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From Gridlock to Groundbreaking: Realizing Reliability in Forensic Science

Jessica D Gabel, Georgia State University

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REALIZING RELIABILITY IN FORENSIC SCIENCE

By:
Jessica D. Gabel*

INTRODUCTION

Forensic science is a flawed and burdened discipline. In 2009, The National Academy of Sciences published a revealing report announcing that forensic science is broken.¹ Depending on the audience, reaction to the report ran the gamut from predictable to groundbreaking to misleading.² The NAS Report, in many respects, laid forensic science’s shortcomings to bear, but it could hardly be characterized as new information. Nonetheless, the Report brought the weaknesses that have plagued forensic science for decades to the surface.³ Moreover, the NAS Report underscored a harsh truth: that faulty forensic science has contributed to the conviction of innocent people—and will continue to do so if the status quo persists.⁴

In recent years, the reality of wrongful convictions has become mainstream through the work of the Innocence Project and other organizations.⁵ Although impossible to quantify, the

* Associate Professor of Law, Georgia State University College of Law.
¹ NAT’L ACADEMY OF SCI., STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 14 (2009) [hereinafter NAS REPORT].
³ NAS REPORT, supra note 1, at 14 (pointing to the “variability in capacity oversight, staffing, certification, and accreditation across federal and state jurisdictions,” and the backlogs in state and local crime labs as two symptoms of the broken state of forensic science).
⁵ Wrongful convictions are also not a creature of the 20th Century. In Perry’s Case, 14 How. St. Tr. 1312 (1661)), Perry, a servant, goes to search for his master, Harrison, after Harrison went missing. Perry disappeared, but was found with some bloody items of Harrison. Harrison’s body never found, and Perry gave inconsistent stories. Perry was hanged. In Act V Harrison returned some time later with a story of being robbed, taken by force to Turkey, and forced into slavery.
number of wrongfully convicted is at least in the hundreds.6 Unreliable science presents itself in a virtual smorgasbord of options, from the routine (contamination) to the egregious (forensic misconduct) and everything in between (misrepresented or exaggerated results; misinterpretation of results, lack of research for basic assumptions; unqualified analysts; inconsistent laboratory practices). Regardless of the root cause of the forensic flaws, the NAS Report clearly issued a “call to arms” to reform forensic science from the top down by creating a centralized National Institute of Forensic Science (NIFS). Little has been done, however. Indeed, legislation has crawled to a standstill (i.e., dead in the water) several times in Congress and certain constituencies have brought stiff resistance to reforms.7

With the exception of DNA, no single forensic technique has the ability to definitively link an evidence sample to its source.8 Ability is very different from actuality, however, and even DNA evidence has its limitations and stress points.9 Deficiencies in forensic science have harrowing implications, and the number of exonerations in recent years has underscored the very real threat that innocent people can be convicted. Of course, there are numerous factors that contribute to wrongful convictions outside of faulty forensic evidence—witness misidentification,

7 See Barnadette Mary Donovan & Edward J. Ungvarsky, Strengthening Forensic Science in the United States: A Path Forward—Or Has it Been a Path Misplaced?, 36 CHAMPION 22, 23–24, 27 (January/February 2012) (outlining the issues with the Criminal Justice and Forensic Science Reform Act, which proposes federal oversight in the form of an agency located within the DOJ in stark contrast to the emphasis the NAS report places on independence from law enforcement and describing prosecutors and forensic scientist’s opposition to defense counsel’s use of the NAS report).
8 In Law and Order terms, accuracy and precision are “two separate yet equally important” concepts. Accuracy evaluates whether or not the correct result can be reached and what the strength of that result is; precision measures the repeatability or reproducibility of the same result. See Jessica D. Gabel, Probable Cause from Probable Bonds: A Genetic Tattle Tale Based on Familial DNA, 21 HASTINGS WOMEN’S L.J. 3 (2010).
9 William C. Thompson, Laurence D. Mueller, Dan E. Krane, Forensic DNA Statistics: Still Controversial in Some Cases, 36 CHAMPION 12, 12 (December, 2012) (noting that “when labs try to ‘type’ samples that contain too little DNA, or DNA that is too degraded, the results of the DNA test can be unreliable.”).
false confessions, jailhouse snitches—but in some ways, the public conception of erroneous convictions comes from a somewhat myopic lens.

The Innocence Project predominantly accepts cases where there is biological evidence available for DNA testing. That only applies to a small subset of cases with potential claims or actual innocence. For each case where DNA is able to definitively exonerate an individual, there are many more cases that lack DNA and the person is just as innocent. Relying on the post-conviction process to correct the problem simply puts a Band-Aid on a gaping wound. We can do better. DNA may bring the “get out of jail free” card to certain cases, but its absence in a case nearly ensures that the conviction (and any bad forensic science involved) will continue to persist.

In order to prevent wrongful convictions (as opposed to just responding to them), the NAS Report concluded that problems with forensic evidence could “only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country.” To be clear, the NAS Report was not the first conscious conclusion that forensic science needs work. Moreover, the Report was not the first suggestion that the mechanisms for change should occur at the federal level. It probably won’t be the last.

The spate of legislation spawned by the NAS Report over the past few years represents laudable efforts and failed attempts to repair a broken system. The top-down mentality of restructuring forensics essentially sweeps everything under a gigantic curtain in an attempt to control all of the loose pieces in a one-size-fits-all manner. But once you arrive at the bottom of

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10 Gould, et. al., supra note 4, at iii.
11 See id. at xiii.
12 NAS REPORT, supra note 1, at xx.
13 See id., at xix (noting that the impetus of the report was Congressional recognition “that significant improvements are needed in forensic science.”).
14 See id. at xx (explaining that the consistent message conveyed to the NAS committee by guest speakers in various areas of the forensic science industry is that a federal system is necessary to effectuate reform). See also Forensic Science Standards Act, S. 3378, 112th Cong. (2012).
15 See Donovan, et al., supra note 7, at 23–26 (outlining the shortcomings of legislation proposed in the wake of the NAS report).
the curtain, you see the wizard’s feet peeking out underneath: the reforms are plagued by underfunded entities, unrealistic budgets, and permissive language that strips real reform of any enforcement power. Simply put, if we continue to suggest a national entity to overhaul forensic science in a grandiose and unrealistic fashion, then we merely will continue to tabulate wrongful convictions based on bad science.

Having formerly argued that we need a federal agency devoted to the development and distribution of sound forensic science, history coupled with reality tells me that legislative gridlock and territorial pissing contests may make this impossible. Thus, while I still maintain that centralization is the key, I advocate for a grassroots effort in creating a reliable forensic framework from the ground up rather than the top down. Cooperation and collaboration across all levels of the criminal justice commerce stream is (currently) the only way to accomplish this. In addition, bringing universities—the bastions of scientific research—into the framework will increase the speed and accuracy and reduce the costs of the development of standards. Law enforcement, forensic analysts, research scientists, and lawyers need to recognize that forensic science does not exist in a vacuum and if errors continue to multiply then we are left with a system that slides farther into disrepair.

This article proceeds in five parts. Part I focuses on the science behind forensic science and highlights some of the misconceptions regarding the validity of some disciplines. Part II discusses previous attempts at reform in the United States. Part III discusses the obstacles to implementing a federal forensic science entity and national standards including constitutional challenges to federal enforcement of national standards in state labs and the ever-present issue of

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16 See discussion infra, Part I.
17 See discussion infra, Part II.
locating funding for such an endeavor. Part IV proposes that rather than creating an entirely new framework, we should leverage existing models and frameworks already in place to improve the quality and cost of the U.S. forensic science program. Finally, part V outlines some works-in-progress and a major overhaul the U.K. has just undergone in forensic science and suggests we can capitalize on lessons already learned to transform forensics into a science.

I. FORENSICS: FAR FROM SCIENTIFIC CERTAINTY

“[Forensic science] is justice’s best friend, but it has to not only be used right but done right.”

Despite the authority with which television and movie crime dramas depict forensic science results, the practice sometimes falls short of that “used and done right” standard. Popular culture, news outlets, and public perception guide the belief that the forensic evidence is reliable and certain proof of an individual’s guilt. In fact, forensic evidence has the essential hallmarks of certainty that juries need and society craves. Most people agree that it would be a miscarriage of justice to imprison an innocent person. Consequently, we want to be sure that we are convicting the right person. In many cases, forensic evidence closes the confidence gap and seals the defendant’s fate. It has the power to move the jury from maybe to guilty and everyone can sleep better at night because the “science” solidified the conviction. The forensic analysts are the criminal justice system’s rock stars, bringing their objective scientific skill and authority to

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18 See discussion infra, Part III.
19 See discussion infra, Part IV.
20 See discussion infra, Part V.
22 But see In re Davis, 557 U.S. 952, 955 (Scalia, J. dissenting) (“This court has never held that the Constitution forbids the execution of a convicted defendant who has had a full and fair trial but is later able to convince a habeas court that he is ‘actually’ innocent.”)
23 See NAS REPORT, supra note 1, at 4 (“in some cases . . . testimony based on faulty forensic science analyses may have contributed to wrongful convictions of innocent people.”)
24 This is not to say that forensic science does not have its place in the criminal justice system. Rather, it needs to be presented in context and in light of its weaknesses.
an otherwise emotionally charged process. Yet “public crime laboratories are not the sanctuaries of science we believed them to be.”

Even the Supreme Court has recognized that “[s]erious deficiencies have been found in the forensic evidence used in criminal trials.” It is undeniable, and the “legal community now concedes, with varying degrees of urgency, that our system produces erroneous convictions based on discredited forensics.”

A. “Science” Short of the Nth Degree

In tracking the 290 cases of post-conviction exoneration brought about by DNA testing, the Innocence Project estimates that the average sentence served in those cases is thirteen years, with seventeen people sentenced to death before DNA was able to prove their innocence. Moreover, of those 290 cases, 126 of the original convictions involved “unvalidated or improper forensic science.”

Given the now-ubiquitous nature of DNA testing, “it is possible to forget that, for decades, law enforcement had to rely on much less accurate forensic methods.”

Although today’s criminal cases often revolve around whether or not there is DNA—even for low-level property crimes—forensic science traditionally encompasses many different disciplines, including “general toxicology, firearms/toolmarks, questioned documents, trace evidence, controlled substances, biological/serological screening, fire debris/arson analysis, impression evidence (e.g., fingerprints, shoe/tire prints), blood pattern analysis, crime scene

25 For example, Dr. Henry Lee is an accomplished forensic analyst who has worked on high profile cases, including the JonBenet Ramsey case, the O.J. Simpson case, and the Casey Anthony case. DRHENRYLEE.COM, http://www.drhenrylee.com/famous/ (last visited March 27, 2013).
31 GOULD, ET. AL., supra note 4, at 16.
investigation, medicolegal death investigation, and digital evidence.” 

In most forensic disciplines, “the human examiner is the main instrument of analysis.” The forensic analyst examines visual patterns and “determines if they are ‘sufficiently similar’ to conclude that they originate from the same source.” The forensic disciplines can be divided into two main categories—laboratory disciplines and disciplines based on expert interpretation of observed patterns. Examples of the former include DNA analysis, toxicology, and drug analysis. Disciplines based on expert interpretations of observed patterns include, but are not limited to, the analysis of fingerprints, writing samples, and toolmarks in order determine a common source.

In what may be an oversimplification of the distinction, the laboratory disciplines also bring quantitative results that seem to reflect objectivity. For example, DNA results culminate in the all-important statistical representation of the likelihood of a random match based on population genetics (i.e., the ubiquitous “1 in n billion” number). The laboratory-based forensic disciplines are deemed to be more analytical and thus more reliable than the “pattern identification” disciplines that are more subjective and produce qualitative results. Whether the laboratory disciplines are deserving of such deference is better saved for another article. DNA analysis is subject to human error based on the interpretation (read: subjective analysis) of results that include, among other things, mixture samples, low-copy DNA, and degraded evidence.

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34 Id.
35 Id.
36 Id.
37 Id. at 41.
38 Id. at 7 (“In terms of scientific basis, the analytically based disciplines generally hold a notable edge over disciplines based on expert interpretation.”).
39 See generally Thompson et. al., supra note 9 (discussing the problems with mixture, low-copy DNA, and degraded samples).
Distinctions aside, forensic science disciplines lack significant peer-reviewed research of the scientific bases and validity of the forensic methods.\textsuperscript{41} The pattern-identification disciplines lack “sufficient data on the diagnosticity and reliability” of even the most basic assumptions.\textsuperscript{42} Further, research in many disciplines would allow for more consistent, quantitative results. Research could also provide limits and measures of performance, which are especially needed in the disciplines based on subjective interpretation of observed patterns.\textsuperscript{43} Without the requisite level of empiricism that grounds scientific endeavors, forensic science devolves into forensic art.

Despite the public desire for certainty and legal requirement of “beyond a reasonable doubt,” “[f]ew forensic science methods have developed adequate measures of accuracy of inferences made by forensic scientists.”\textsuperscript{44} It seems common sense that every forensic technique should include the applicable level of “uncertainty in the measurements that are made.”\textsuperscript{45} Taken in isolation, the lack of scientifically acceptable standards for such a wide segment of a discipline that continually calls itself a “science” seems quixotic. The gap between forensic research and forensic practice occurred long ago, and is the product criminal justice system. Many of the disciplines evolved solely for the purpose of solving crimes.\textsuperscript{46} Forensic techniques were applied to cases in the absence of validation studies, but once the foothold was established, ongoing use essentially grandfathered these applications in and courts cemented their longevity.\textsuperscript{47}

\textsuperscript{41} NAS REPORT, supra note 1, at 8.  
\textsuperscript{43} NAS REPORT, supra note 1, at 8.  
\textsuperscript{44} Id. at 184.  
\textsuperscript{45} Id.  
\textsuperscript{47} See, e.g., United States v. Crisp, 324 F.3d 261, 268 (2003) (“While the principles underlying fingerprint identification have not attained the status of scientific law, they nonetheless bear the imprimatur of a strong general acceptance, not only in the expert community, but in the courts as well.”).
With a pile of cases to solve, research, repeatability and reliability assessments were—quite understandably—not a priority. Furthermore, implementation of research and standards present costs (in both workload and real dollars) that crime lab budgets cannot allocate for. This steady progression and acceptability, however, permitted forensic evidence to run unimpeded and elevated it to the “sure bet” in criminal trials. Of course, some forensic evidence is more reliable than others,⁴⁸ but that does not excuse a continued culture of “because I said so” testimony that uses loaded conclusions such as “match,” “positively,” or “to the exclusion of all others” without the proper measurements of reliability and rarity.

