



*American Academy of Forensic Sciences
American Society of Crime Laboratory Directors
International Association for Identification
International Association of Forensic Nurses
National Association of Medical Examiners
Society of Forensic Toxicologists/ American Board of Forensic Toxicology*

January 8, 2016

Office of Science and Technology Policy, Executive Office of the President
Eisenhower Executive Office Building
1650 Pennsylvania Avenue
Washington, DC 20504

RE: President's Council of Advisors on Science and Technology

Dear Diana Pankevich, Ph.D.

On behalf of the over 21,000 forensic science practitioners represented by the Consortium of Forensic Science Organizations (CFSO), we wish to express our appreciation for the work of the Office of Science and Technology Policy (OSTP). We particularly want to thank you for making time to meet with us on December 9th regarding our issues of mutual interest.

One topic we discussed was the President's Council of Advisors on Science and Technology (PCAST) working group efforts on forensic science. We understand this group is interested in making recommendations to the President before the end of calendar year 2016. The CFSO believes strongly in an increased federal research agenda to advance forensic science in the United States. We also understand the PCAST may be highly influential in obtaining the funding necessary to further that agenda.

We recognize the recent survey of our membership was an attempt to ferret out specific research needs of the forensic science community. We have encouraged our membership to respond. We wish to also take this opportunity to bring the following to the attention of PCAST and OSTP:

- The NAS report was not a comprehensive review or evaluation of research related to forensic science;
- There have been significant efforts since the NAS report to catalog and evaluate forensic research;
- There are challenges in providing a valuable literature search and review to PCAST;
- Support is needed for forensic labs and scientists to publish more of the available data supporting the scientific foundation of forensic science disciplines;
- Changes are needed to the federal research strategy regarding forensic science;
- Forensic practitioners and leaders need to be involved in the national policy decision process.

2009 NAS Report

The current PCAST effort seems to start with the 2009 National Academy of Sciences (NAS) report, which the forensic science practitioner community views as being more harsh in its criticism than what is truly deserved. We believe there was a greater scientific basis for forensic science practice than what was appreciated then. Further, the intent of the 2009 NAS effort was never to provide an evaluation of all of the foundational research available to support each forensic science discipline. An effort to catalog and value all the available research is almost impracticable. Accordingly, to focus exclusively on the forensic scientific literature since 2009, will miss some important foundational literature. It is important to the forensic science community that the current PCAST effort is not dismissive of the collective body of research related to forensic science before and after 2009. The literature is vast and growing and should not be dismissed. Nonetheless, the NAS report did appropriately point out that more scientific research would be useful and that, in particular, the patterned evidence disciplines deserved more attention.

Efforts Since the 2009 NAS Report

Several efforts have been launched since the NAS report to address these research gaps. This is noted in your February 2014 report, *Strengthening Forensic Science: A Progress Report* (https://www.whitehouse.gov/sites/default/files/microsites/ostp/forensicscience_progressreport_feb-2014.pdf), but we would particularly like to point out the following:

- The Laura and John Arnold Foundation has funded the American Association for the Advancement of Sciences (AAAS) to conduct a study, *Forensic Science Assessments: A Quality and Gap Analysis*, to review the forensic science literature to reveal areas for further research need (<http://www.aaas.org/page/forensic-science-assessments-quality-and-gap-analysis>). They will initially study fire investigation, latent print analysis, and firearms and toolmarks, but will then move to bitemark analysis, hair analysis, bloodstain pattern analysis, and others.
- The AAAS effort developed out of the Research, Development, Technology and Evaluation (RDT&E) Interagency Working Group of the OSTP Subcommittee on Forensic Science, which itself had attempted to collect the foundational literature for many of the pattern evidence disciplines (i.e. <https://afte.org/uploads/documents/position-rdte-iwg-2011.pdf>, <http://www.nist.gov/forensics/upload/Annotated-Bibliography-Odontology.pdf>, <http://www.nist.gov/forensics/upload/Annotated-Bibliography-Hair.pdf>).
- The National Commission on Forensic Science (NCFS) has a Scientific Inquiry and Research subcommittee that has been studying the research and scientific literature in the field (<http://www.justice.gov/ncfs/scientific-inquiry-and-research>) —they have produced a work product and another has been out for public comment.
- The National Institute of Justice (NIJ) has a long standing Forensic Science Technology Working Group (<http://www.nij.gov/topics/forensics/pages/forensic-operational-requirements.aspx>) which brings leaders in the field together to discuss areas for further research and priorities for NIJ funding. As late as September 2015, they developed a twelve page listing of needs and requirements for research in the field (<http://www.nij.gov/topics/forensics/documents/2015-forensic-twg-table.pdf>). The recently published 2015 NAS report, *Support for Forensic Science: Improving the scientific role of the National Institute of Justice*, made recommendations for improving NIJ grant funding.

