

***Solving the Problems That Plague the Forensic Science Community***

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The National Academy of Sciences Report and Beyond***

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On February 18, 2009, after more than two years of work, the Committee on Identifying the Needs of the Forensic Science Community at the National Academy of Sciences issued a report entitled, “Strengthening Forensic Science in the United States: A Path Forward.” I had the privilege of serving as co-chair of the committee, which was composed of a diverse and talented group of professionals, some expert in various forensic science disciplines, others in law, some in higher education, and others in different fields of science, engineering, and medicine. It was gratifying to work with my co-chair, Dr. Constantine Gatsonis, the Director of the Center for Statistical Sciences at Brown University, and with the other wise and dedicated members of the committee.

Rather than merely summarizing the report, I would like to focus on some of its nuances and the challenges that it poses. My vantage point is that of a federal judge who has served on the bench for nearly 30 years, with the added perspective of a co-chair of a committee that has just spent 26 months studying the forensic science community. I would like to take this occasion to offer some thoughts on the crucial issues raised by the report.

With the benefit of hindsight, I can now say that the *substance* of the committee’s report really was not hard to write. Tedious? Yes. Time consuming? Yes. But not really difficult. Why? Because, as the good professionals in the field have known for some time, the forensic science community is plagued by serious problems. The impetus for our committee’s report came in 2005, when Congress – at the urging of the Consortium of Forensic Science Organizations (representing professionals in the forensic science community) – passed legislation directing the Academy to create an independent committee to study the forensic science community. In other words, Congress passed the legislation in response to a *call for help* from forensic professionals who understood the problems. In retrospect, I now realize that a principal part of the committee’s assignment was to document what the professionals and a number of commentators already knew – namely, that the problems that afflict the forensic science community are serious and they cannot be cured without significant congressional action.

The committee spent an enormous amount of time listening to testimony from and reviewing materials published by countless experts, including forensic science practitioners, heads of public and private laboratories, directors of medical examiner and coroner offices, scientists, scholars, educators, government officials, members of the legal profession, and law enforcement officials. Not only were we trying to understand how the forensic science disciplines operate, we were also trying to determine the extent to which there is any peer-reviewed, scientific research to support the validity and reliability of existing forensic disciplines; in particular, we were looking for scientific studies that address the level of accuracy of forensic disciplines that rely on subjective assessments of matching characteristics. We invited experts in each discipline to refer us to any such research; however, apart from the materials on nuclear and mitochondrial DNA and drug analysis, we received little in the way of compelling scientific research assessing the accuracy of forensic disciplines.

When it came time to write the report, the committee had to summon its collective skills to “tell the truth” about what we had found, even as we knew that we would face resistance from some institutions that have an interest in forestalling change. We also knew that we would face disbelief from *CSI* addicts who naively assume that the forensic disciplines and practitioners are infallible.

Our aim was to write a credible story – measured and thoughtful, but compelling. We could not be seen to have any “axes to grind.”

Finally, we hoped that, because of the importance of the subject, the report would receive widespread attention. It did. The vast media coverage of the report has generated serious attention, concern, and discussion. And, to date, there have been two hearings on the Hill to consider the report’s recommendations – one in the Senate and one in the House – with the promise of more to come.

The foundation for change has been laid. So now what?

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I started this project with no preconceived views about the forensic science community. Rather, I simply assumed, as I suspect many of my judicial colleagues do, that forensic science disciplines typically are well-grounded in scientific methodology and that crime laboratories and forensic science practitioners follow proven practices that ensure the validity and reliability of forensic evidence offered in court. I was surprisingly mistaken in what I assumed. The truth is that the manner in which forensic evidence is presented on television – as invariably valid and reliable – does not correspond with reality.

There are scores of talented and dedicated people in the forensic science community, and the work that they perform is very important. However, the quality of practice in forensic disciplines varies greatly. And this work often suffers greatly, because of

- the paucity of scientific research to confirm the validity and reliability of forensic disciplines and establish quantifiable measures of uncertainty in the conclusions of forensic analyses;
- the paucity of research programs on human observer bias and sources of human error in forensic examinations;
- the absence of scientific and applied research focused on new technology and innovation;
- the lack of autonomy of crime laboratories;
- the absence of rigorous, mandatory certification requirements for practitioners;
- the absence of uniform, mandatory accreditation programs for laboratories;
- the failure to adhere to robust performance standards;
- the failure of forensic experts to use standard terminology in reporting on and testifying about the results of forensic science investigations;

- the lack of effective oversight; and
- a gross shortage of adequate training and continuing education of practitioners.