This lack of a research-oriented culture in forensic evidence leads to errors in the way the evidence is used in prosecutions and presented in courts. The errors come in a variety of shapes and sizes. In a recent study of the “predictors” of wrongful convictions, the authors concluded that forensic errors most often accumulate in the interpretation of the evidence and the resulting testimony as opposed to the “actual scientific testing.” In some ways, this presupposes that “scientific testing” takes place as opposed to an analyst merely “eyeballing”⁴⁹ the evidence. Nonetheless, the authors acknowledge that there is a fundamental lack of foundational research underlying the forensic science disciplines. But the absence of data produces the eventual errors in forensic testimony that the study’s authors focus on such as exaggerating the “inculpatory nature of the evidence by providing inaccurate or non-existent statistics; and misstating the certainty of the results when the forensic technique, such as bite mark, scent, or fiber analysis, does not allow for it.”⁵⁰ Indeed, there are no instruments that measure or quantify a “reasonable

⁴⁸ DNA is often heralded as the gold standard and the NAS report cites it as the one method that “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.” NAS REPORT, supra note 1, at 7.
⁵⁰ GOULD ET. AL., supra note 4, at xix–xx.
degree of scientific certainty” when the phrase really boils down to the experience of the witness and not much else.

B. Splitting Hairs: Anatomy of a Cheap Fix

Last year, in a sequence of investigative reports, the Washington Post exposed a Department of Justice review of hundreds of cases believed to contain flawed forensics. The DOJ task force spanned nine years and (regrettably) focused on the work of one particular examiner performing hair and fiber analyses. DOJ officials began reexamining cases in the 1990s after reports that careless work by analysts at the FBI lab produced unreliable forensic results that were later used in trials. The results of that review—kept silent for more than a decade—demonstrated that flawed hair and fiber evidence was used in numerous cases to garner convictions.

Hair and fiber evidence has long been the subject of scrutiny. It should not come as a surprise that some of the defendants against whom this evidence was used turned out to be innocent. What is surprising is that the DOJ deliberately withheld the findings from those whose convictions resulted—at least in part—on that evidence. Instead, the DOJ made the findings available only to the prosecutors in the affected cases. The Washington Post investigation revealed possibly fifty percent of the defendants whose hair evidence was called into question never learned of the Task Force’s review. Just running the numbers, it is clear that hundreds of “remain in prison or on parole for crimes that might merit exoneration, a retrial or a retesting of

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51 See Gabel & Wilkinson, supra note 49, at 1008–09 (discussing the unreliable nature of hair analysis and its role in several wrongful convictions).
evidence using DNA because FBI hair and fiber experts may have misidentified them as suspects.”

In one case, Donald E. Gates, served 28 years for the rape and murder of a Georgetown University student based on FBI Special Agent Michael P. Malone’s testimony that his hair was found on the victim’s body. DNA testing exonerated Gates in 2009. Even before DOJ task force reviewed Malone’s work, the Office of Inspector General issued a scathing report investigated “allegations of wrongdoing and improper practices within certain sections of the [FBI] Laboratory.” That particular report—released in 1997—specifically targeted Malone. Malone’s work was the lynchpin to Gates’s conviction, but Gates never learned about the OIG’s report regarding Malone or his faulty work.

Gates spent decades in prison for a crime he did not commit. Benjamin Herbert Boyle was also convicted based on Malone’s testimony. Boyle’s case was part of the task force’s review, but like Gates, he never learned of the investigations into Malone’s case. In fact, Boyle would never have the opportunity to learn about it. The state of Texas executed him in 1997. A prosecutor’s memo indicated that Boyle would have never been eligible for the death penalty had the hair evidence not been part of the State’s case. The task force would later determine that Malone’s conclusions in Boyle’s case were flawed.

For years, scholars, attorneys and scientists have questioned the validity of microscopic hair comparison. The discipline is beset with weaknesses, yet the Department of Justice only reviewed the work of one FBI analyst—Malone—despite the questions surrounding the integrity of the FBI Lab as a whole. Of course, choosing to focus on bad apple rather than a holistic repair the tree is the easier, low-cost option. Moreover, it allowed the task force to blame the misconduct or ineptitude of one and ignore the systemic failures of an entire discipline.

The myopia of the limited scope of the review is apparent and palpable when viewed through the lens of cases that slipped through the cracks. Santae A. Tribble was convicted of killing a taxi driver in 1978. During the investigation of John McCormick’s murder in Seat Pleasant, Maryland, a police dog uncovered a stocking mask several blocks away from the crime scene. The stocking contained thirteen hairs total. Of the thirteen, the FBI concluded through hair analysis that one belonged to Santae Tribble, leading to his subsequent arrest. Over the course of his three-day trial, Tribble took the stand in his own defense, urging the jury to accept the fact that he had no connection to McCormick’s death. Nevertheless, the jurors gave weight to the one “matching” hair and found Tribble guilty of murder; the judge sentenced him to twenty years to life in prison.

http://www.abajournal.com/news/article/review_found_fbi_hair_analysis_flaws_in_250_cases_but_doj_didnt_inform_defense/

56 Executive Summary, supra note 53.
57 Id.
59 See Id. (describing a juror’s suspicion that other jurors wrongly discounted Tribble’s detailed alibi).
60 Id.
61 Hsu, supra note 52.
Although on parole, Tribble maintained his innocence and in January 2012, Tribble’s lawyer, succeeded in having the evidence retested. A private lab concluded through DNA testing that the hairs could not have belonged to Tribble. A more thorough analysis—even absent DNA testing—would have revealed the same result: one hair had Caucasian characteristics and Tribble is African American. But a shoddy examination left an innocent man in prison for twenty-five years, plus another three years on top of that for failing to meet the conditions of his parole. And Tribble is, perhaps, “lucky.” There was testable DNA and he found freedom in 2012 (eight years after the task force completed its work).

In another case that escaped the task force’s review, Kirk L. Odom was convicted of a sexual assault in 1981. The star prosecution witness—an FBI Special Agent—testified that a hair discovered on the victim’s nightgown was microscopically similar to Odom’s hair “meaning that the samples were indistinguishable.” To illustrate the credibility of the evidence, the agent also testified that he had concluded hairs to indistinguishable only “eight or 10 times in the past 10 years, while performing thousands of analyses.” Although Odom presented alibi evidence, the jury convicted him after just a few hours of deliberation. Odom was paroled in March 2003 and required to register as a sex offender.

That would have been the end of Odom’s story had it not been for a lawyer who remembered the Donald Gates case and the unreliable FBI microscopic hair analysis that played

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63 Id.
64 Id.
a role in Gates’s conviction. Odom’s PDS trial attorney remembered the use of similar evidence in Tribble’s case and his claim of innocence. In February 2011, Sandra Levick (who had also represented Gates and Tribble), filed a motion for DNA testing under the D.C. Innocence Protection Act. In response, the government located stained bedsheets, a robe and the microscopically examined hair from the crime scene. DNA-STR testing on semen from a pillowcase and robe, as well as mitochondrial testing of the hair, all excluded Odom and instead implicated a convicted sex offender. Odom was exonerated on July 13, 2012.

In response to the Gates-Tribble-Odom trifecta, the Justice Department and the FBI announced a joint effort to review convictions involving FBI (and only FBI) analysis of hair evidence. For its part, the FBI appears to be in denial. In a July 2012 statement, the FBI explained:

The FBI Laboratory still conducts microscopic hair comparisons. There is no reason to believe the FBI Laboratory employed “flawed” forensic techniques.

The validity of the science of microscopic hair comparison is not at issue; however, based on recent cases, the FBI and Department of Justice are committed to undertaking a review of historical cases that occurred prior to the regular use of mitochondrial DNA testing to ensure that FBI testimony at trial properly reflects the bounds of the underlying science.

The U.S. Attorney for the District of Columbia—Ronald C. Machen, Jr.—has stated that “his office would try to review all convictions that used hair analysis his office would try to review all convictions that used hair analysis.” In addition to being too little, too late for some, this effort again seems to deliberately ignore that flawed hair analysis is a widespread problem. It


67 Id.

68 Id.

69 Hsu, supra note 58.


71 Hsu, supra note 52.
completely runs afoul of simple common sense to believe that such errors occur in isolation, confined to just one laboratory. Yet we continue to allow the criminal justice system to be held hostage by bad science.

C. Reading the Fine Print

Bad science comes in many forms—it may reside in weak methodology, the misapplication of that method to a specific case, a poor analyst, or outright fraud. While it may be easy to conceive of how forensic errors can exist in disciplines such as hair analysis, we have more difficulty with established forensic techniques, such as latent print identification, commonly known as fingerprints. The bedrock of fingerprint analysis is the familiar refrain that no two fingerprints are alike. Indeed, fingerprints have general ridge patterns that make it possible to systematically classify and compare them, and the average fingerprint contains between 50 and 150 points of comparison (termed “friction ridge analysis”).

But fingerprint analysis does not involve a comparison of 150 or even fifty points of identification. Rather, most jurisdictions in the United States do not require a minimum number of points between samples to sufficiently call the comparison a “match.” Comparisons of six or eight points are enough for identification and, ultimately, conviction. So, while it may be that on the whole no two fingerprints are alike, there is little to support that six, eight, or even ten points are a sufficiently discriminating way to identify a suspect.

This theoretical disconnect became palpable in the case of Brandon Mayfield. On March 11, 2004, a terrorist attack on commuter trains in Madrid, Spain killed approximately 200 people

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72 See DAVID R. ASHBAUGH, QUANTITATIVE-QUALITATIVE FRICTION RIDGE ANALYSIS: AN INTRODUCTION TO BASIC AND ADVANCED RIDGEOLOGY, 1–10 (1999) (outlining the evolution of friction ridge analysis).

73 See, e.g., Commonwealth v. Patterson, 840 N.E. 2d 12, 17 (Mass. 2005) (“[M]ost agencies in the United States no longer mandate any specific number [of matches.] Rather, the examiner uses his expertise, experience, and training to make a final determination.”).

and injured nearly 1,500.75 Needing assistance, the Spanish National Police enlisted the help of the world-renowned FBI crime lab and its fingerprint specialists. On March 19, the FBI identified Mayfield as the source of one of the fingerprints on the bag containing the detonators connected with the attacks.76 A second examiner verified the “match”, and this conclusion was reviewed by a Unit Chief who concurred in the results.77 The FBI then learned on April 13 that the Spanish National Police performed an independent examination of the Mayfield and suspect print comparison, but could not positively identify him as the source.78 After meeting with FBI representatives, the Spanish National Police agreed it would reexamine Mayfield’s fingerprints.79

The FBI ultimately arrested Mayfield on May 6.80 Mayfield was still in detention on May 17 when the court appointed an independent fingerprint examiner to review the FBI’s identification.81 On May 19, the independent examiner agreed with the FBI’s identification, and became at least the fourth examiner to positively link Mayfield to the suspect print.82 Yet, on the same day, the Spanish National Police notified the FBI that it had positively matched the fingerprint with Ouhnane Daoud, an Algerian national.83 The court released Mayfield to home detention the next day, the FBI withdrew its identification on May 24, and the case against Mayfield was dismissed.84

76 Id. at 1.
77 Id. at 2.
78 Id.
79 Id.
80 Id. at 3.
81 Id.
82 Id.
83 Id.
84 Id.
The Office of the Inspector General (OIG) ultimately found multiple sources for the FBI Laboratory’s error, including facts about the specific case—such as the similarity between the prints being identified and Mayfield’s religious background—and problems with the fingerprint identification process—including reliance on extremely tiny details, inadequate explanations for differences found, failure to assess the poor quality of the similarities, and failure to reexamine the fingerprints after the SNP’s negative result. While the Mayfield case may seem like an outlier, it remains that serious errors in supposedly reliable and accurate methodology nearly perpetrated a miscarriage of justice. Brandon Mayfield is a high-profile example of a systemic problem that likely increases in frequency when the case is merely average and doesn’t implicate national security and require multiple reviews of the evidence. Perhaps what makes Brandon Mayfield’s case the exception is not that forensic science got it wrong, but that we figured out the error before the man was convicted.

These errors resulted in an innocent man being investigated and detained. Further, the resources of the FBI and other investigatory organizations were wasted on pursuing a lead that was fruitless from the start at a time when the world’s investigative agencies were pursuing the perpetrators of the terrorist attacks. Even beyond the Mayfield blemish, evidence is mounting in support of the conclusion that fingerprint analysis has been undermined by its own methodology. The NAS Report cites a paper by Harber and Harber, in which the authors conclude: “[w]e have reviewed the available scientific evidence of the validity of the ACE-V method [of latent fingerprint identification] and found none.” The development of the ACE-V method itself has a curious chronology. It was conveniently adopted after the Supreme Court’s

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85 Id. at 6.
86 Id. at 6, 11.
87 Id. at 8–10.
88 For a critique of fingerprint analysis technique, see generally Epstein, supra note 74.
89 NAS REPORT, supra note 1, at 143.
decision in *Kuhmo Tire*, which equivocated technical testimony to that of scientific evidence, making it subject to the rigors of *Daubert*.90 The decision effectively removed the cloak of invisibility for some forensic disciplines that rested on “technical experience” rather than scientific methods as the foundation for the expert opinion.91

Suddenly, latent print examiners needed some sort of method in addition to an abundance of experience and a good set of eyes. Consequently (and conveniently), the ACE-V method was born, but it is not in the family of scientific analysis that the term “method” might otherwise provoke. Despite the widespread propaganda that promotes ACE-V as a scientific method, fingerprint analysis lacks validated standards and testing with respect to the process and the level of reliability needed to draw conclusions about the relative similarity between two prints.92 A recent study has shown that when identical fingerprint evidence is presented to the same set of examiners for analysis, they reach different conclusions approximately ten percent of the time.93

Moreover, the “V” in ACE-V (which stands for “verification”) was meant to address the need for “peer review” but the slipshod fix ignores the vulnerabilities of cognitive bias replete in fingerprint analysis. The Mayfield case highlighted this particular weakness, but it is not an isolated incident nor is it limited to fingerprint analysis. Context influences many aspects of the forensic process. Forensic examiners may: be aware of the nature and details of the particular crime or the suspect; be pressured by an investigator to find a match between samples; be apprised of prior conclusions drawn by colleagues working on the same piece of evidence (the peer review). All of these factors can contribute to contextual bias.94

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90 Epstein, *supra* note 74, at 641.
91 *Id.* at 642.
94 Kassin, et al., *supra* note 33, at 43.
The contextual stimuli that permeate forensic science may be subtle or flagrant, but they are omnipresent. The erroneous identification of Brandon Mayfield exemplified the gravity of forensic bias (“the latent fingerprint was examined against a pre-existing “target,” without first being properly analyzed in isolation; the examiners were pre-armed with contextual information, leading them to be suspicious of their target; and the case was high in profile and time-urgent, increasing the need for closure”).