- The National Institute of Standards and Technology (NIST) has established a Center for Statistics and Applications in Forensic Evidence (CSAFE) which will focus on pattern evidence (<http://www.nist.gov/coe/forensics/>). This group is also collecting literature and research supportive of pattern evidence disciplines.
- The NIST Organization of Scientific Area Committees (OSAC)'s Physics and Patterned Evidence Scientific Area Committee is reviewing standards in this area.
- The first NIST International Symposium on Forensic Science Error Management was held on July 21-24, 2015.
- NIJ has established a Forensic Science Center of Excellence to assist in technology transfer and forensic science education and training.
- Thousands of papers have been published in the forensic sciences since 2009.

Challenges of a Forensic Science Literature Search

At your request we did circulate the survey to our membership. However, the task to respond is a daunting one. The sheer number of journals and articles produced in the forensic science space each year is overwhelming. Appendix A of this document is a list of many of the forensic science journals regularly publishing forensic science research. We tried to provide some type of helpful review of available literature, but this effort proved unfruitful. We did learn through this effort some things that may benefit the PCAST effort:

- There is currently no available search engine available to forensic practitioners that contains the majority of forensic science journals.
- Even if a search engine existed to catalog all the research, there are thousands of search terms that could be used to bring up different articles related to these disciplines.
- The majority of forensic practitioners do not have access to the majority of the forensic science journals and research articles.
- There are very few forensic science librarians and scant resources in the forensic science community to perform comprehensive literature searches.
- A great deal of the research has been done outside of the United States and in foreign language journals without translation resources.
- Much of the forensic science research is not published or not published in a cataloged way.

Conducting a comprehensive literature search contains many obstacles for the forensic science practitioner. As noted above, there is no single source, whether database or search engine, that provides complete indexing to the forensic science literature. While a database such as PubMed, from the National Library of Medicine, provides access to a respectable number of forensic science journals, there are glaring omissions. The AFTE Journal, from the Association of Firearms and Toolmark Examiners, is the preeminent journal in its field, but it is not indexed either in PubMed or in a scientific/scholarly search engine such as Google Scholar. The Journal of Forensic Identification, another core forensic science journal, can only be searched via a costly commercial subscription database. A literature search can not only take many hours out of a busy bench scientist's day, but some of the core information might be completely inaccessible. The very

few labs that have librarian resources are overwhelmed with requests from practitioners that do not have access to these services.

Another significant challenge to providing a literature search is the number of “non-forensic science specific journals” publishing in the forensic science arena. For example, a simple search related to the PCAST survey brought up two pages of references from “non-forensic science” medical and legal journals that we have not listed in Appendix A of this document.

CFSO made a proposal to the Department of Justice for a forensic science library service that would start to put together the available research and catalog it for searching by the community. PCAST supporting a forensic library service to include the development of a forensic literature search tool, and recommending this to the President could be immediately impactful on the forensic community.

Getting the Data Published

While the forensic science community in the U.S. is getting better at publishing data, every lab in the country had a treasure trove of validation data that is not usually published in scientific journals. Labs have been historically been protective of this data being released in a general way. Many labs are looking for ways to have their internal validation data evaluated by other scientists and statisticians. PCAST could evaluate effective partnerships that might lead to more labs being willing to publish this data in scientific journals or at the very least on their agency websites.

Perhaps close to 100 or more forensic science conferences are held each year. Forensic science conferences and symposia have become better at publishing a “proceedings” document after the conference, but many historical and current presentations are not published anywhere. To emphasize this point, the upcoming annual meeting for the American Academy of Forensic Sciences (AAFS) had 56 submissions and will have 41 scientific presentations on research related to the disciplines mentioned by the recent PCAST survey. While the academy does publish these in a “proceedings,” and many of them are published in the AAFS Journal of Forensic Sciences, many smaller conferences do not have the resources of AAFS to be able to publish the research presented. PCAST could possibly recommend some mechanisms or incentives for more scientific presentations to be converted into peer reviewed publications.