These were the principal findings of the committee. Unsurprisingly, our principal recommendations are designed to address these specific problems.

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In my written statement to the Senate Judiciary Committee, I cited a few examples of the problems uncovered by our committee underscoring the needs of the forensic science community. Let me digress for a moment here to recite these examples. They are telling.

1. My first example concerned **Subjective Interpretations, Exaggerated Testimony, and a Paucity of Research**. Often in criminal prosecutions and civil litigation, forensic evidence is offered to support a claim that an evidentiary specimen is a “match” to a particular individual or other source. With the exception of nuclear DNA analysis, however, no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source. Yet, for years, the courts have been led to believe that disciplines such as fingerprinting stand on par with DNA analysis. For example, in a decision issued by the Seventh Circuit, the court reported that an FBI fingerprint expert had “testified that the error rate for fingerprint comparison is essentially zero.” In a later decision issued by the Fourth Circuit, that court cited the Seventh Circuit opinion approvingly, noting that an expert from the FBI had testified that the error rate for fingerprint comparison was “essentially zero.”

The committee’s report rejects as scientifically implausible any claims that fingerprint analyses have “zero error rates.” There is no such concept as a zero error rate in good scientific analysis. Yet, for years the courts were led to believe otherwise. Of even greater concern is the dearth of scientific research to establish limits of performance, to ascertain quantifiable measures of uncertainty, and to address the impact of the sources of variability and potential bias in fingerprint examinations and in other forensic disciplines that rely on subjective assessments of matching characteristics.

One of the most telling moments for me during the committee’s hearings occurred when I heard the testimony of an expert fingerprint analyst who is a member of the Scientific Working Group on Friction Ridge Analysis, Study and Technology. At one point in his testimony, he was asked about the scientific basis for determining a match in prints in a situation when the examiner has only a partial or smudged print. The expert did not hesitate in conceding that the research has yet to be done.

When there is no good scientific basis to support a forensic discipline, and when experts cannot quantify certainty and uncertainty, the testimony that experts offer is too often exaggerated (as with the claims of “zero error rates”). Sometimes testimony is even fabricated. Some of you

may have seen the recent story in the *San Jose Mercury News* reporting that, for years, San Jose police never told anyone when fingerprint technicians could not agree about whether a suspect's prints matched those taken from the crime scene. Instead, the police department's Central Identification Unit generated a report indicating that two technicians agreed that the suspect's prints had been positively identified, while omitting that a third technician dissented. Stories like this are disheartening, to say the least.

Another serious concern is contextual bias. Some studies have demonstrated that identification decisions on the same fingerprint can change solely by presenting the print in a different context. In one study, for example, fingerprint examiners were asked to analyze fingerprints that, unknown to them, they had analyzed previously in their careers. Contextual biasing was introduced – that is, examiners were told that the “suspect confessed to the crime” or the “suspect was in police custody at the time of the crime.” In one-third of the examinations that included contextual manipulation, the examiners reached conclusions that were different from the results they had previously reached.

2. My second example involved **Inconsistent Practices in Crime Laboratories**. In recent years, the integrity of crime laboratories has been called into question, with some heavily publicized cases highlighting (1) unqualified practitioners, (2) sometimes lax standards that have generated questionable or fraudulent evidence, and (3) the absence of quality control measures to detect questionable evidence. One notorious case, involving the Houston crime laboratory, highlights the sometimes blatant lack of proper education and training of forensic examiners. In the Houston case, an audit by the Texas Department of Public Safety confirmed serious inadequacies in the laboratory's procedures, including routine failure to run essential scientific controls, failure to take adequate measures to prevent contamination of samples, failure to adequately document work performed and results obtained, and routine failure to follow correct procedures for computing statistical frequencies.

This past fall, it was reported that the Detroit police crime lab was shut down after an outside audit found errors in evidence used to prosecute cases involving murder and other crimes. The audit uncovered erroneous or false findings in 10% of 200 random cases, subpar quality control compliance, and a “shocking level of incompetence” in the lab. It was also reported that the chief of the police crime lab in Baltimore was fired after it was revealed that DNA samples had been contaminated by lab employees.