Couple the bias component with the possibility for false positives, the threat of a wrongful conviction based on flawed fingerprint evidence is very real.

D. Crime Lab Contagion: A Culture of Cutting Corners

In recent years, a number of shocking crime lab scandals have gained media attention and grabbed headlines. The cases appear to range from mere negligence to outright malfeasance and occur in laboratories all over the country. Accusations involve evidence tampering, perjury, and withholding evidence. Such accusations are often linked to a particular person or even section within the crime lab. The problem of one, however, becomes the pestilence for many because a crime lab is the sum of its collective parts and when one part is infected, it can bring down the entire organism.

As with the individual forensic disciplines, crime labs also lack any cohesive set of mandatory standards. Depending on the crime lab, this creates a quality control issue. The

95 Id.
crime lab accreditation process—which implies reviews, testing and audits—is, at best, voluntary and, at worst, as a charitable endowment. Many states do not require crime labs to be accredited.\(^{100}\) Many crime labs receive accreditation from the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB), the primary certifying body for crime labs. In 1996, Peter Neufeld—co-founder of the Innocence Project—observed that “[t]here’s absolutely no reason that crime laboratories, which routinely make decisions that have life and death consequences for an accused person, should be less regulated than a clinical laboratory utilizing similar tests.”

The NAS Report noted the lack of standards for laboratory management and administration.\(^{101}\) Specifically, it observed that:

> There is no uniformity in the certification of forensic practitioners, or in the accreditation of crime laboratories. Indeed, most jurisdictions do not require forensic practitioners to be certified, and most forensic science disciplines have no mandatory certification programs. Moreover, accreditation of crime laboratories is not required in most jurisdictions. Often there are no standard protocols governing forensic practice in a given discipline. And, even when protocols are in place … they often are vague and not enforced in any meaningful way.\(^{102}\)

History demonstrates that if a lab produces errors (on any scale), it is unlikely to affect its accreditation from ASCLD/LAB. A member of the New York Forensic Science Commission criticized ASCLD/LAB for its “culture of tolerance for errors stemming from a highly forgiving corrections system, some times of major and/or lesser magnitudes, but many of which either violate ASCLD/LAB’s ethics guidelines and/or standards.”\(^{103}\)

\(^{100}\) Id.
\(^{101}\) NAS REPORT, supra note 1, at 6.
\(^{102}\) Id.
\(^{103}\) Justin Peters, Crime Labs Botch Tests All the Time. Who’s Supposed to Make Sure They Don’t Screw Up?, CRIME Blog (January 17, 2013, at 6:08PM), http://www.slate.com/blogs/crime/2013/01/17/crime_lab_scandal_crime_labs_botch_tests_all_the_time_who_s_supposed_to.html
ASCLD/LAB does not conduct random inspections of crime labs. Laboritories are always given notice of a visit and the lab itself selects the case files for review.

In what reminds this author of mortgage servicers’ counter-cyclical diversification strategy, ASCLD offers a wealth of services to its member labs “such as protection from outside inquiry, shielding of internal activities and where necessary, especially in the event of public condemnation, a spokesperson to buffer the laboratory from media inquiry.” In other words, when times are bad for a crime lab, ASCLD still reaps benefits from its member labs. The accreditation of crime labs is a for-profit business that sorely needs an overhaul, but it likely is not the root cause of crime lab scandals.

What makes forensic error a full-blown crime lab scandal? As with any scandal that brings down an organization, it usually includes repetitive conduct, a failure to respond, and a culture of tolerance of such activity. The situations that move an incident into the scandal column are varied and diverse. Examiners may lie about test results, produce misleading data regarding the reliability of their methods, or conceal exculpatory evidence. Other cases may involve “dry-labbing,” where an analyst records data for tests that he or she never conducted.

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104 See id. (“Laboratory inspections are always on notice to a laboratory rather than by surprise . . . .”).
105 Id.
106 Id. (citing the NAS REPORT).
107 See Matt Clarke, Crime Labs in Crisis: Shoddy Forensics Used to Secure Convictions, PRISON LEGAL NEWS, https://www.prisonlegalnews.org/displayArticle.aspx?articleid=22698&AspxAutoDetectCookieSupport=1 (last visited March 28, 2013) (“forensic experts and other lab personnel may lie about test results, be misleading about the reliability of their methods, and/or cover up test outcomes when they are beneficial to the defendant.”).
108 Id. See also Denise Lavoie & Erika Niedowski, Annie Dookhan, Chemist in Drug Lab Scandal, May Face More Charges, HUFF. POST, Sept. 29, 2012, available at http://www.huffingtonpost.com/2012/09/29/annie-dookhan-chemist-drugs-lab-charges_n_1925335.html (describing Annie Dookhan, a chemist accused of, inter alia, reporting positive test results when the test was actually negative, adding cocaine from another sample to the negative sample to produce a positive result, and lying about obtaining a masters degree in chemistry from the University of Massachusetts).
109 Id.
110 Id.
Protocols may be ignored, forensic scientists may exaggerate their credentials or expertise, or tests may be tampered with.

Whatever the particular problem, what cannot be denied is that between 2005 to 2011, there have been 50 significant failures at American crime labs. These types of problems have led to scandals at dozens of crime labs across the nation, resulting in full or partial closures, reorganizations, investigations or firings at city or county labs in Baltimore; Boston; Chicago; Colorado Springs, Colorado; Dallas; Detroit; Erie County, New York; Houston; Los Angeles; Monroe County, New York; Oklahoma City; San Antonio, Texas; San Diego; San Francisco; San Joaquin County, California; New York City; Nashville, Tennessee; and Tucson, Arizona, as well as at state-run crime labs in Illinois, Montana, Maryland, New Jersey, New York, Oregon, Pennsylvania, Virginia, Washington, North Carolina, West Virginia and Wisconsin.

To highlight some recent examples, in 2008, Detroit shut down its crime lab when an audit revealed errors in ten percent of cases. In 2010, an audit revealed that technicians in a North Carolina lab provided false or misleading results in 190 murder or other serious cases. In 2011, New York shut down a state crime lab after an investigation revealed that the lab had engaged in flawed testing for MDMA (more commonly known as ecstasy), triggering the review of 9,000 cases. Authorities were aware of issues with the crime lab as far back as

112 Peters, supra note 103.
113 Error-Prone Detroit Crime Lab Shuts Down, USATODAY (Sept. 25, 2008), http://usatoday30.usatoday.com/news/nation/2008-09-25-crime-lab_N.htm. In response to the crime lab’s scandal, a Detroit prosecutor said, “As prosecutors, we completely rely on the findings of police crime lab experts every day in court, and we present this information to our juries . . . when there are failures of this magnitude, there is a complete betrayal of trust. We feel betrayed, as prosecutors.” Id.
116 Id.
Some tampering comes in the form of theft where analysts steal evidence for personal use. San Francisco crime lab technician Deborah Madden admitted to taking cocaine from evidence. Police arrested Massachusetts chemist Sonja Farak on similar charges related to both cocaine and heroin earlier this year. The need for standard protocol and oversight in state-run crime labs has never been more apparent.

Other analysts commit fraud to attain professional recognition. Chemist Annie Dookhan (also in Massachusetts) was responsible for the lab’s quality control. It would be discovered that she manipulated evidence in order to obtain false positives. She admitted to sprinkling samples submitted for testing with a known illegal substance to ensure a positive result, as well as testing a small percentage of samples and then listing all the remaining samples as positive. Her misconduct implicated over thirty thousand defendants and as many as two hundred cases, which federal officials now must review. Dookhan was renowned for her “preternatural speed.” She analyzed an astonishing 500 samples per month while the average forensic chemist makes it through 50 to 150 samples in the same amount of time.

119 Id.
123 Lavoie, supra note 96.
124 Id.
125 Id.
127 Lavoie & Niedowski, supra note 108.
supersonic speed was anything but the result of superior skill. Dookhan admitted that she cut corners rarely respected laboratory protocol. One of Dukhan’s supervisors noted that she “did not seem to use a microscope, which is necessary to confirm that a substance is cocaine.”

Ohio toxicologist James Ferguson lied about his credentials on the witness stand in hundreds of cases. Ferguson claimed to have received his college degree sixteen years prior to his actual graduation date. Ferguson discounted the magnitude of the deception in light of his twenty-plus-years experience. One cannot help but wonder what else Ferguson has lied about given his willingness to perjure himself over something he characterized as minor. Ferguson would not be alone in committing perjury to bolster the state’s case. Michael Hansen served six years for the murder of his daughter before a judge found the medical examiner, Dr. Michael McGee, testified falsely in Hansen’s trial. The prosecution ultimately dropped the charges.

In addition to overt misconduct, the close connection between law enforcement and crime laboratories can result in policies favoring the prosecution. For example, North Carolina’s crime lab recently came under fire for a policy of withholding certain results from defense attorneys.

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128 Former Toxicologist Sentenced for Lying About Credentials, TV10.COM (May 13, 2010 4:15PM, updated May 18, 2010 11:07AM), html#sthash.oa6nuAbj.dpufhttp://www.10tv.com/content/stories/2010/05/13/story-licking-county-false-testimony.html. Dookhan also lied about her credentials at various stages of her career. Jacobs, supra note 121. Dookhan at one point claimed to have both a Masters degree and a Doctoral degree from Harvard—neither of which was true. Id. “She inflated her salary and gave herself grandiose job titles, referring to herself in an e-mail as ‘an on-call supervisor for chemical and biological terrorism.’” Id. 
129 Former Toxicologist Sentenced for Lying About Credentials, supra note 128.
130 Id.
131 Baran, supra note 97.
133 Giannelli, supra note 98. Even where there is not a stated policy favoring law enforcement, the personal relationships between prosecutors and crime labs can instill a sense of loyalty toward the prosecution. Again, Dookhan’s case is instructive. A string of emails between the disgraced chemist and state prosecutors revealed that Dookhan saw her role as anything but a neutral scientist. Andrea Estes, Indicted drug analyst Annie Dookhan’s e-mails reveal her close personal ties to prosecutors (Dec. 20, 2012), http://www.boston.com/news/local/massachusetts/2012/12/20/indicted-drug-analyst-annie-dookhan-mails-revealer-close-personal-ties-prosecutors/A37GaatHLKfW1kphDjxLXJ/story.html#sthash.2z1vBPhp.dpuf (“Dookhan . . . viewed herself as part of the prosecution team, the e-mails show. She coached assistant district
In situations where an initial sample tested positive as blood, the lab would withhold any subsequent negative test—even where the later test was more specific. According to a report issued by the FBI, the “North Carolina crime lab workers omitted, overstated or falsely reported blood evidence over a 16-year period.”

The harms caused by errant crime labs are often compounded by a lack of transparency. Labs are often more concerned with reputation than with rectifying wrongs (which requires informing defendants of the error(s)).

These troubling issues exact enormous costs. When these scandals do come to light, the criminal justice system must reexamine huge numbers of past convictions. Annie Dookhan was directly involved with at least 100 cases in one Federal District Court alone. As many as 500 federal cases may eventually have to be reviewed. Ultimately, once state court cases and cases invoking the mandatory minimum sentencing requirements based on state convictions are considered, the toll is estimated to reach approximately 34,000 cases. In the cases that have been reviewed, 1,141 individuals are serving sentences on drug cases Dookhan was involved in. District attorneys place the cost for prosecutors in the $50 million range. The judiciary

attorneys on trial strategy and told one that her goal was ‘getting [drug dealers] off the streets.’”). Another district attorney resigned over a string of suggestive emails with Dookhan. Id.


Id.


Id.

Jacobs, supra note 121. Some estimates run as high as 34,000 tainted cases. Id. As of February of this year nearly 300 offenders have been released. Id.

Peters, supra note 99.
reportedly requested nearly $9 million to deal with the scandal. These figures exclude the expense of the public defenders needed in many of these cases.

There are substantial costs even in scenarios where the wrongdoing involves theft of already tested substances. Internal investigations are still required to ferret out tainted samples. More importantly, the integrity of the criminal justice system is eroded. At a time when the federal and states’ governments bemoan declining revenues, it seems far more efficient to ensure labs are adequately resourced in the first instance than to divert money cleaning up messes after the fact. Moreover, the human cost is greatest of all. There is no way to quantify the pain suffered by innocent people incarcerated for crimes they did not commit.

While these are but a few in a laundry list of crime lab errors, collectively, they underscore the need for greater oversight, increased standardization and accountability. The continued failure to address these problems exacts too high a toll. In addition to the inestimable suffering of individuals wrongly convicted, these scandals undermine society’s faith in a fair and just system. It is also worth remembering that in crimes where there is a victim, every innocent person wrongfully convicted means a guilty person is allowed to go free.

II. GROUNDHOG DAY: ATTEMPTS AT REFORMING FORENSIC SCIENCE IN THE UNITED STATES

“Insanity: doing the same thing over and over again and expecting different results.”

