreditation Board
- Analytical Chemistry Division, National Institute of Standards and Technology
- Arizona State University
- ASCLD Laboratory Accreditation Board
- Biomedical Forensic Sciences Program, Boston University School of Medicine
- Bureau of Justice Statistics
- Case Western Reserve University School of Law
- Cedar Crest College
- Centre for Criminal Justice Studies, School of Law, University of Leeds
- Center for Education and Research in Forensics and Department of Dental Diagnostic Science, The University of Texas Health Science Center at San Antonio
- City of Houston Crime Lab
- Clark County Coroner's Office (Las Vegas, Nevada)
- College of Pharmacy, University of Illinois at Chicago
- Consortium of Forensic Science
- Crime Scene Services, Massachusetts State Police
- Department of Defense
- Department of Homeland Security
- Department of Justice
- Department of Statistics, Carnegie Mellon University
- Drug Enforcement Administration
- DuPage County Sheriff's Office Crime Laboratory
- Emory University School of Medicine
- Exponent Federal Bureau of Investigation
- Forensic Analysis Division, U.S. Army Criminal Investigation Laboratory
- Forensic Integrated Product Team, U.S. Department of Defense
- Forensic Quality Services
- Forensic Science Associates
- Forensic Science Center at Chicago, Illinois State Police
- Forensic Science Initiative and Forensic Business Development, West Virginia University
- Fried, Frank, Harris, Shriver & Jacobson LLP
- Fulton County Medical Examiner's Center, Fulton County, Georgia
- Georgia Bureau of Investigation
- Gordon Thomas Honeywell Government Affairs
- Hennepin County Medical Examiner's Office, Minnesota
- The Higgins-Hermansen Group
- Federal Bureau of Investigation
- Forensic Analysis Division, U.S. Army Criminal Investigation Laboratory
- Forensic Integrated Product Team, U.S. Department of Defense
COMMITTEE HEARD FROM

- Forensic Quality Services
- Forensic Science Associates
- Forensic Science Center at Chicago, Illinois State Police
- Forensic Science Initiative and Forensic Business Development, West Virginia University
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- Fulton County Medical Examiner's Center, Fulton County, Georgia
- Georgia Bureau of Investigation
- Gordon Thomas Honeywell Government Affairs
- Hennepin County Medical Examiner's Office, Minnesota
- The Higgins-Hermansen Group
- Illinois State Police Forensic Science Center
- Innocence Project
- Institute for Forensic Science Administration, Fairleigh Dickinson University
- International Association for Identification
- Komarinski & Associates, LLC
- Las Vegas Office of the Coroner, Las Vegas, Nevada
- Massachusetts State Police
- McCrone Associates, Inc.
- Minnesota Bureau of Criminal Apprehension
- National Association of Medical Examiners
- National Biodefense Analysis and Countermeasures Center
- National Clearinghouse for Science, Technology and Law; Stetson University
- National Counterproliferation Center, Office of the Director of National Intelligence
- National Institute of Justice
- National Institute of Standards and Technology
- New Jersey Office of the State Medical Examiner
- New York Police Department Crime Laboratory
- School of Criminal Justice and Criminalistics, California State University, Los Angeles
- School of Psychology, University of Southampton
- Scientific Fire Analysis, LLC
- Scientific Services Bureau, Los Angeles County Sheriff's Department
- Scientific Working Group for Firearms and Toolmarks
- Scientific Working Group for the Analysis of Seized Drugs
- Scientific Working Group on Friction Ridge Analysis, Study and Technology
- Scientific Working Group on Materials Analysis
- Seton Hall Law School
- Stanford University School of Law
- Stoney Forensic, Inc.
- Stroz Friedberg, LLC
- U.S. Army Criminal Investigation Laboratory
- U.S. Secret Service
- University of California, Los Angeles Law School
- University of Virginia School of Law
ISSUES COVERED DURING COMMITTEE’S DELIBERATIONS

- Fundamentals of the scientific method as applied to forensic practice;
- Assessment of forensic methods and technologies;
- Infrastructure and needs for basic research and technology assessment in forensic science;
- Current training and education in forensic science;
- Structure and operation of forensic science laboratories;
- Structure and operation of the coroner and medical examiner systems;
- Budget, future needs, and priorities of the forensic science community and coroner/medical examiner systems;
ISSUES COVERED DURING COMMITTEE’S DELIBERATIONS

- Accreditation, certification, and licensing of forensic science operations, medical death investigation systems, and scientists;
- Scientific Working Groups (SWGs) and their practices;
- Forensic science practices—
  - pattern/experience evidence
  - analytical
  - digital evidence;
- Effectiveness of coroner systems as compared with medical examiner systems;
- Use of forensic evidence in criminal and civil litigation;
- Forensic practice and projects at various federal agencies;
- Forensic practice in state and local agencies;
- Nontraditional forensic service providers; and
- Forensic science community in the United Kingdom
CHALLENGES FACING THE FORENSIC SCIENCE COMMUNITY