3. My third example involved **Scientific Working Groups or SWGs**. There are a number of SWGs for forensic disciplines. For example, the SWGDRUG group recommends minimum standards for the forensic examination of seized drugs. The chair of SWGDRUG testified before the committee and explained how his SWG group operates. His answers to my questions indicated that some SWG standards undoubtedly incorporate good technical protocols that should enhance forensic science analyses; however, his testimony also confirmed that, as a general matter, SWGs are of questionable value. Why? Because

- SWG committees meet irregularly and have no clear or regular sources of funding.

- There are no clear standards in place to determine who gains membership on SWG committees.
- Neither SWGs nor their recommendations are mandated by any federal or state law or regulation.
- SWG recommendations are not enforceable.
- A number of SWG guidelines are too general and vague to be of any great practical use.
- SWG committees have no way of knowing whether state or local agencies even endorse the standards.
- Complaints are not filed when a practitioner violates a SWG standard.
- SWG committees do not attempt to measure the impact of their standards by formal study or survey.

In other words, even if it is true that some SWG standards make sense and might result in good practice, there is nothing to indicate that the standards are routinely followed and enforced in a way to ensure best practices in the forensic science community.

4. The last example that I offered involved **The Coroner System**. In 1928, the National Academy of Sciences strongly recommended that the coroner system should be abolished in the United States. In 2008, the committee determined that 28 states still operate with coroners, instead of medical examiners. Less than one-third of the states with coroners require training for those who hold the positions. Recently, in Indiana, a 17-year-old high school senior was appointed a deputy coroner. Obviously, the teenager was not a trained physician; and, like many coroners, she was not qualified to conduct an autopsy or make sophisticated assessments of the dead for disease, injury, medical history, and laboratory studies – assessments that we need from qualified medical examiners and pathologists in the wake of homicides, natural disasters, suicides, and breaches of homeland security.

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Problems such as these highlight some glaring weaknesses in the forensic science community. It is worth noting here that the committee's report does not say that disciplines such as fingerprint analyses have no uses – rather, it raises important questions about the absence of research to support the validity and reliability of a number of forensic disciplines. For example, the report notes the paucity of scientific studies addressing the accuracy of fingerprint analyses, especially in cases in which there are only partial or smudged prints. The absence of research can have unfortunate consequences in cases in which an examiner is looking at something other than a clear, clean, full print.

The report does not mean to suggest that fingerprint analysis must stand on par with DNA. Indeed, the report does not mean to say that DNA analyses are flawless. Rather, the report notes that DNA analysis has had a level of scientific study and development that should be done for other disciplines (such as fingerprint identifications) that are used to support individualization claims. In other words, each discipline/modality should be evaluated scientifically in order to assess its accuracy using current technical capabilities and to identify areas in which new research and development is needed.

*[After I presented this paper, I was told that the National Institute of Justice has recently funded “foundational” studies to assess the accuracy of fingerprint identifications, and also that a task force recently has been established to consider the problem of contextual bias in forensic examinations. But I was also told that we have a long way to go before meaningful studies will be completed to determine the scientific basis for determining a match in prints in situations when an examiner has only a partial or smudged print.]*

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When I think about the problems facing the forensic science community, I now focus on four significant issues: **(1) law, (2) science, (3) practice, and (4) federal oversight.** I would like to reflect with you a bit on these four issues.

**LAW.** The work of the forensic science community is critically important in our system of criminal justice. Forensic science experts and evidence are routinely used in the service of the criminal justice system. So it matters a great deal whether an expert is qualified to testify about forensic evidence and whether the evidence is sufficiently reliable to merit a fact finder’s reliance on the truth that it purports to support.

Unfortunately, the adversarial approach to the submission of evidence in court is not well suited to the task of finding “scientific truth.” The judicial system is encumbered by, among other things, judges, lawyers, and jurors who generally lack the scientific expertise necessary to comprehend and evaluate forensic evidence in an informed manner; defense attorneys who often do not have the resources to challenge prosecutors’ forensic experts; trial judges (sitting alone) who must decide evidentiary issues without the benefit of judicial colleagues and often with little time for extensive research and reflection; and very limited appellate review of trial court rulings admitting disputed forensic evidence.