In the aftermath of the NAS Report and the rise in reporting of crime lab errors (whether it’s a true increase versus an uptick in reporting is subject to debate), it would seem that forensic reform is in its infancy stages in the United States. While, the NAS Report presented a frontal

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143 Id.
144 See id.
145 Roman, supra note 120.
146 Albert Einstein.
assault on forensic science services, it was not the first entreaty into reform. Legislation has tiptoed around forensic issues for decades, with little to no success. Most of the legislation targeted laboratories rather than the forensic science as an industry. Last year saw a shift in legislation that addressed the need for standards and oversight as opposed to dumping more money into labs.

A. Treating Symptoms Instead of the Cause: The Early Years of Forensic Reform

The abysmal state of crime labs first gained national attention in 1967 when President Lyndon B. Johnson’s “Crime Commission on Law Enforcement and the Administration of Justice” found that many police labs lacked both equipment and expertise. During the Nixon Administration, a 1973 Commission echoed many of these same concerns. A few years later, the National Institute of Law Enforcement and Criminal Justice garnered nationwide media attention with its finding that scores of crime labs were underperforming. Identifying weaknesses, however, does little to actually effectuate change in the absence of funding to accomplish those improvements. This is a continuous theme in the chronology of forensic reform legislation.

In the 1970s and 1980s, the answer to performance issues was often to treat symptoms rather than causes. This ad-hoc approach essentially threw some cash at various problems in order to incentivize and compel improvements. Of course, that rarely works and the early attempts at reform were just that—attempts.

B. The Cash Cow: Funding Linked to DNA Testing

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147 Kenneth E. Melson, Embracing the Path Forward: The Journey to Justice Continues, 36 NEW ENG. J. ON CRIM. & CIV. CONFINEMENT 197, 199 (2010).
148 Id.
149 Id.
150 Id. at 199.
151 Id.
Despite this evidence, Congress largely remained silent on performance lapses until the use of DNA in criminal investigations gained prominence.\footnote{152} Competing views over the admissibility of DNA evidence led to a 1992 report (NRC I) by the National Academy of Sciences.\footnote{153} A 1996 follow-up report (NRC II) revealed that DNA tests were both scientifically valid and reliable.\footnote{154} NRC II report, in concert with the standards for admissibility established by \textit{Daubert v. Merrell Dow Pharmaceuticals, Inc.},\footnote{155} resulted in a rise in the use of DNA in criminal trials—and a corresponding uptick in legislation.\footnote{156}

After NRC II, the National Institute of Justice (NIJ) joined forces with the Office of Law Enforcement Standards to fund the “Forensic Summit: Roadmap to the Year 2000.”\footnote{157} The summit resulted in an NIJ Report outlining persistent deficiencies in most public crime labs.\footnote{158} The report called for greater standardization, increased research, and quality controls in laboratories.\footnote{159} The report notwithstanding, as DNA became the so-called “gold standard” in law enforcement, this new reverence—bordering on obsession—meant the vast majority of federal funding allocated to crime laboratories was tied to DNA research.\footnote{160} For example, in 2000 Congress enacted the “DNA Analysis Backlog Elimination Act”\footnote{161} and the “Paul Coverdell

\footnotesize{\textsuperscript{152} Although there was little federal legislation in this area, Senator Abraham Ribicoff did introduce a “joint resolution designating February 21, 1973” as a day of honor celebrating the twenty-fifth anniversary of the American Academy of Forensic Sciences. S. J. Res. 12, 93d Cong. (1973).} \footnotesize{\textsuperscript{153} Paul C. Giannelli, \textit{Daubert and Forensic Science: The Pitfalls of Law Enforcement Control of Scientific Research} 2011 U. ILL. L. REV. 53, 58; Melson, \textit{supra} note 147 at 202 (citing \textit{COMM. ON DNA TECH. IN FORENSIC SCI., NAT’L RESEARCH COUNCIL, DNA TECHNOLOGY IN FORENSIC SCIENCE (1992))}.} \footnotesize{\textsuperscript{154} Melson, \textit{supra} note 147 at 203 (citing \textit{COMM. ON DNA FORENSIC SCI.: AN UPDATE, NAT’L RESEARCH COUNCIL, THE EVALUATION OF FORENSIC DNA EVIDENCE (1996))}.} \footnotesize{\textsuperscript{155} 509 U.S. 579 (1993).} \footnotesize{\textsuperscript{156} See Giannelli, \textit{supra} note 153 at 58; Melson, \textit{supra} note 147 at 202–03.} \footnotesize{\textsuperscript{157} Melson, \textit{supra} note 147 at 199.} \footnotesize{\textsuperscript{158} Id. at 199–200.} \footnotesize{\textsuperscript{159} Id.} \footnotesize{\textsuperscript{160} See Giannelli, \textit{supra} note 153 at 58; Melson, \textit{supra} note 147 at 202–03.} \footnotesize{\textsuperscript{161} Pub. L. No. 106-546, 114 Stat. 2726 (codified in 10 U.S.C. § 1565 and scattered sections of 42 U.S.C.).}
National Forensic Sciences Act.” The funding mechanisms for DNA far outstripped any other allotments, despite the fact that DNA testing represents a mere fraction of the work carried out by crime labs. Moreover, this preference for DNA spending did nothing to address the persistent issues with crime labs.

The sad state of forensic laboratories again gained national attention a few years later when President George W. Bush spearheaded the formation of a “Forensic Science Commission.” Subsequently, two mechanisms in 2004 were supposed to carry out the President’s mandate. The “Consolidated Appropriations Act” obligated the NIJ to provide Congress with a report on the continued inadequacies of crime labs and the needs of the forensic community. That same year, the DNA Sexual Assault Justice Act (or “Justice For All Act”) tasked the Attorney General with creating a National Forensic Science Commission, which would have identified resource needs beyond DNA in addition to making recommendations, disseminating best practices, and researching privacy issues around the use of DNA samples.

Although the bill passed, the Commission was never funded.

The situation again appeared hopeful in 2005 with the passage of the “Science, State, Justice, Commerce, and Related Agencies Appropriations Act of 2006,” which authorized the NAS to create a Forensic Science Committee and issue findings and recommendations to improve the state of forensic science. Among the findings previously mentioned, the NAS

163 Melson, supra note 147 at 203.
164 Id. at 200.
166 Id.
168 Id.
Report noted “great disparities among existing forensic science operations in federal, state, and local law enforcement jurisdictions and agencies.” The differences pertained to “funding, access to analytical instrumentation, the availability of skilled and well-trained personnel, certification, accreditation, and oversight.” In the chronology of forensic reform, the NAS study did much to gain national attention to an issue first acknowledged—and not much improved—since the Johnson Administration.

C. Forensic Reform 3.0: A Graveyard of Good Ideas

If the release of the NAS Report can be viewed as a watershed moment, then the legislation it spawned might be viewed as the third iteration of forensic reform. A few days prior to the release of the NAS report, Representative Peter Roskam introduced the “State and Local Criminal Forensic Laboratory Enhancement Act of 2009.” The bill never made it out of committee, despite the national attention garnered by the NAS findings. President Obama responded by chartering a Subcommittee on Forensic Science. That subcommittee’s role is to make recommendations to achieve the goals outlined in the 2009 NAS report. In Congress, however, DNA testing remained the focus of most legislation and received the lion’s share of funding through the 111th Congress.

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170 Id. at 5
171 Id. at 6.
172 Melson, supra note 147 at 203–04.
176 Aside from the “COPS Improvement Act of 2009,” H.R. 1139, 111th Cong., which also died in committee, the majority of legislation pertaining to forensics centered on DNA. E.g., Sexual Assault Forensic Evidence Registry
In 2011 Senator Patrick Leahy introduced the “Criminal Justice and Forensic Science Reform Act.”\textsuperscript{177} The bill, which died in committee, would have established “an Office of Forensic Science” within the Department of Justice.\textsuperscript{178} In 2012 Senator John D. “Jay” Rockefeller, IV, and Representative Eddie Bernice introduced companion bills in the senate and house. The “Forensic Science and Standards Act of 2012”\textsuperscript{179} sought to “establish scientific standards and protocols across forensic disciplines.”\textsuperscript{180} The Act would have created “a national forensic science research program to improve, expand, and coordinate federal research in forensic sciences.”\textsuperscript{181} In addition, the Act would have established a “National Forensic Science Coordinating Office” at the National Science Foundation and a “Forensic Science Advisory Committee.”\textsuperscript{182} Unlike Leahy’s bill, which would place the Forensic Science Office within the DOJ, the Advisory Committee would be created by both the Director of the National Institute of Standards and Technology (NIST) and the Attorney General.\textsuperscript{183} The committee would advise the DOJ and NIST.\textsuperscript{184}

To be sure, the Forensic Science Standards Act was notable for its trailblazing approach to tackle forensic reform in a manner that prior legislation had not. The legislation aimed to fix forensic science by encouraging research, adopting standards, and creating accreditation requirements. Despite its ambitious objectives, however, the legislation suffered from its corpulent proportions. Aside from the historical failure rate of forensic reforms, the legislation

\begin{footnotes}
\item \textsuperscript{177} S. 132, 112th Cong. (2011).
\item \textsuperscript{178} Id.
\item \textsuperscript{179} S. 3378, 112th Cong. (2012); H.R. 6106, 112th Cong. (2012).
\item \textsuperscript{180} S. 3378, 112th Cong. (2012); H.R. 6106, 112th Cong. (2012).
\item \textsuperscript{181} S. 3378, 112th Cong. § 4(a) (2012); H.R. 6106, 112th Cong. § 4(a) (2012).
\item \textsuperscript{182} S. 3378, 112th Cong. § 4(c) (2012); H.R. 6106, 112th Cong. § 4(c) (2012).
\item \textsuperscript{183} S. 3378, 112th Cong. (2012); H.R. 6106, 112th Cong. (2012).
\item \textsuperscript{184} S. 3378, 112th Cong. (2012); H.R. 6106, 112th Cong. (2012).
\end{footnotes}
was problematic because it birthed a Lernaean Hydra with a multitude of agencies, committees and other entities that bordered on redundancy and grandiosity. It created a chaotic assemblage of organizations by establishing new entities under the auspices of the existing National Science Foundation (NSF) and National Institute of Standards and Technology (NIST). Ultimately, however, the legislation was doomed by a lack of political capital and a steep price tag.

The NAS Report observed that a lack of quality, peer-reviewed forensic science research stymies advancements in the field. To address this deficit, the Forensic Science Standards legislation created the National Forensic Science Research Program that required research efforts from a variety of federal groups. The Standards Act would have required the Research Program to “improve, expand, and coordinate Federal research in the forensic sciences.”185 It also tasked the Director of the NSF with writing a report to identify and make recommendations regarding areas of forensic science that would benefit from further research.

Different from the Research Program, the NSF would also house the National Forensic Science Coordinating Office. The Coordinating Office’s purpose consisted of producing a “unified Federal research strategy” that identified and prioritized research goals consistent with the NAS report, and develop a roadmap to achieve them.186 Specifically, the roadmap was intended to establish the criteria that the Coordinating Office would use to assess research progress. The Coordinating Office also had oversight responsibility for Research Program.

In addition, the legislation provided the NSF with a Forensic Science Research Grants Program at an operating budget of $34 million for fiscal year 2013 and increasing by $3 million each year until 2017.187 A separate Grants Program would have supported the publication of grant-based research in peer-reviewed journals. On top of the tremendous budget allocation, the

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most ambitious aspect of the legislation was the creation of two new forensic science research centers under the auspices of the—funded up to $10 million each for a period of four years.\textsuperscript{188} The Standards Legislation established the research centers for four specific purposes: (1) carry out the national forensic research strategy; (2) “build relationships between forensic science practitioners and members of the research community;” (3) promote the education of individuals with the aim of creating leaders in the forensic sciences; and (4) disseminate their work.

Outside of the NSF (and to add bodies to the federal entities convention), the Act provided for additional forensic roles within the confines of the National Institute of Standards and Technology. The Act responds to the NAS Report’s concerns about disparate forensic science results by requiring NIST to develop “forensic science standards to enhance the validity and reliability of forensic science activities.”\textsuperscript{189} Such “activities” encompassed uniform measurements and criteria both for the methods and tools forensic scientists use.\textsuperscript{190} Further, NIST was saddled with standardizing the terminology forensic scientists use in their reports, providing for inter-operability of forensic science databases, test and validate existing standards, and independently validating “forensic science measurements and methods.”

To add to the confusion, the Act established a Forensic Science Advisory Committee under the supervision of NIST, the NSF, and the Attorney General to counsel federal departments, agencies, and offices. The Committee would have consisted of an interdisciplinary array of scientists and lawyers. To achieve these ends, the Director of NIST was given free reign to establish working groups to “identify gaps, areas of need, and opportunities for standards development.”\textsuperscript{191} The Act allocated NIST a budget of $5 million for 2013, $12 million for 2014,

\textsuperscript{190} See S. 3378, 112th Cong. § 7 (2012); H.R. 6106, 112th Cong. § 7 (2012).
\textsuperscript{191} S. 3378, 112th Cong. § 7(b)(1) (2012); H.R. 6106, 112th Cong. § 7(b)(1) (2012).
$20 million for 2015, $27 million for 2016, and $35 million for 2017.\textsuperscript{192}

The final piece to this forensic puzzle concerned the Attorney General’s role. The Act provided the Attorney General with lackluster enforcement powers. The Act requires the Attorney General to enforce forensic standards developed under the Act at the federal level. But as to non-federal laboratories, the Attorney General is relegated to “encourage” and “promote” powers.\textsuperscript{193} “Encourage” non-federal labs to adopt the standards and “promote” certification and accreditation criteria.\textsuperscript{194} Since the Act effectively held the cash hostage at the federal level, all other laboratories would have little incentive to implement any new standards or accreditation measures. Simply put, the legislation lacked any “buy in” for the little guys.

On the one hand, the broad agenda of the Forensic Science Standards legislation accomplished several things. It identified the need for research; showcased the utility of research centers; and underscored the basic requirement of standards. Unfortunately, both versions of the Forensic Science Standards Act died in Committee and by 2013, it became another obituary in the history of forensic reform. Consequently, the Forensic Science Standards Act is a classic example of an unrealistic wish list that no one can afford.