Federal Research Efforts

Instead of duplicating the efforts of others in this area or perhaps becoming mired down in an untenable task for a twelve month period, the CFSO believes that PCAST could better focus their efforts in support of the forensic sciences by specifically pointing out the inadequate forensic science research base funding. This could do more to enhance the scientific base than any other single effort. The [NAS report on NIJ forensic science](#) specifically noted that research and development (R&D) funding levels have declined since 2010. The primary federal R&D funding agencies (NIH, NSF, NASA, DOD DOE, USDA) do not include DOJ (<1% of the federal R&D portfolio; \$112M of \$130T; [NSF R&D Report FY2013 to 2015](#) and [NSF R&D Funding Drop Brief](#)). While we appreciate and support the research efforts of federal laboratories, the current funding mix within the forensic sciences is heavily weighted to applied research at federal crime laboratories and very little to university research; this is in sharp contrast to R&D in other

sectors. In general, research universities receive 13% of the private and governmental expenditures, but 56% of the basic science research (<http://files.eric.ed.gov/fulltext/ED517265.pdf>). The R&D spending in forensic science is further diluted by social science research and research grants that go outside forensic science departments. The calls for research by basic researchers outside of the existing forensic science academic community serves to dilute and undermine the funding of the forensic science academic community itself, which is the greater need. It is currently not possible for a university research career in forensic science based upon existing levels of funding available for sponsored forensic science research. A core group of forensic science researchers at universities must be developed. This requires stable sustained funding available to support the academic enterprise. It is also virtually impossible for forensic science departments to acquire any equipment on forensic science research grants. Without a university research base the foundational science for the forensic sciences will continue to lag. Without significant active R&D in forensic science programs, students are not adequately exposed to research and a research culture. Furthermore, the federal government funds research and technology transfer primarily through universities, but this does not appear to be the case with regard to forensic science. This is an issue that has not received sufficient attention and yet is fundamental to confidence and progress in forensic science. In fact, this could be conceived as an issue of national security given the role that forensic science has come to play in criminal justice, civil rights, terrorism, and intelligence issues.

Although NIJ is the primary research grant funding agency in the forensic sciences, other agencies should be encouraged to more actively engage in forensic science research efforts. The ongoing efforts at the Department of Commerce (NIST), Department of Justice (NIJ, OJP, DEA, FBI, BATFE, etc.), and the Department of Defense should be increased and others like the Department of Health and Human Services (NIH), Department of Energy (national laboratories), and Department of Homeland Security should direct more research into this space. This is not an exhaustive list and there is a need for other federal agencies such as the Department of Interior (wildlife forensics), Department of Treasury (financial forensics), Department of Transportation (NHTSA), Department of Agriculture (food safety), and Department of Education (education and training of forensic researchers and applied scientists) to increase their research programs related to forensic science. More involvement from the nation's most prestigious government research laboratories would be a welcome addition to the forensic science community. CFSO encourages networking of these federal research programs with the practitioners working at federal, state, and local laboratories. Many federal agencies have found great success by partnering with practitioners to perform the research and inform the forensic science community about the results, conclusions, and implementations. The research efforts of these federal agencies should not be siloed. These entities should meet together regularly to discuss coordination of forensic science research efforts so the combined group is addressing the most serious issues, transferring information to the forensic science practitioners, and building off the research being done in other parts of the federal government.

A second reason for minimal research in academic forensic science programs is an absence of PhD students. Forensic science degrees are undergraduate or Master's level degrees. The Sam Houston State University has developed the first PhD in forensic science only this year. There are biology and chemistry PhD degrees with a forensic focus and there are some discipline specific PhDs such as UMD forensic toxicology programs and the UNT forensic molecular biology degree programs. Without PhD students, it is very difficult to have long-term, in-depth research programs. Master's students matriculate for only two

years and can only commit to short term projects. In traditional university science programs, much learning is transferred from student to student over several years, but this is simply not possible in most existing forensic science programs. Again, it is difficult to inculcate a scientific cultural without such PhD student-based infrastructure.