Furthermore, the judicial system embodies a case-by-case adjudicatory approach that is not well suited to address the systematic problems in many of the various forensic science disciplines. I have heard some good lawyers suggest that defense attorneys, armed with our committee’s report, will now be better able to challenge forensic evidence in court. Maybe. It is certainly possible that the courts will take into account the report’s findings when considering the admissibility of forensic evidence in a particular case. But admissibility under section 702 of the Federal Rules of Evidence is a “flexible” standard and trial judges have great discretion in deciding whether to admit evidence.

More important, however, is the reality that the question whether forensic evidence in a particular case is admissible is not coterminous with the question whether there are studies confirming the scientific validity and reliability of a forensic science discipline. Individual defendants may prevail in particular cases, but this will not remedy the paucity of good scientific research supporting the forensic disciplines, at least not in the short term. If enough individual prosecutions fail, this may force law enforcement agencies to insist on the necessary scientific research. But relying on the judicial system in this way may take too much time to bring about the dramatic reforms that are needed to fix the problems in the forensic science community.

In an article entitled *Expert evidence, partisanship, and epistemic competence*, pondering the conjunction between law and forensic science, Professor Jennifer Mnookin has aptly observed that,

so long as we have our adversarial system in much its present form, we are inevitably going to be stuck with approaches to expert evidence that are imperfect, conceptually unsatisfying, and awkward. It may well be that the real lesson is this: those who believe that we might ever fully resolve – rather than imperfectly manage – the deep structural tensions surrounding both partisanship and epistemic competence that permeate the use of scientific evidence within our legal system are almost certainly destined for disappointment.

I am of the view that judicial review, by itself, will not cure the infirmities of the forensic science community. Good science includes two attributes that the law needs from the forensic disciplines: (1) valid and reliable methodologies that enable the accurate analysis of evidence and reporting of results and (2) practices that minimize the risk of results being dependent on subjective judgments or tainted by error or the threat of bias. Because of the many problems presently faced by the forensic science community and the inherent limitations of the judicial system, the forensic science community as it is now constituted cannot consistently serve the judicial system as well as it might. And lawyers and judges should not be counted on to fix the *science* problem. What we need is for the forensic science community to improve so that it better serves the needs of justice.

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**SCIENCE.** I think the most important part of our committee's report is its call for real science to support the forensic disciplines. Simply increasing the number of staff within existing crime laboratories and medical examiners' offices will not solve the principal problems of the forensic science community. What is needed is interdisciplinary, peer-reviewed, scientific research to determine the validity and reliability of existing disciplines, and to achieve technological advancements.

And we need educational programs – serious programs at good universities – in which we not only train undergraduates in existing forensic practices, but in which we entice top scholars in the physical and life sciences, along with strong students in PhD programs, to pursue scientific research in forensic science. If universities would devote the same time and effort to research related to the forensic science disciplines that was given to research in support of DNA, this would



move us a long way toward meaningful reform. Can universities be enticed? Of course they can. All it takes is money for research programs and fellowships. Universities rarely turn away from research money.

I am also convinced that the forensic science community will never change for the better unless certain cultural habits are broken. One of the worst habits that I have seen is the unfathomable willingness among some professionals in the forensic science community to stick with the idea that a forensic science practitioner is bound to get better with practice and experience. I heard this refrain all too often in testimony presented to the committee. Surely we can set our aspirations higher than this.

The forensic science community needs talented people who are hungry to learn whether there is any “science” in the forensic disciplines; who crave to establish quantifiable measures of certainty and uncertainty in their field; who insist upon knowing the extent to which there may be human observer bias and sources of human error in forensic examinations; and who are determined to pursue scientific innovation. This is all about adding a culture of “science” to the forensic science community. From what I have seen, we still have a long way to go.

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**PRACTICE.** There is another crucially important point that pervades the committee’s report. The point is this: The solution to the problem is not to commit more money and people to do things as they are now being done. We need to adopt and enforce better and consistent practices in the forensic science community.

As the report details, we need to upgrade organizational structures; establish better education and training programs for practitioners; adopt uniform and enforceable best practices, quality controls, and proficiency testing; require *mandatory* certification and accreditation programs; establish standard terminology to be used by forensic practitioners when they report on and testify about the results of forensic investigations; and ensure operational autonomy for forensic laboratories. This overhaul of the system is essential if we expect forensic practitioners to serve the goals of justice. And these practice reforms *must* occur whether or not a new federal agency is created to oversee the forensic science community.