In a post-script to the demise of the Forensic Science Standards Act, Senator Leahy indicated his commitment to forensic reform in January 16, 2013 speech.\textsuperscript{195} In February 2013, pursuant to the Federal Advisory Committee Act, the Department of Justice announced that it would partner with NIST to create a National Commission on Forensic Science.\textsuperscript{196} The role that commission will play, however, in the ongoing debate on forensic reform remains unclear.

\textsuperscript{192} S. 3378, 112th Cong. § 7(c) (2012); H.R. 6106, 112th Cong. § 7(c) (2012).
\textsuperscript{194} S. 3378, 112th Cong. § 9(1)(B) (2012); H.R. 6106, 112th Cong. § 9(1)(B) (2012).
\textsuperscript{196} https://www.federalregister.gov/articles/2013/02/22/2013-04140/notice-of-establishment-of-the-national-commission-on-forensic-science-and-solicitation-of#h-4
III. TOO BIG TO FAIL: OBSTACLES TO FEDERAL FORENSIC OVERSIGHT

Against the backdrop of failed forensic legislation, it remains that a myriad of different forensic standards exist across the multitude of forensic science disciplines.\(^{197}\) The NAS Report concluded that these problems could “only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country.”\(^{198}\) After the release of the report, other scholars and forensic science experts called for a national entity or entities to provide national forensic science standards,\(^{199}\) but not all commentators agreed.\(^{200}\) Indeed, the most recent legislation highlights the problem of too many ideas floating about to translate into one workable system.

Even assuming consensus that a federal entity should promulgate national forensic standards,\(^{201}\) two questions remain: 1) whether the federal government has the power to effectively create and enforce such standards; and 2) if so, how such a program should operate. This section examines whether the federal government could even create an independent federal agency to enforce standards. By tying adoption of its regulations to federal funding for forensic science initiatives. First, the federal government likely has the power to regulate at least parts of the forensic science community, but it would need support from state and federal courts to

\(^{197}\) NAS REPORT, supra note 1, at 14 (“The forensic science disciplines currently are an assortment of methods and practices used in both the public and private arenas.”).

\(^{198}\) NAS REPORT, supra note 1, at xx.

\(^{199}\) See Jessica D. Gabel & Ashley D. Champion, Regulating the Science of Forensic Evidence: A Broken System Requires a New Federal Agency, 90 TEX. L. REV. 19, 26-27 (arguing that a federal agency should be created to regulate forensic services nationwide now, before states establish their own schemes); Kenneth E. Melson, Embracing the Path Forward, 36 NEW ENG. J. ON CRIM. & CIV. CONFINEMENT 197, 232 (arguing in favor of a national forensic science agency to reside within the DOJ); Edward J. Ungvarsky & Bernadette Mary Donovan, Strengthening Forensic Science, 36-FEB CHAMPION 22, 27 (“[T]he NAS Report has created a window of opportunity for defense counsel to demand meaningful reform on all fronts.”).

\(^{200}\) Ryan M. Goldstein, Improving Forensic Science Through State Oversight, 90 TEX. L. REV. 225, 226 (arguing that stronger state-level oversight would help with current problems in the forensic sciences).

\(^{201}\) Several national forensic science organizations already exist in different disciplines, including American Academy of Forensic Sciences (AAFS), the American Association of Crime Laboratory Directors (ASCLD), the International Association for Identification (IAI), and the National Association of Medical Examiners (NAME). STATUS AND NEEDS, supra note 32, at 2. But despite their existence, “it is not clear how these associations interact or the extent to which they share requirements, standards, or policies.” NAS REPORT, supra note 1, at 16
enforce the standards it promulgates. I submit that even with judicial support and the express authority to cram federal legislation down the state pipeline, the resistance would be stiff and the requisite buy-in is lacking from crime labs and forensic organizations.

A. Federal Power to Mandate Standards

Congress could attempt to mandate federal standards on its own. Under *Gonzalez v. Raich*, Congress has the power to regulate even non-economic goods if it does so as part of a commercial regulatory scheme.\(^{202}\) This would give Congress much latitude to regulate parts of the forensic science community. For example, Congress could choose to regulate the instruments used in forensic science analysis because it would have a rational basis for regulating the creation and use of such instruments. But the power to regulate commerce would have its limits. One of the most critical needs in the forensic science community is for research into the science, standards, and protocols used.\(^{203}\) Congress could perhaps fund its own research into these areas, but mandating the direction of research at the university level would be beyond the scope of Congress’s power, even if it were politically feasible.

Congress is also limited in what it can do to mandate what state and local courts admit as evidence either politically or constitutionally.\(^{204}\) Even if Congress could significantly affect the landscape of the forensic science community through mandates, much of the effect would be diminished if state and local courts do not adopt the same standards.

B. Enforce National Standards in Federal Courts

Enforcing national standards in federal courts is a direct method of encouraging their adoption. First federal forensic science agency could take the current Federal Rules of Evidence

\(^{202}\) *Gonzalez v. Raich*, 545 U.S. 1 (2005).
\(^{203}\) NAS REPORT, supra note 1, at 15.
\(^{204}\) See Anthony J. Bellia Jr., *Federal Regulation of State Court Procedures*, 110 YALE L.J. 947, 952 (2001) (arguing that “Congress has no authority to prescribe procedural rules for state courts to follow in state law cases”).

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under consideration and advise Congress on the changes needed to properly implement national standards in federal courts. Next, mandating forensic evidence standards in federal courts would certainly provide for significant, positive changes in the federal court system. Terminology, reporting, operational principles, and other processes could be standardized in federal court, providing for more efficiency, less juror confusion, more accurate outcomes, and less time spent in litigation. Further, many of the changes at the federal level would positively impact standards at state and local levels because state and local agencies often rely on the same laboratories as federal law enforcement agencies. Thus, changing standards in the shared laboratories would benefit agencies at all levels. Finally, federally-mandated certifications would result in increased demand for colleges and universities to offer courses of study that would allow students to pursue those certifications. The resulting increase in educational opportunities would allow more state and local forensic scientists to receive the same education as their federal counterparts.

But enforcing national forensic standards in federal courts would only be the first positive step in achieving national forensic standards. Perhaps some states would adopt the changes to the FRE, but not all states base their rules of evidence off of the FRE, thus the changes may not receive universal or even significant adoption. Moreover, lack of resources would also slow adoption. As it is, local and state forensic science services are underfunded and backlogged.

205 See, e.g., RHODE ISLAND STATE CRIME LABORATORY, http://www.uri.edu/pharmacy/crime_lab/ (last visited May 10, 2012) (“The RISCL has defined its customer base as all appropriate agencies investigating evidence relating to federal, state or local crimes.”); NEBRASKA STATE PATROL CRIME LABORATORY, http://statepatrol.nebraska.gov/CrimeLab.aspx (last visited May 10, 2012) (“The Division...serves all local, county, state, federal and military law enforcement agencies in Nebraska.”).
207 Jackson Holtz, Backlog Swells at Washington State Crime Lab, SEATTLE TIMES, Jan. 17, 2010, http://seattletimes.nwsource.com/html/localnews/2010821741_apwacrimelabbacklog1stlwdwritethru.html (“On average, it now takes state experts more than six months to complete ballistics tests in cases involving firearms.”); Melissa Maynard, Federal Funds Help Crime Labs Struggling with DNA Evidence Backlogs, WASH. POST, Mar. 18,
Many laboratories have neither the time nor the funds to make the necessary changes a national forensic science agency is likely to impose. Finally, the implementation of national standards would also face political resistance in many states, especially under current economic conditions.

Without the ability to truly mandate the same changes at the state and local level, mandating new forensic evidence standards would only get part of the way to a truly national system of forensic science standards. This approach would have to be combined with another approach, such as tying federal funding for forensic science initiatives to the adoption of national standards.

C. Tie Federal Funds to Adoption of Regulations

1. Constitutionality of Tying Federal Funding to Related Programs

Tying federal funding to the adoption of national standards is another, less direct method to allow for effective national forensic standards. Congress has employed this method before to coerce states to adopt a drinking age of twenty-one. The National Minimum Drinking Age Act was passed in 1984 and pursuant to the Act, Any State that lowered its drinking age below twenty-one lost ten percent of its federal highway funding.  

The State of South Dakota challenged the constitutionality of the National Minimum Drinking Age Act in South Dakota v. Dole. The Court upheld the Act but laid out four general restrictions on Congress’s spending power: 1) any such “exercise of the spending power must be in pursuit of ‘the general welfare’”; 2) Congress must make its conditions on federal funds unambiguously; 3) any condition must relate “to the federal interest in particular national projects or programs”; 4) other constitutional provisions might create independent bars to

Congress’s conditional grants. Thus, any attempt to create national forensic standards would need to fall within these restrictions. Each portion of a national forensic standards program legislated by Congress could theoretically be challenged, but the analysis here covers only a national forensic standards program as a whole.

First, a national forensic standards program would be in pursuit of the general welfare. National forensic standards would help place the correct criminals in jail sooner, providing for safer communities. Relatedly, wrongful convictions would decrease, resulting in less time and resources spent fighting in court. Providing clear job paths in the forensic sciences would also streamline educational processes and attract more people to the field. Next, Congress could easily meet the second restriction by unambiguously writing the conditions for federal funding into the legislation. Further, the third restriction—that the condition relates to the particular federal interest—would also be easy to meet. In *Doe*, the condition was that the State keep its drinking age at twenty-one or higher, and the Court found that this directly related to safe interstate travel, the main purpose of highway funding. Here, the condition would be following a national forensic standards program, which is directly related to creating national forensic standards, the main purpose of the funding. Finally, none of the many components of the national program discussed here would violate other constitutional provisions. Thus, satisfying all four restrictions, a national forensic standards program tying federal funds to participation in a national standards program would be a constitutionally viable option for encouraging the adoption of national forensic standards.

2. Obstacles in Using Federal Funds to Encourage Adoption of Standards

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210 *Id.* at 207–09.
211 *Id.* at 208.
Constitutional permissibility does not mean that the best or easiest method for encouraging adoption of national standards is tying federal funding to a national forensic standards program. There are also practical challenges such as state adoption and the source of funding. Examining similar programs already in place can provide guidance

a. Adoption

The strength of a national forensic standards program will come from it being truly national, and this would require eventual adoption by all States. To this end, federal funding can be a powerful motivator. For example, after the National Minimum Drinking Age Act tied only five percent of a State’s federal highway funds to the drinking age requirement, all fifty States complied with the condition.²¹² Perhaps this quick adoption based on such a relatively small percentage of funding is simply evidence that States can only be enticed to make decisions they were not far from making in the first place. Even so, there is little evidence of strong resistance among the States regarding the idea of national forensic standards.

Greater resistance to a federal funding program might come from States that won’t benefit from it. It is unlikely enough federal funding could be offered to cover every State’s forensic science expenditures, especially when those expenditures must raise a State’s forensic standards to the federal level. Thus, some states will lack the resources to effectively implement national forensic requirements even with the offered federal funding.

Further, to close the gap between current State forensic science standards and the standards a national program would require, multiple methods of fund distribution are necessary. Initially, federal funding directed at elevating current State forensic standards could be offered, followed by a separate source of funding to maintain that standard. This would help States overcome the burden of eliminating the significant disparities between their current standards.

²¹² Kathleene M. Sullivan & Gerald Gunther, Constitutional Law 166 (17th ed. 2010).
and those that would be required under a federal system. Assuming adoption could be achieved through funding, paying for that funding could still present a problem.

b. **Source of Funds**

In light of the current economic conditions and approaches to federal spending, finding significant sources of federal funding for a national forensic standards program will be challenging. Arguments for such a national program should include both any cost savings and any economic stimulus such a program would create.

As discussed, national standards would address the current inefficiency of the forensic standard systems in place. Incorrect criminal convictions cost the country both in terms of what wrongly-convicted defendants could otherwise provide for society and the damage criminals that escape conviction can cause. Moreover, unsettled and constantly changing forensic standards across the country impede labs, investigators, prosecutors, and defense attorneys from seeking out more efficient and effective methods for resolving forensic issues in litigation. Consistent national standards streamline forensic processes based on findings from any part of the country.

A national forensic standards program would also provide economic stimulus. Research funding would both produce more efficient ways of reaching forensic conclusions and advance our universities and research institutions. A clear career path across the nation for forensic scientists would draw more students both to the STEM subjects and the field of forensic science. Focusing the nation’s forensic science standards on the same national goals might also create new industries and allow the United States to become a leader in others. In addition to considering the potential funding and adoption problems, a survey of previous attempts to develop a national set of standards can provide guidance in a new endeavor.

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c. **Previous Attempts**

Congress has tied the allocation of federal funds to forensic science initiatives before. From 2000 to 2004, Congress created and expanded the aforementioned Paul Coverdell National Forensic Sciences Act. The Coverdell Act “awards grants to states and units of local government to help improve the quality and timeliness of forensic science and medical examiner services.” In 2009 and 2010, over $23 million and $33 million were given out in Coverdell grants, respectively, but that amount fell back to less than $28 million in 2011.

The Coverdell grant program has faced two problems that any national forensics standards program would need to be overcome. The first is the total funding level, which would need to be significantly higher than the $33 million cap under the Coverdell program to initiate and ultimately maintain a national forensic standards program. The second problem the Coverdell system has faced is in administration. An Innocence Project report found enough significant problems with the administration of the Coverdell program to call into question whether the program even ensured that the law’s most basic requirements were being followed. Again, history does not bode well for establishing a federal forensic agency that has authority over non-federal forensic stakeholders.

D. **The Buy-In: Resistance to Reform**

Assuming that a more tempered, fiscally palatable, and constitutional approach to a

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federal forensic agency would be possible, the problem of the “buy-in” has not been overcome. There would need to be commitment to reform from the stakeholders across all levels of the forensic process. Without involvement in the formulation of forensic reform, a federal agency would lack the necessary support. The system requires integrity and the cooperation of all parties. It is about more than just ironing out kinks in the system.