- Disparities in the Forensic Science Community
- Lack of Mandatory Standardization, Certification, and Accreditation
- Broad Range of Forensic Disciplines
- Problems Relating to the Interpretation of Forensic Evidence
- Need for Research to Establish Limits and Measures of Performance
- Admission of Forensic Science Evidence in Litigation
- Political Realities
WHAT THE COMMITTEE FOUND

- Scores of talented and dedicated people the forensic science community performing vitally important work
- Often strapped for lack of adequate resources, sound policies, and national support
- Forensic science disciplines very important - deserve additional research to determine their reliability
- Clear that change and advancements, both systemic and scientific, needed in a number of forensic science disciplines to ensure the reliability of the disciplines, established enforceable standards, and promote best practices and their consistent application
WHAT IMPRESSED THE COMMITTEE THE MOST:

• Consistency of the message they heard

• The forensic science system, encompassing both research and practice, has serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country.

• This can only be done with effective leadership at the highest levels of both federal and state governments, pursuant to national standards, and with a significant infusion of federal funds.
WHAT IS NEEDED

- Forensic science enterprise needs strong governance to adopt and promote an aggressive, long-term agenda to strengthen the forensic science disciplines.

- Governance must be strong enough—and independent enough—to identify the limitations of forensic science methodologies, and be well connected with nation’s scientific research base to effect meaningful advances in forensic science practices.

- Governance structure must create appropriate incentives for jurisdictions to adopt and adhere to best practices and promulgate the necessary sanctions to discourage bad practices.

- It must have influence with educators in order to effect improvements to forensic science education.

- It must be able to identify standards and enforce them.

- Governance entity must be geared toward (and be credible within) the law enforcement community, but it must have strengths that extend beyond that area.
COULD SUCH A GOVERNING ENTITY BE ESTABLISHED WITHIN AN EXISTING FEDERAL AGENCY?

• Considered both NSF and NIST
• But concluded that neither NSF nor NIST has the breadth of experience or institutional capacity to establish an effective governance structure for the forensic science enterprise.
COULD SUCH A GOVERNING ENTITY BE ESTABLISHED WITHIN AN EXISTING FEDERAL AGENCY?

• Strong consensus in the committee that no existing or new division or unit within DOJ would be appropriate

• DOJ’s principal mission is to enforce the law and defend the interests of the United States according to the law.

• Agencies within DOJ operate pursuant to this mission.

• The work of these law enforcement units is critically important to the Nation, but the scope of the work done by DOJ units is much narrower than the promise of a strong forensic science community.

• The committee determined that the research funding strategies of DOJ have not adequately served the broad needs of the forensic science community.

• This is understandable, but not acceptable when the issue is whether an agency is best suited to support and oversee the Nation’s forensic science community.
WHERE DOES FORENSIC SCIENCE FIT?

• In sum, the committee concluded that advancing science in the forensic science enterprise is not likely to be achieved within the confines of DOJ.

• Little doubt that some existing federal entities are too wedded to the current “fragmented” forensic science community, which is deficient in too many respects.

• Most notably, these existing agencies have failed to pursue a rigorous research agenda to confirm the evidentiary reliability of methodologies used in a number of forensic science disciplines.

• These agencies are not good candidates to oversee the overhaul of the forensic science community in the United States.
MAJOR RECOMMENDATION

• Recommendation 1:
  – To promote the development of forensic science into a mature field of multidisciplinary research and practice, founded on the systematic collection and analysis of relevant data, Congress should establish and appropriate funds for an independent federal entity, the National Institute of Forensic Science (NIFS).
  – NIFS should have a full-time administrator and an advisory board with expertise in research and education, the forensic science disciplines, physical and life sciences, forensic pathology, engineering, information technology, measurements and standards, testing and evaluation, law, national security, and public policy.
MAJOR RECOMMENDATION

• Recommendation 1 (Cont.):
  – NIFS should focus on:
    • establishing and enforcing best practices for forensic science professionals and laboratories;
    • establishing standards for the mandatory accreditation of forensic science laboratories and the mandatory certification of forensic scientists and medical examiners/forensic pathologists—and identifying the entity/entities that will develop and implement accreditation and certification;
    • promoting scholarly, competitive peer-reviewed research and technical development in the forensic science disciplines and forensic medicine;
    • developing a strategy to improve forensic science research and educational programs, including forensic pathology;
MAJOR RECOMMENDATION

• Recommendation 1 (Cont.):
  
  • establishing a strategy, based on accurate data on the forensic science community, for the efficient allocation of available funds to give strong support to forensic methodologies and practices in addition to DNA analysis;
  
  • funding state and local forensic science agencies, independent research projects, and educational programs as recommended in this report, with conditions that aim to advance the credibility and reliability of the forensic science disciplines;
  
  • overseeing education standards and the accreditation of forensic science programs in colleges and universities;
  