There is an inherent dilemma in the report, one that we really do not address. Better science to determine the validity and reliability of forensic disciplines will take time. So there is a question as to how we can ensure better practices before we know whether a particular forensic discipline is founded on good science and produces accurate results. For example, if we cannot quantify measures of uncertainty and we do not know sources of variability, how can we establish best practices? The big questions are not whether we should require mandatory certification of practitioners and mandatory accreditation of labs, but by whom and on what terms.

One answer, I guess, is that not all “classification” practices in the forensic science community are bad. Although no discipline matches DNA in its capacity to consistently

demonstrate a connection between evidence and a specific individual or source, there appear to be some disciplines that can be used to assess whether a particular piece of evidence is associated with a particular source class. An example might be a paint mark left at a crime scene is consistent with a particular paint sample in a database, from which one can infer the model or production year of a vehicle that could have left the mark. So we cannot throw out the baby with the bath water as we work to improve the science underlying forensic practice.

As scientific studies are being conducted, there are three recommendations relating to forensic *practice* that I am sure will have salutary effects, even in the short term. The first is the committee's recommendation requiring forensic experts to use standardized, honest, and clear terminology in reporting on and testifying about the results of forensic science investigations. In Professor Mnookin's article, *The validity of latent fingerprint identification: Confessions of a fingerprinting moderate*, she offers a very useful critique that highlights the problems of exaggerated expert testimony:

At present, fingerprint examiners typically testify in the language of absolute certainty. [They] make only . . . "positive" or "absolute" identifications – essentially making the claim that they have matched the latent print to the one and only person in the entire world whose fingertip could have produced it. In fact, if a fingerprint examiner testifies on her own initiative that a match is merely "likely" or "possible" or "credible," rather than certain, she could possibly be subject to disciplinary sanction! Given the general lack of validity testing for fingerprinting; the relative dearth of difficult proficiency tests; the lack of a statistically valid model of fingerprinting; and the lack of validated standards for declaring a match, such claims of absolute, certain confidence in identification are unjustified, the product of hubris more than established knowledge.

This critique could be applied to several forensic disciplines that rely on subjective assessments of matching characteristics. When their testimony is admitted, forensic experts should offer nothing more in the way of evidence than what they actually know, leaving it to the jury or judge to weigh the evidence offered against the other evidence that is presented in a case. My concern is that some forensic practitioners may not know what they do not know about the limits of their discipline; they will have to be taught this so they can be circumspect in their testimony.

Relatedly, the committee also recommended the adoption of model laboratory reports with specifications regarding the minimum information that should be included in a lab report. This recommendation is intended to facilitate the ability of lawyers, judges, and jurors to better comprehend the limits of forensic evidence that is offered in a case. Obviously, this is crucially important.

The third recommendation relating to forensic practice that I believe will have salutary effects, even in the short term, is the recommendation calling for the removal of all public forensic laboratories and facilities from the administrative control of law enforcement agencies or prosecutors' offices. In other words, the report recommends administrative autonomy for laboratories in their performance of scientific work. This is a controversial recommendation,

because it raises political issues over the control of crime labs and their funding. The argument is made that it is easier for law enforcement units to secure appropriations to support the work of crime labs than it would be for labs to do so on their own. Thus, it is claimed that labs must stay under the control of law enforcement in order to be properly funded. In my view, this is a dubious argument. Law enforcement units would be less effective if they did not have the support of crime labs. Therefore, no thoughtful directors of law enforcement units will oppose adequate funding for crime labs. This issue is not about funding; it is about control.

The report does not mean to suggest that, say, the Director of the FBI or a State Attorney General could not act to prioritize the cases that they send to crime labs, only that the scientific work should be under the sole control of the scientists, not law enforcement officers. Nor does the report mean to suggest that law enforcement officers and prosecutors cannot communicate with crime lab officials regarding pending cases. What the report recommends is that forensic practitioners working in crime laboratories should operate autonomously in performing their scientific analyses and in writing reports that state their findings.