Immediately after the release of the NAS Report, several specialty forensic organizations promulgated rapid-fire statements condemning the report, the representative groups of the NAS committee and the methodology that led to the committee’s long list of recommendations. Rather than responding with reason and authority, the organizations resorted to defensive rhetoric. In what was an obvious attempt at “damage control,” the organizations demonstrated that any attempt to overhaul forensic science would be met with swift and strong resistance. Indeed, had these groups had the lobbying prowess of the NRA, for example, they probably would have been able to get legislation moving in the opposite direction would have declared forensic reform unconstitutional.

As already noted, the NAS Report singled out fingerprinting and firearms analysis (among a host of others). With regard to the ACE-V method, the Report concluded that the framework lacked specificity, failed to prevent bias, and could not produce repeatable and reliable results. In sum, the process “does not guarantee that two analysts following it will obtain the same results.” In response, the International Association of Identification (IAI) issued a response stating that “[t]here is no research to suggest that properly trained and professionally guided examiners cannot reliably identify whole or partial fingerprint impressions to the person

219 Id.
from whom they originated.”

This sentiment was echoed by the Association of Firearm and Toolmark Examiners (AFTE), but to a lesser degree. The AFTE allowed that deficiencies exist in the discipline, but maintained that the “NAS painted an incomplete and inaccurate portrait of the field of firearm and toolmark identification using a very broad brush, and in doing did not consider the appropriate scientific principles on which our discipline is founded.” These responses are but two in a larger pool maintaining the status quo, and they reveal reluctance, resistance or even resentment to forensic reform. If those attitudes continue, forensic reform—whether federally mandated or not—will fail.

To be fair, in the years since the NAS Report, various forensic organizations have refined their knee-jerk responses somewhat and while perhaps falling short of a love letter, they acknowledge at least an interest in performing research to establish statistical measures for the evidence. In fact, the IAI more recently recommended that the IAI:

[C]reate a Standing Committee on probability theory and statistics as it relates to the forensic disciplines represented by the IAI. Their charge would be to assist the Science and Practice Committee in the acceptance and implementation of probability modeling and to liaise with various entities such as the FBI’s Biometric Center of Excellence, National Institute of Science and Technology, National Institute of Justice, National Academy of Sciences and the European Network of Forensic Science Institutes.

The IAI also supported the “pursuit of a single internationally accepted examination methodology and standard for conclusions.” So while there is some discord about forensic reform, it is clear that federal reform may disenfranchise the very groups that are needed to

220 Id.
221 Id.
224 Id. at 4.
effectuate that change. But there are other ways to accomplish a paradigm shift in forensic science.

IV. **Organic Chemistry: Reforming Forensic Science From Its Base**

Given the political logjam that likely will persist, we need to shift the dynamic between science and the practice of forensic analysis. This demands not only cooperation between law enforcement and the legal system but must also involve scientists and universities as active participants in the everyday world of forensic evidence. It also requires accountability and ownership of shortcomings. This would facilitate the implementation of science-based practices and policies in forensics and would change the fundamental relationship between research and practice that often exist on opposite sides of a deep chasm.

While a single, federal entity would be optimal; it also is an elusive ambition at this point. Accepting the practical obstacles for what they are, starting at the bottom and “on the frontline” of forensic science is a more realistic and workable model. Moreover, research partnerships accomplish what a federal entity perhaps could not: marrying the theory and practice and forensic science. The partnership—whether with a University or a research nonprofit—would facilitate the simultaneous and informed development of forensic science standards and frameworks in collaboration with the crime labs where the actual casework is performed. To divorce the research from the practice of forensic science may have a chilling effect because it would be suspect to the very entities that it would be thrust upon—the forensic laboratories. By making them part of the solution instead of telling them that they are the problem would go a long way toward reforming forensic science.
A. Appreciating the Big Picture: Non-Negotiables

Until recently, most practice-driven studies of forensic techniques were based on very simplistic methodologies, and focused on implementation rather than design.225 These studies often failed to address key issues around repeatability or, equally crucial, fallibility. After an assessment of whether the methodology worked, forensic labs then diffused the technique more widely in their agencies, and across agencies, without adequately having researched what the real effect was.226 There have been some inroads into the process, but it could hardly be called a trend toward a research culture. The framework for testing forensic techniques has traditionally been more a symbolic activity than a real scientific activity.

Given the uptick in requests for forensic analysis in everything from murder cases to low-level property crimes, it is becoming increasingly expensive to carry out the necessary work. But without a scientific base to legitimize the value and reliability of the analysis, it is likely that forensic evidence will continue to not only be vulnerable and but also untrustworthy. An environment in which crime labs see little value in university-level research is also a reality in which there will be few serious scientists who are interested in or know about the forensic science.

As compared to other public services such as health and education, there is little funding for research in forensic science outside of DNA technology, and this means (Hollywood glamour aside) that young scientists will be unlikely to see forensics as an area of study with promise.227 This is a vicious cycle: a lack of priority accorded to forensic science translates into limited

225 See NAS REPORT, supra note 1, at 8 (outlining the need for more extensive and scientific research in nearly all disciplines of forensic science).
226 Id.
227 As previously mentioned, nearly the entire NIJ budget in the last few years has reflected such developments, with DNA testing being the single most prominent federal investment in research that has been carried forward by the agency (NIJ, 2008). The same could be said for the U.K. government which invested heavily in the “DNA expansion program” from 1999 to 2007 (Williams and Johnson, 2008).
investment and rewards (i.e., grant funding) attached it, in turn, into limited opportunities and
career prospects for scientists interested in developing the research culture.

Perhaps the most important cost of the present state of forensic science is that there will be a growing fissure between scientific research and forensic practice. Forensic practice has had little scientific guidance and though much more is known today than even just a decade ago, what is most striking is that we know little about considerations like effectiveness, what works, in what contexts, and at what cost.

It makes no sense in a system that habitually pairs crime labs with law enforcement agencies to have budgets absent any allocation for research and development in the area of forensic science. One might argue that the cost of research should not be borne on a local level, but it seems unreasonable that larger crime labs (which are in some respects like large medical centers) do not see themselves as responsible for advancing and testing their forensic practices in a scientific framework.

1. The Need for Research: From Butchers to Bakers

The NAS Report characterized the current research situation in forensic science as a “serious problem.” The Report noted that although some research has been conducted in some disciplines, “the simple reality is that the interpretation of forensic evidences not always based on scientific studies to determine its validity.” Many forensic evidence disciplines lack significant peer-reviewed research of the scientific bases and validity of the forensic methods. Fingerprint identification is one such discipline where “sufficient data on the diagnosticity and

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228 NAS REPORT, supra note 1 at 8.
229 Id.
230 Id.
reliability . . . do not exist.”\textsuperscript{231}

Unfortunately, not much has changed since the Report revealed the dearth of research in the forensic sciences. As Paul Giannelli notes, the very government agencies tasked with research in the forensic sciences have manipulated their craft in the areas of DNA profiling, fingerprint analysis, and bullet lead analysis.\textsuperscript{232} These scholarly shortcomings, he posits, may be attributable to tight budgets and a lack of training.\textsuperscript{233} The profound—and potentially dangerous—absence of peer-reviewed research in the forensic sciences

Research must become an important part of forensic science’s infrastructure. It is instructive to remember that hospitals were not always integrated with major university centers. Indeed, in the early 19th century the integration of universities and hospitals was a major innovation. During the 18\textsuperscript{th} and 19\textsuperscript{th} centuries, hospitals operated more like butcheries, separate and apart from universities that housed the medical training and research that needed to be brought into the hospitals.\textsuperscript{234} Crime labs may be modern day butcheries, but they have the ability to create the research partnerships. Much like the approach to teaching hospitals, the movement did not remove medical research from the hospital, but rather sought to bring the universities into the hospitals.\textsuperscript{235}

In this same sense we must bring the universities and other research partners into crime labs. New partnerships between forensic scientists and forensic science researchers can build

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  \item \textsuperscript{232} Giannelli, \textit{Daubert}, supra note 153, at 57.
  \item \textsuperscript{233} Paul C. Giannelli, \textit{Forensic Science: Why No Research?}, 38 Fordham Urb. L.J. 503, 504 (2010). Justice Scalia observed how unsatisfactory training makes it way from the crime lab to the witness stand. \textit{In Melendez-Diaz v. Massachusetts}, he noted that forensic science isn’t perfect, but that some of its shortfalls could be remedied through cross-examination. Melendez-Diaz v. Massachusetts, 557 U.S. 305, 318 (2009). Scalia noted that, for example, an analyst with insufficient training could be confronted on the stand. \textit{Id}. Scalia did not take note of the fact that when such insufficient training is the norm, a jury would not likely be persuaded to discredit that expert’s testimony.
  \item \textsuperscript{234} Tim McHugh, \textit{Hospital Politics in Seventeenth-Century France: The Crown, Urban Elites, and the Poor} 81 (2007 (citing Jaques Tenon, \textit{Memoires sur les Hitaux de Paris} (1788))).
  \item \textsuperscript{235} Bonner (2010).
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upon the university medical center model. Fostering these relationships may ultimately prove more fruitful than the federal funding scramble. At bottom, science must become a natural part of forensics and forensics must become based in science.

2. Creating the Research Partnerships

What some might call “hard sciences” — the sciences of engineering and biotechnology have been slow to gain a foothold in forensic research. Because of this, an evidence-based model in which standards are developed with clear scientific criteria is lacking. Crime labs do not, on the whole, encourage their scientific staff to publish in scientific journals in criminalistics. Instead, this practice is generally discouraged because it might in some way negatively affect the lab or the law enforcement agency to which it is linked.

Science in this sense is not a part of many crime labs—whether large or small. The implication of this is that the scientific quality of forensic analysis is often relatively low. Much of this is because crime labs do not have the resources to develop scientific research while also managing caseloads, tight budgets, and backlogs. Many of the issues with forensic science research stems from its lack of independence: any facility with a research capacity is often housed within the law enforcement agencies that exacerbate the problems with forensic methodologies, analysis, and reporting. The NAS Report concluded that these law enforcement agencies are too wedded to the status quo to make good candidates for carrying out a research agenda. Indeed, the creation of university-crime lab partnerships to conduct forensic research may be the only way to bolster scholarly research in the field.

Admittedly, this structure requires legwork by both crime labs and the research partners they identify. There would need to memorandums of understanding, a bit of politicking, and

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236 Giannelli, supra note 153 at 56.
237 Id.
some compromises all the way around. Starting small and incrementally would be a step in the right direction. Although the NAS Report called for an abrupt and absolute overhaul, it also was not realistic, especially when viewed through the lens of failed legislation left in its wake. Thus, the research partnerships might choose to focus their efforts on more specific and narrow subject matter such as directed research, establishment of forensic frameworks, or standardization of terminology and reporting.

3. **Directed Research Efforts**

One of the most pressing needs in nearly every discipline in the forensic science community is more research. Particularly outside of DNA analysis, very little research has been carried out in disciplines where more consensus is needed regarding the merits of the science; the protocols that should be used; and the standards and terminology that should be adopted at a national level. There are two major types of disciplines that would require different research approaches—laboratory-based disciplines and disciplines based on the subjective observations of experts.

Laboratory-based disciplines will require traditional, peer-reviewed research common in other disciplines outside of the forensic sciences. Educational institutions often perform such research. Thus, a research partnership intent on advancing forensic science in the laboratory-based disciplines will need to encourage (which typically means fund) research at the university

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238 As Judge Harry T. Edwards, co-chair of the NAS Report committee and judge on the U.S. Court of Appeals for the D.C. Circuit stated, “The most important part of our committee’s report is its call for real science to support the forensic disciplines.” Harry T. Edwards, The National Academy of Sciences Report on Forensic Sciences: What It Means for the Bench and Bar, 51 JURIMETRICS 1, 6 (2010).

239 See NAS REPORT, supra note 1, at 15 (“The broader research community generally is not engaged in conducting research relevant to advancing the forensic science disciplines.”).

240 Id. at 7.
level. To promote research in the forensic sciences, the crime labs and universities would need to establish strong ties.\textsuperscript{241}

Disciplines that involve the subjective review of observations by experts particularly suffer from a lack of a research culture.\textsuperscript{242} Judges and juries alike are prone to inferring “scientific validity from the fact of longstanding use.”\textsuperscript{243} Given the fact that these methods are often accepted in the courtroom at first blush, creating a research culture for the more subjective forensic disciplines will not only require traditional, peer-reviewed research at the university level, but also focus on the scientist’s role in the analysis of evidence.\textsuperscript{244} Analysis in disciplines such as fingerprints, toolmarks, and ballistics often comes down to a scientist’s experience and “eye” for the evidence. Very little research has been directed towards biases in this process and how the scientist’s role as a possibly partial observer can be limited.\textsuperscript{245} Some scholars suggest moving away from the “eyeballing” method altogether by ensuring that an emphasis on empirical data drives the reform of these fields.