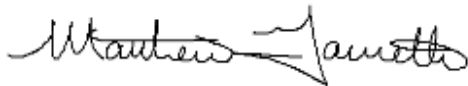
Continue to Engage the Forensic Scientists

The next generation of techniques and tools that will be used in the nation's crime laboratories need to be researched and developed. We believe that more research will always be needed to solidify and strengthen all forensic science disciplines, and finding and funding the research needs is critical. We applaud your efforts to reach out and engage crime laboratory leaders and practitioners to understand these issues. We encourage even more outreach and offer resources such as tours of our laboratory and Medical Examiner facilities, shadowing practitioners, and further dialog with all of our member organizations. One of the biggest criticisms from the forensic science practitioner community regarding the 2009 NAS report was the minimal involvement from practitioners. Efforts ongoing at the NIST OSAC demonstrate that practitioners are very interested in the scientific basis and standards related to forensic science practice. Partnership and collaboration with the federal, state, and local practitioners during the development of federal policy initiatives will lead to more rapid and wide-spread implementation in the forensic science community.

We appreciate the efforts of OSTP and PCAST to address this critical issue and we look forward to engaging with OSTP and PCAST on a more robust federal research agenda related to forensic science. We anticipate more opportunities to discuss the critical report that will go to President Obama on this issue and offer our assistance in this endeavor.

Sincerely,

The Consortium of Forensic Science Organizations

A handwritten signature in black ink, reading "Matthew Gamette". The signature is written in a cursive style with a large, stylized initial "M" and "G".

Matthew Gamette M.S., C.P.M.
CFSO Chair

Appendix A

This list does not include the more general science, medical, or legal publications that may publish forensic science information such as “Science” and “Nature.” The journals in this appendix are more specific to the forensic science community and are not a comprehensive list.

Academic Forensic Pathology
Accident Analysis and Prevention
Accreditation and Quality Assurance
AFTE Journal (Association of Firearm and Toolmark Examiners)
American Journal of Clinical Pathology
American Journal of Forensic Medicine and Pathology
American Journal of Physical Anthropology
American Law Register
Analytical Chemistry
Analyst
Australian Journal of Forensic Sciences
British Journal of Forensic Practice
Bulletin of The International Association of Forensic Toxicologists
CAC News (California Association of Criminalists)
Canadian Society of Forensic Science Journal
Clinical Chemistry
Digital Investigation
Drug and Alcohol Dependence
Drug Testing and Analysis
Egyptian Journal of Forensic Science
Evidence Technology Magazine
FBI Law Enforcement Bulletin
Fire and Arson Investigator
Fingerprint Whorld
Forensic Drug Abuse Advisor
Forensic Science Communications
Forensic Science International
Forensic Science International – Genetics
Forensic Science, Medicine, and Pathology
Forensic Science Policy and Management
Forensic Science Regulator
Forensic Science Review
Forensic Technology Review
Forensic Toxicology
Global Forensic Science Today
Human Biology: The International Journal of Population Biology and Genetics
Information Bulletin for Shoeprint/Toolmark Examiners
International Journal of Digital Evidence
International Journal of Law and Psychiatry
International Journal of Legal Medicine
International Journal of Mass Spectrometry
Japanese Journal of Forensic Science and Technology
Journal of the American Society of Questioned Document Examiners
Journal of Analytical and Applied Pyrolysis
Journal of Analytical Toxicology
Journal of the Association for Crime Scene Reconstruction
Journal of Bloodstain Pattern Analysis (IABPA)
Journal of the Clandestine Laboratory Investigating Chemists Association
Journal of Digital Forensic Practice
Journal of Fire Sciences

Journal of Forensic Document Examination
Journal of Forensic Identification
Journal of Forensic and Legal Medicine
Journal of Forensic Nursing
Journal of Forensic Research
Journal of Forensic Science and Criminology
Journal of Forensic Sciences
Journal of Mass Spectrometry
Journal of Medical Entomology
Journal of Medical Toxicology
Journal of Microscopy
Journal of Molecular Spectroscopy
Journal of the National Association of Document Examiners
Journal of Pathology Informatics
Legal Medicine
Medicine and Law: An International Journal
Medicine, Science and the Law
Microgram Bulletin
Microgram Journal
Palynology
PLoS ONE
Problems of Forensic Science
Science and Justice
The Open Forensic Science Journal
Traffic Injury and Prevention