As the report makes clear, the simple point here is that forensic scientists should function independently of law enforcement administrators. The best science is conducted in a scientific setting as opposed to a law enforcement setting. Because forensic practitioners often are driven in their work by a need to answer a particular question related to the issues of a particular case, they sometimes face pressure to sacrifice appropriate methodology for the sake of expediency or for other nonscientific reasons. This is not as it ought to be. Such pressures inhibit good science and ultimately adversely affect the credibility of the field.

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**FEDERAL OVERSIGHT.** In thinking about how best to address the problems that now encumber the forensic science community, the committee first considered whether a governing entity could be established within an existing federal agency. We concluded that no existing agency has the capacity or appropriate mission to take on the roles and responsibilities needed to govern and improve the forensic science community. The Committee considered the National Institute of Standards and Technology (“NIST”), for example, but rejected this idea. NIST is a non-regulatory federal agency within the Department of Commerce and its laboratories conduct research in a wide variety of physical and engineering sciences. However, NIST has little experience in establishing and running an extramural research program; it has never assumed sweeping responsibilities of the sort that should be assigned to any entity that is authorized to oversee the forensic science community (including reporting, codes of ethics, accreditation, professional certification, and incentives for their widespread adoption in state and local agencies); it has no experience in running a comprehensive regulatory program; and it has no meaningful expertise in the legal issues affecting the forensic science community.

There was also a strong consensus in the committee that no unit within the Department of Justice would be an appropriate location for a new entity governing the forensic science community. DOJ’s principal and important mission is to enforce the law and defend the interests of the United

States according to the law, not to pursue serious scientific research and education. The entity that is established to govern the forensic science community cannot be principally beholden to law enforcement. The potential for conflicts of interest between the needs of law enforcement and the broader needs of forensic science are too great.

The committee concluded that what is needed to support and oversee the forensic science community is a new, strong, and independent entity that can take on the tasks that would be assigned to it in a manner that is as objective and free of bias as possible – one with no ties to the past and with the authority and resources to implement a fresh agenda designed to address the problems found by the committee and discussed in the report.

With these considerations in mind, the committee's principal recommendation is that Congress should authorize and fund the creation of an independent federal entity, the National Institute of Forensic Science, or NIFS. This new agency should have a full-time administrator and an advisory board with members who are experts in research and education, the physical and life sciences, forensic science disciplines, forensic pathology, engineering, information technology, measurements and standards, testing and evaluation, law, national security, and public policy.

A number of commentators have questioned whether, especially in a time of economic duress, Congress will create a new federal entity. My own view is that we will be best served by a new, strong, and independent entity, with no ties to the past dysfunctions of the forensic science community. When I last counted, there were a significant number of independent federal agencies – this is not a novel idea. Metaphorically, I ask: Why build an addition to a house that is not well situated to accommodate your best plans, when you can build a new house whose design fits your needs?

Furthermore, although the committee was unable to estimate the cost of a new entity, it is clear to me that costs can be contained as necessary when NIFS is first established. The new agency will have plenty of resources to draw on when it first gets started – *e.g.*, ASCLD/LAB for advice on accreditation; SWGs for advice on technical protocols; officials in organizations like the American Academy of Forensic Sciences who know the best professionals in the field; and strong legal scholars who have carefully studied the conjunction between law and forensic science for years. With the right people in charge of the operation – people of the caliber of John Holdren, the new director of the White House Office of Science & Technology Policy – and with adequate funding to promote important programs, a new entity like NIFS will effectively promote positive change in the forensic science community.

As the committee's report makes clear, what is needed is a massive overhaul of the forensic science system in the United States, both to improve the scientific research supporting the disciplines and to improve the practices of the forensic science community. And the creation of NIFS is the keystone for such an overhaul. I do not believe that truly meaningful reforms will be uniformly adopted by the forensic science community without the support and oversight of an entity like NIFS. The committee's report surely will promote some changes in current forensic practices, but more is needed. I hope that those who now control the destiny of this enterprise will have the

resolve to take the necessary steps to put into effect the full package of reforms that we so badly need.

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**PRINCIPAL SOURCE**

Committee on Identifying the Needs of the Forensic Science Community, *Strengthening Forensic Science in the United States: A Path Forward* (National Academy of Sciences 2009), available at <http://www8.nationalacademies.org/cp/projectview.aspx?key=48741>