4. \textit{Adoption of Standards and Forensic Frameworks}

The lack of standards has far-reaching effects. The NAS Report noted that forensic science training programs have no uniform standards, leading to uncertainty in both quality and relevance.\textsuperscript{246} Moreover, there is no consistent standard for granting accreditation to crime labs.\textsuperscript{247} And, even if those crime labs were uniformly accredited, there is no standard “language” for reporting results. A “negative” fingerprint analysis, for example, could mean “excluded,”

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\item\textsuperscript{241} Id., at 16 (“Governance...must be well connected with the Nation’s scientific research base to effect meaningful advances in forensic science practices.”).
\item\textsuperscript{242} Jennifer L. Mnookin et al., \textit{The Need for a Research Culture in the Forensic Sciences}, 58 UCLA L. Rev. 725, 725-26 (2011).
\item\textsuperscript{243} Id. at 747.
\item\textsuperscript{244} NAS REPORT, supra note 1, at 8 (“A Body of research is required to establish the limits and measures of performance and to address the impact of sources of variability and potential bias.”).
\item\textsuperscript{245} Id.
\item\textsuperscript{246} Id. at 237.
\item\textsuperscript{247} Id. at 43.
\end{itemize}
“inconclusive,” or “unable to locate” depending on the agency or individual conducting the analysis.\textsuperscript{248} Similarly, reporting standards differ from laboratory to laboratory. Reports span from detailed accounts of tests and protocols performed to brief conclusory statements discussing only the results.\textsuperscript{249}

A research partnership would tackle each of these shortcomings. By way of example, consider a cancer researcher working side-by-side with an oncologist. The oncologist practices medicine and the researcher is documenting, analyzing and working on ways to improve treatments. Moreover, research would be shared across hospitals and universities and published in medical journals. A similar partnership would be a perfect fit for forensic science. First, it would establish standards for measurements, analysis, and interpretation.\textsuperscript{250} This standardization would ensure that labs are uniform in their determination of what results mean. Second, it creates standardization in the products and services supplied by forensic scientists to the criminal justice system.\textsuperscript{251} Such standardization would address the disparities that arise when labs on the whole employ different methodologies, vary in their protocols, or maintain dissimilar reporting requirements.\textsuperscript{252}

I should underscore that research and the development of standards cannot occur overnight. These relationships take time to establish and agreeing on a specific research agenda is no easy task. There will be setbacks, frustrations, and unforeseen issues that develop. But the

\textsuperscript{248} Id. at 141. Similarly, a jury can hear that two samples are a “match,” are “consistent with,” are “identical,” “likely” match, or are of many other kinds of relation to each other without understanding what the terms really mean. Id. at 21.
\textsuperscript{249} Id. at 21.
\textsuperscript{251} Id. § § (7)(a)(1)(A)(ii).
\textsuperscript{252} The NAS report notes that under-funded crime labs are in dire need of up-to-date equipment. NAS REPORT, supra note 1 at 6. Such inconsistencies in funding necessarily lead to inconsistencies in results. Further, insufficient equipment maintenance is also a common problem facing labs. Id. at 59. Even the FBI lab, which holds itself out as using “cutting-edge science,” reported a need for upgraded equipment. Id. at 66; Laboratory Services, THE FED. BUREAU OF INVESTIGATION, http://www.fbi.gov/about-us/lab (last visited Nov. 18, 2012).
notion of “we’re in this together” is what forensic science needs. The NAS Report’s indictment of forensic science created an “Us vs. Them” mentality that still lingers. Moreover, research, standards and empirical studies are not a one-size-fits-all fix to forensic science. The frameworks of each individual discipline require different methodologies and indeed different approaches to how to conduct research. Understanding of the limitations and longevity of the research partnerships is critical to their success.

5. **Standardize Terminology and Reporting**

Very few, if any, national standards for terminology and reporting exist in the forensic sciences.\(^\text{253}\) Terminology plays a significant role in many court settings. A jury can hear that two samples are a “match,” are “consistent with,” are “identical,” “likely” match, or are of many other kinds of relation to each other.\(^\text{254}\) Worse, the meanings of relationship correspondence can vary from scientist to scientist, depending on what standards, if any, the scientist operates under.

Reporting standards also differ between laboratories.\(^\text{255}\) Some forensic reports contain barely more than the scientist’s ultimate conclusion (which, as stated, could have many different meanings). Further, reports can differ as to what, if any, error rates they list; whether and to what extent the report lists the tests performed and protocols followed; and other factors.\(^\text{256}\) The decision to provide a conclusory, as opposed to a detailed report falls to the lawyer and her client.

A forensic research partnership could be the pioneer on standard terminology and reports. This would allow for juries to hear consistent, reliable, and clear testimony with respect to forensic evidence. It would also prevent forensic witnesses from obfuscating the results through


\(^{254}\) NAS REPORT, supra note 1, at 21.

\(^{255}\) Id. (“Some forensic science laboratory reports meet this standard of reporting, but many do not.”)

\(^{256}\) Id.
exaggerated reporting methods. As a baseline the International Organization for Standardization has already promulgated international guidelines for general competence requirements to carry out certain tests or calibrations.\textsuperscript{257} While adopting this standard throughout the United States would not necessarily solve all terminology and reporting issues, but it would at the very least provide some reference points for uniform vocabulary and reporting protocols.

\textbf{B. Drilling Down on the Details: Longer-term Goals}

While the above are the broad, big picture attributes that would be the primary efforts of a partnership, there are other (I hesitate to say “secondary”) benefits that are significant needs, but would take some time to realize.

\textit{1. Certifications of Practitioners and Laboratories}

A lack of certification programs for both practitioners and laboratories engenders inconsistencies. Currently laboratory accreditation is only required in three states, and judges and juries are often unfamiliar with the certification processes used by different organizations.\textsuperscript{258} Texas is one of the forty-seven states in which accreditation is voluntary. In a Houston lab, a roof leak in a DNA lab went unchecked for years, rendering evidence maintained in a storage facility contaminated and unusable.\textsuperscript{259} Very few states have any sort of mandatory accreditation or accountability program for their scientists.\textsuperscript{260} The American Society of Crime Laboratory Directors/Laboratory Accreditation Board (“ASCLD/LAB”) offers accreditation standards that

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  \item \textsuperscript{257} NAS REPORT, supra note 1, at 15-16.
  \item \textsuperscript{258} See Paul C. Giannelli, Wrongful Convictions and Forensic Science: The Need to Regulate Labs, CASE W. RES. L. REV. 164, 170 (2007) (“The scandals have prompted Texas and Oklahoma to require their crime laboratories to be accredited, joining New York, which has mandated accreditation since 1994.”).
  \item \textsuperscript{259} \textit{Id.} at 187.
  \item \textsuperscript{260} NAS REPORT, supra note 1, at 6.
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align with the ISO described above, but in most cases it is not mandatory. According to the ASCLD/LAB, the United States has 393 crime laboratories accredited in its program.

The absence of required certifications for practitioners is problematic as well. Additionally, in disciplines where some organizations do offer certifications, many extremely experienced practitioners choose not to even pursue the certifications. Without any requirement that forensic evidence witnesses hold certifications, there is little reason for many practitioners to pursue them. This undercuts the validity of such certifications for those that do choose to pursue them.

Moreover, the lack of certification programs creates practitioners with disparate proficiencies. In 1978, the Law Enforcement Assistance Administration (“LEAA”) sponsored a Laboratory Proficiency Testing Program and over 200 crime labs throughout the country participated. The results showed a wide range of proficiency levels. The unacceptable proficiency labs failed most often in test result interpretation because of careless error or lack of experience; utilizing improper methodology; standard contamination or mislabeling; and insufficient databases and standard spectra. The Forensic Science Foundation conducted

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262 Of the 393, 193 are state laboratories, 132 are local agency laboratories, 23 are federal laboratories, 19 are international laboratories, and 26 are private. ASCLAD/LAB Accredited Laboratories, AMERICAN SOCIETY OF CRIME LABORATORY DIRECTORS LABORATORY ACCREDITATION BOARD, http://www.ascld-lab.org/labstatus/accreditedlabs.html (last visited 2/4/2013).
263 See, e.g., Diane L. France, Forensic Anthropology: A Brief Review, http://www.wadsworth.com/anthropology_d/special_features/forensics/forensics_index/index.html (last visited May 10, 2012) (“Presently, not all individuals who identify themselves as forensic anthropological experts are board certified; although almost all have at least a master’s degree and several years of experience.”).
264 Id.
265 Id. at 213-14 (Results showed that “‘Seventy-one percent of the crime laboratories tested provided unacceptable results in a blood test, 51.4% made errors in matching paint samples, 35.5% erred in a soil examination, and 28.2% made mistakes in firearms identifications. The report concluded: ‘A wide range of proficiency levels among the nation’s laboratories exists, with several evidence types posing serious difficulties for the laboratories . . . .’” (internal citations omitted).
266 Id. at 214.
further testing from 1978 to 1991, with similar results to those found by the LEAA.\textsuperscript{267} Despite these glaring errors from a study conducted in 1978, there has been no comprehensive reform.\textsuperscript{268} A national forensic science standards entity could provide for certifications for both laboratories and practitioners.

Providing one national certification program would ensure a baseline of standards in all laboratories and predictability in courts. Further, a federal agency charged with promulgating national forensic science standards could create certification systems for forensic science disciplines. National certification requirements could provide for a base level of education, experience, and expertise of practitioners, making the voir dire stage of tendering a witness as an expert much simpler and the result much more reliable. Requiring certain educational steps before one is able to practice in the forensic sciences would encourage the creation of forensic science courses of study at the university level. This increased demand would also help encourage research in the forensic sciences, and promote education programs to broadly disseminate the results the joint research.\textsuperscript{269}

2. \textit{Codes of Ethics}

Forensic scientists frequently encounter ethical issues because they may be paid by the government but have to offer their services to both the government and the defense in criminal trials. Practitioners also need to be able to operate in situations where there will be little, if any, oversight and where bias might be a significant motivator. To address these concerns, several forensic science organizations have adopted codes of ethics, but currently, “there are no consistent mechanisms for enforcing any of the existing codes of ethics.”\textsuperscript{270} A federal entity

\textsuperscript{267} \textit{Id.} at 215.
\textsuperscript{268} Giannelli, \textit{Wrongful Convictions, supra} note 259, at 214.
\textsuperscript{270} \textit{Id.} at 26.
could mandate such a code of ethics and allow for the slight variations different forensic
disciplines may require. Further, tying this code of ethics to certifications in the various
disciplines would help effect wider adoption.

3. Coordinate National Databases

Forensic science in a criminal case usually involves matching some type of
unknown sample to one or more known samples with the goal of producing a match or an
exclusion. The probability of matching an unknown sample to a known person or thing increases
with the amount of known samples available to search against. Databases of forensic samples
would provide scientists with increased amounts of known samples. Some forensic science
disciplines have already started national databases, such as the FBI’s Combined DNA Index
System (AFIS), which includes fingerprints, criminal histories, mug shots, and other information

But the mere existence of these databases is not enough, even CODIS currently suffers
from fragmentation and backlogs. DNA evidence is submitted into CODIS, which itself is made
up of three different groups for the data: LDIS (local), SDIS (state), and NDIS (national).\footnote{See Goulka et al., supra note Error! Bookmark not defined., at 4.} One
Federal Bureau of Investigation (“FBI”) report revealed that in every category of testing,
American laboratories took more than 150 days before a report was issued on DNA evidence.\footnote{U.S. DEPARTMENT OF JUSTICE OFFICE OF THE INSPECTOR GENERAL, REVIEW OF THE FEDERAL BUREAU OF INVESTIGATION LABORATORY’S FORENSIC DNA CASE BACKLOG 6 (2010), available at http://www.justice.gov/oig/reports/FBI/a1039.pdf.}
Related to this steep turnaround time, in 2007 the United States had a backlog of over 800,000 DNA samples nationally.\textsuperscript{276} And despite its wealth of data, AFIS still poses problems for forensic scientists using it. AFIS equipment vendors do not follow the same standards for interfacing with AFIS, law enforcement agencies and laboratories do not always have the resources to interact with AFIS, and jurisdictional disagreements and differences in policies prevent agencies from sharing fingerprint data more broadly.\textsuperscript{277}

For the forensic sciences that already have national databases, a federal entity could mandate the use of such databases and dictate the way local agencies interact with them. This would prevent many of the access and sharing problems law enforcement agencies currently experience. For forensic disciplines that do not have significant national databases, a federal entity could pattern new databases from the successes seen with other databases such as CODIS and AFIS. This would allow a central authority to apply best practices in database management from one discipline to another.

4. \textit{Independence of Forensic Labs}

Forensic labs currently maintain a cozy relationship with law enforcement and prosecution offices. In fact, a recent survey found that approximately seventy-five percent of the 300 forensic laboratories are located within law enforcement or public safety agencies and fifty-seven percent worked exclusively with evidence submitted by law enforcement.\textsuperscript{278}

Moreover, courts rely on the adversarial process and rigorous cross-examination of expert witnesses to ensure scientific integrity; however, there is a wide disparity in resources available to defense counsel as opposed to the governmental bodies of prosecutors’ offices and law

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{276} \textit{Id.}
\item \textsuperscript{277} \textit{NAS REPORT, supra note 1, at 31.}
\item \textsuperscript{278} \textit{Id. at 250} (internal citations omitted).
\end{itemize}
\end{footnotesize}
enforcement agencies.Prosecutors often have cost-free access to their local or branch labs, and while indigent defendants secured the due process right to expert defense witnesses in *Ake v. Oklahoma*, they often do not have reciprocal rights of access or the means to afford private defense experts.

5. **Develop Education Programs**

The NAS Report criticized the forensic sciences for the absence of Ph.D. and Master’s degree programs. While each university will have to specifically address how forensic science fits into the curriculum, a collaboration that promotes Bachelor of Science degrees (as opposed to a Bachelor of Arts in Forensic Science found at some schools) will improve forensic science education. It may supplant the “apprenticeship” system found in some forensic disciplines, but that component can be fine tuned and bolstered in the confines of a scientific degree program. These education programs could serve not only to benefit practitioners, but also lawyers and judges.

V. **Building on Existing Models and Frameworks to Improve Quality and Cost**

The NAS Report’s cardinal recommendation was the creation of a National Institute of Forensic Science (NIFS), a single forensic science entity to promote an “aggressive, long-term agenda to help strengthen the forensic science disciplines.” The NAS Report envisioned that a national entity would be responsible for overseeing research and determining standards. This

279 Giannelli, *Daubert, supra* note 153, at 76.
280 *Id.*
282 Giannelli, *Daubert, supra* note 153, at 76.
283 NAS REPORT, supra note 1 at 223. Currently, there is no doctoral program in forensic science. *Id.*
285 *Id.*
286 *Id.* at 16.
287 *Id.* at 189–90.
broad undertaking was immediately met with skepticism and resistance.\(^{288}\) I would like to keep the “aggressive long-term agenda” but replace the national entity piece with smaller research partnerships that share their work with a larger clearinghouse (perhaps the new National Commission on Forensic Science) that tracks the universe of research being conducted. Of course, any fix to forensics comes with its own set of drawbacks, and the research partnership is not immune to downsides. Nonetheless, the past four years of debate have shown that everyone has an opinion, but we have not been able to take those from the idea phase to the execution stage. We can, however, look at some of the current frameworks out there that are attempting to embrace forensic reform.