  • developing programs to improve understanding of the forensic science disciplines and their limitations within legal systems; and
  
  • assessing the development and introduction of new technologies in forensic investigations, including a comparison of new technologies with former ones.
ADDITIONAL RECOMMENDATIONS

• Highlights the Need for Standardized Terminology and Reporting of the Results of Forensic Analyses
• Addresses Research Needs in Forensic Sciences Calling for More and Better Research
• Urges Independence of Forensic Laboratories From Law Enforcement and Prosecutorial Offices
• Emphasizes the Need for Assessing and Minimizing Bias and Human Error
• Stresses the Need for Mandatory Accreditation and Certification
ADDITIONAL RECOMMENDATIONS

• Calls for Uniform Quality Control and Quality Assurance Programs
• Calls for a National Code of Ethics
• Calls for Major Emphasis on Graduate Education and Training
• Calls for the Establishment of Medical Examiner Offices and the Elimination of Existing Coroner Offices
• Stresses the Need to Achieve Interoperability of Fingerprint Data Systems Across the Country
• Calls for Preparedness of Forensic Scientists, Medical Examiners, and Laboratories to Address Homeland Security Needs
Coverage

• Tremendous Press/Media Coverage Across the Globe
  NPR/CNN/NBC
  Full Page Science Times – NYT
  Cover Story Popular Mechanics

• Congressional Hearings
  Senate Judiciary Committee
  House Technology & Innovation Subcommittee
  House Crime, Terrorism & Homeland Security Subcommittee
Presentations Made

Sampling of Presentations made:
• Cleveland Marshall School of Law
• Arizona State University Law School
• Duquesne University Law School
• AAFS
• IAI
• NIJ
• Federal Public Defenders
• Arizona Judicial Conference
• Center of American and International Law
• New York State Defenders Association
• Massachusetts Continuing Legal Education
Presentations Made continued

- Office of the Public Defender
- NACDL
- Police Executive Research Forum
- FBI
- Midwest Crime Lab Directors
- Indiana Public Defenders
- California Association of Criminalists
- NIJ Applied Technologies Conference
- Pennsylvania Association of Criminal Defense Lawyers
- NIST
- American Academy of Forensic Sciences Annual Meeting
- UCLA Law School
- American International Law Center
Response

- “A few weeks ago the National Academy of Sciences completed one of the most thorough reviews of forensic science ever undertaken in the United States. It demonstrates that we have problems... It is critically important to our criminal justice system that we have accurate, timely forensic science, so we can find and punish the guilty, and exonerate the innocent... This National Academy of Sciences report is detailed and far-reaching and can provide a foundation for building broad consensus for change.” Senator Patrick Leahy, Chair, Senate Judiciary Committee, opening statement at Senate Judiciary Committee Hearing

- "These recommendations will be extraordinarily important in shaping the future direction of forensic science in this country. If properly implemented, these recommendations will lead to greater investments in forensic science and in forensic labs, including in the training and certification of forensic scientists. In turn, this will lead to a higher quality of justice." Michael Bromwich, former Inspector General, U.S. Department of Justice

- "The implications of this [report] are seismic." Barry Scheck, Co-founder, The Innocence Project
Response

- SWGFAST- “…agrees with and supports many of the conclusions and recommendations…maintains that a significant body of constructive scientific research has not been adequately reported by the NAS. Future research is certainly encouraged”
Response

• ASCLD – “The report...will bring opportunities to make unprecedented changes to the structure and delivery of forensic sciences in the US.”

• “…the report distills down to two fundamental issues: the need for both standardization and resources in the forensic community. ASCLD has been a strong advocate in both of these areas…”
Response

AFTE – “the NAS Committee painted an incomplete and inaccurate portrait of the field of firearm and toolmark identification using a very broad brush, and in so doing did not consider the appropriate scientific principles on which our discipline was founded.”
Response

Supreme Court Decision in Melendez-Diaz

“Nor is it evident that what respondent calls ‘neutral scientific testing’ is as neutral or as reliable as respondent suggests. Forensic evidence is not uniquely immune from the risk of manipulation.” Justice Scalia cites the NAS report:

*The forensic science system, encompassing both research and practice, has serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country.*

“Like expert witnesses generally, an analyst’s lack of proper training or deficiency in judgment may be disclosed in cross-examination.”
Response

• From the White House
• Establishment of the Subcommittee of Forensic Science by action of the National Science and Technology Council (NSTC) Committee on Science (COS).
CONCLUDING THOUGHTS

• Tremendous resources must be devoted to improving the forensic science community.

• With more and better educational programs, accredited laboratories, certification of forensic practitioners, sound operational principles and procedures, and serious research to establish the limits and measures of performance in each discipline, forensic science experts will be better able to analyze evidence and coherently report their findings in the courts.

• This is particularly important in criminal cases in which we seek to protect society from persons who have committed criminal acts and to protect innocent persons from being convicted of crimes that they did not commit.