A. Incubating Forensic Science Reform: Ideas at Home and Abroad

Forensic science in the United States represents a patchwork quilt of standards and policies. Because thousands of jurisdictions have their own operating procedures, there is a lack of consistency and predictability across the forensic landscape. It seems that a logical starting point is to consider pooling and sharing forensic resources across state and even international borders.\(^{289}\) In fact, the European Union has embraced the notion “that forensic cooperation does not stop at Europe’s borders but needs to be seen in the context of international forensic cooperation around the world.”\(^{290}\) Moreover, the United Kingdom—which has been on the


\(^{289}\) *Policing in Europe*, 2010-3 J. Police Studies 16, 92–94 (Antoinette Verhage, et. al., eds, 2010). Moreover, the ancillary benefit to this construct is that with crime becoming increasingly global having unified forensics in place makes good investigative sense as well. *Id.* at 93

foreground of forensic development for decades—has made significant inroads into forensic reform using a grassroots approach rather than a top-down legislation thrust upon reluctant labs.

The harsh truth is that the United States does not have the budget surplus needed to legislate a federal forensic science agenda. Yet we cannot afford an ad hoc fix to forensic science or wait for the system to self-correct on the back-end, in the post-conviction setting. Allowing an innocent person to languish in prison until the criminal justice system finds the time and opportunity to remedy its errors arguably approaches a human rights catastrophe. That should not be the system we settle for. Forensic science needs coordination and creative resourcing through research partnerships that will grow the roots the reform.

1. Test-Tube Babies: Two U.S. Examples

Two U.S. laboratories have committed to forensic science research while also performing casework.

a. The Washington, D.C. Department of Forensic Sciences

On October 1, 2012, the District of Columbia’s newly-built Consolidated Forensics Laboratory and its newly-created Department of Forensic Sciences 291 (DFS) opened for business. 292 The laboratory houses the D.C. Public Health Laboratory, the Office of the Chief Medical Examiner, and a hybrid of the Metropolitan Police Department’s Forensics Lab and the new Department of Forensic Science’s crime lab. 293 Eventually, the Police Department’s crime-

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scene unit will be phased out, and the all-civilian DFS crime lab, along with the Public Health Laboratory, will be under the jurisdiction of DFS.\textsuperscript{294}

The primary motivation for creating DFS and building the crime lab is the NAS Report,\textsuperscript{295} DFS and the crime lab are the District of Columbia’s response to the report’s call for a unified, independent agency that would promulgate, implement, and oversee robust standards and practices for the forensic sciences, albeit on a more local level than the report had in mind. A secondary, but more public, motivating factor for the emergence of DFS and the crime lab are the recent front-page scandals that highlight substandard practices and the lack of effective oversight of forensic laboratories.\textsuperscript{296} One of the main goals is independence—not only from conducting forensic analysis in borrowed space and contracting the analysis with labs outside the area,\textsuperscript{297} but also the independence of forensic analysis from law enforcement and political pressure, as recommended by the NAS report.\textsuperscript{298} DFS hopes to accomplish this by both having its own building and phasing law enforcement personnel out of its operations.

Another goal is encouraging and maintaining efficiency. By housing several interactive departments under one roof, DFS hopes to encourage communication and collaboration, thereby increasing efficiency and preventing backlogs. With a single department—DFS—at the administrative helm, and one intent upon promoting and maintaining high standards, those

\begin{itemize}
\item[\textsuperscript{294}] Id.; Tillman, supra note 292.
\item[\textsuperscript{295}] STRENGTHENING FORENSIC SCIENCE, supra note 169; Pearson, supra note 293; Tillman, supra note 292; Zoe Tillman, In Q&A, D.C. Forensic Sciences Chief Says Lab Moving Toward Accreditation, THE BLOG OF LEGAL TIMES, January 28, 2013, available at http://legaltimes.typepad.com/blt/2013/01/in-qa-dc-forensic-sciences-chief-says-lab-moving-toward-accreditation.html. Specifically, D.C. endeavored to respond to the report’s identification of the crippling fragmentation in the forensic science community as the most significant threat to the quality and credibility of forensic science, particularly the lack of uniform standards across jurisdictions in performance, training, and accreditation, as well as effective oversight of forensic science practice. Id. at 116.
\item[\textsuperscript{296}] See, e.g., Peters, supra note 99.
\item[\textsuperscript{297}] Noble, supra note 292.
\item[\textsuperscript{298}] Pearson, supra note 293. DFS director Max Houck admits that understanding and maintaining its independence from law enforcement will be among its more difficult tasks. Tillman, supra note 295. Yet he is hopeful that its independence from law enforcement and political pressure will allow it to focus more intently on grounding its results upon good science, highly trained (civilian) personnel, and continuing education for analysts. Id.
\end{itemize}
standards would more likely be followed and procedural missteps would be discovered before things get out of hand. The presence of standards and procedures is not the core problem. Rather, the problem is the lack of central oversight, uniform standards of operation, and a manageable system of checks and balances in place.\textsuperscript{299} Having a single department overseeing the efforts of several groups in the same physical area considerably reduces this problem.

**b. The Department of Defense Forensic Enterprise Directive**

The Department of Defense has also made quality at its forensic labs a priority. A recent Department of Defense (DoD) Forensic Enterprise directive establishes policies for forensic work the military engages in and delegates responsibilities for different forensic tasks and areas among groups within the DoD.

The directive seeks to establish increased collaboration and communication among various divisions within Department of Defense in an effort to “develop and maintain an enduring, holistic, global forensic capability to support the full range of military operations.”\textsuperscript{300} The directive sets up a central committee, the Forensic Executive Committee (EXCOM), to coordinate all forensic enterprise activities. Responsibilities for promulgating standards and monitoring implementation and practices are delegated to different groups within the DOD.\textsuperscript{301}

The goals outlined in the directive seem to mirror those of the DFS and the Lab in terms of collaboration, uniformity, and quality. All appear intent on establishing a central oversight entity over different groups performing different forensic discipline functions and on promoting

\textsuperscript{299} Pearson, \textit{supra} note 293; Tillman, \textit{supra} note 292.
\textsuperscript{300} Department of Defense Directive No. 5205.15E, § 1(a), April 26, 2011.
\textsuperscript{301} For instance, the Secretary of the Army is delegated the Executive Agent of Forensics with regard to certain forensic disciplines (e.g., DNA, trace, latent prints), whereas the Secretary of the Air Force is delegated as the EA with regard to other forensic disciplines (e.g., image and video analysis). Directive No. 5205.15E, §§ 1(d)-(e).
collaboration among the groups. The directive sets up a uniform system of standards and procedures to guide forensic activity throughout the DoD.\footnote{Directive No. 5205.15E, Enclosure 3, § 1.}

The directive further establishes a rather complex web of directors and advisors to establish policy and monitor performance with respect to different forensic disciplines, in keeping with standards and procedures established by EXCOM.\footnote{Directive No. 5205.15E, Enclosure 3.} Much like the DC crime lab, the purpose here is likely to maximize efficiency and quality of analysis while minimizing error. And as with the DC crime lab, the difficulty will likely be to strike a balance between local oversight and monitoring of forensic practices and global oversight of collaboration and communication among a number of interdependent groups.

2. Across the Pond: Lessons from the UK

The United Kingdom has arguably been on the forefront of forensic science for decades. From the crime scene investigation in the Jack the Ripper case to its embrace of the use of DNA fingerprinting to the demise of the iconic Forensic Science Services, the UK has experienced a roller coaster of up and downs in forensic science administration. Understanding the United Kingdom’s success requires a review of all of its previous failed attempts to increase quality.

a. First Steps: The Forensic Science Service

The dominant forensic force in the United Kingdom was the Forensic Science Service ("FSS").\footnote{SCIENCE AND TECHNOLOGY COMMITTEE, SEVENTH REPORT, 2010-12, H.C. 855, at 9 (U.K.), available at http://www.publications.parliament.uk/pa/cm201012/cmselect/cmsctech/855/855.pdf.} At one time, the FSS operated a monopoly of the United Kingdom’s forensic science workload.\footnote{Id.} In 1991, the FSS became an Executive Agency that ran more like a business. Before then, the FSS did not charge for its services.\footnote{Id.} As a government-owned company, the FSS sold
its services to police forces and, in December 2010, held 60 percent of the market share.\footnote{\textit{Id.} at 3.} In 1995, the FSS created the first deoxyribonucleic acid (“DNA”) database—The National DNA Database (“NDNAD”).\footnote{\textit{The National DNA Database, PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY POSTNOTE} (Feb. 2006), available at http://www.parliament.uk/documents/post/postpn258.pdf.} Each year, the FSS works on more than 120,000 cases, employing over 1,000 scientists.\footnote{\textit{Science and Technology Committee, Seventh Report}, 2010-12, H.C. 855, at 9 (U.K.), available at http://www.publications.parliament.uk/pa/cm201012/cmselect/cmsctech/855/855.pdf.}

The UK, however, is not without its stories of wrongful conviction. In 1974, a pub bombing left twenty-one people dead and 160 injured.\footnote{Kent Roach & Gary Trotter, \textit{Miscarriages of Justice in the War Against Terror}, 109 \textit{PENN. ST. L. REV.} 967, 975 (2005).} On the night of the bombings, six Irishmen were arrested, and in 1975 the men were convicted based primarily on confessions, evidence linking the men to the Irish Republican Army, and forensics suggesting the men handled explosives.\footnote{\textit{Id.} at 975–77.} They were beaten and even tortured, but, with a series of opportunities to rectify the situation, the courts balked and left the men both legally and physically defenseless.\footnote{\textit{Id.} at 977.} Their first appeal was denied; their civil action against police for assault was dismissed; and a referral by the Home Secretary to review the case in 1987 was largely ignored.\footnote{\textit{Id.}}

With controversy building each day the men sat in jail, a new Home Secretary referred the case to an appeals court yet again, this time with the support of the Director of Public Prosecutions, who decided he would not fight for the conviction to stand.\footnote{\textit{Id.}} The court determined that the two issues addressed—the voluntariness of the confessions and sufficiency of forensic evidence—both signaled unsupportable convictions.\footnote{Roach & Trotter, \textit{supra} note 310, at 977.} The forensic tests were held to confirm two of the six handled explosives; however, scientists would later admit that “a range of
innocent products” could produce the same positive result. This “miscarriage[] of justice” came to an end in 1991, when the six men were finally freed 16 years after being convicted. It would prove to be a watershed moment for forensic science in the UK.

The day after the “Birmingham Six” were released, the government called for a royal commission, the Runciman Commission, to report on forensic science issues. Amidst calls for sweeping changes, there were virtually no major recommendations in the 1993 report, aside from suggesting a Forensic Science Advisory Council to oversee the use of forensics. A few years later, the FSS put its own group together to address quality standards. The FSS was already well on its way to a quality framework based on ISO 17025, an international accreditation standard, but aimed for a broader reaching approach.

b. Learning to Walk: The International Organization for Standardization

The International Organization for Standardization (“ISO”) offers an international standard for laboratory quality. The first couple of versions submitted by the ISO were merely guides for local organizations; however, the ISO decided to transform its guides into standards with the ISO 17025. ISO 17025 applies to testing and calibration laboratories and the ISO

317 Id.
319 Id. at 3.
323 See id.
suggests that accreditation organizations use the standards to measure the quality through management changes and technical requirements.³²⁴ The management requirements focus on the policy-oriented changes within the laboratory to ensure quality, including written policies, standards, and procedures.³²⁵ The technical requirements emphasize competence of scientists, environmental conditions, methodology, reporting requirements, and equipment management.³²⁶

In an effort to increase quality in 1998, the government focused on practitioner registration with the Council for the Registration of Forensic Practitioners (“CRFP”), a voluntary program that assessed competence of forensic scientists.³²⁷ The standards required an assessment of competence, payment of a fee, and reassessment every four years.³²⁸ While it began as a government funded enterprise, the ultimate goal was to reach 10,000 registered practitioners in order to become self-financing, but by 2004 it had only 1,800 members.³²⁹ With less than successful enrollment, the Association of Chief Police Officers withdrew its support and government funding was transferred to the National Policing Improvement Agency.³³⁰ Realizing that focusing on individual practitioners failed to regulate quality at the organizational level, the National Policing Improvement Agency decided to remove all aid.³³¹

Over time, the FSS experienced severe financial troubles, which some attributed to its provision of all types of forensic services, as opposed to private laboratories that provided only

³²⁵ Id.
³²⁶ Id.
³²⁷ Peter White, Crime Scene to Court: The Essentials of Forensic Practice 18–19 (2010).
³²⁸ Id.
³³⁰ Id.
³³¹ Id.
the most lucrative services. In an attempt to rectify the situation, the FSS was “granted trading fund status” in 1999 to increase the flexibility of the organization financially. Six years later, the FSS was established as a GovCo, a “[g]overnment owned, contractor-operated” organization. The government intended to create a kind of public sector-private market partnership that would allow the efficiency of private market with the ability to control quality and standards. As a result, many other companies entered the market, driving competition up and costs down. After reportedly losing £2m a month, the government decided to shut down the FSS in favor of an entirely private market. This decision caused public backlash, with some accusing the government of allowing cost to determine justice, as the organization that employed 1,600 prepared to close its doors.

c. Running Forward: Privatization and Regulation

As the private market increased its activities and amidst concerns that the government was favoring cost over quality, the government stepped in and created the “Forensic Science Regulator,” a position publicly funded but not directly controlled by the government. The Regulator explained in a Parliament Report what he called the “most obvious risk” in the closing of the FSS: going from the very stringent accreditation requirements of the FSS to a non-accredited environment. A condition required to close the FSS alleviates this concern: only

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333 Id. at 5.
334 Id. at 5, 9.
335 Id. at 23.
337 Id.
ISO 17025 accredited laboratories may receive FSS work.\textsuperscript{340} Additionally, all DNA laboratories reporting to the police must comply with ISO 17025 standards and all fingerprint laboratories must be in compliance by 2015.\textsuperscript{341}

Two decades later, the government achieved its goals of increasing both efficiency and quality through regulation and privatization.\textsuperscript{342} DNA profiling is reported within a few days of receipt by the laboratory.\textsuperscript{343} Making the turnaround even more impressive, profiling is available for all crime types, rather than just serious crimes: In the United Kingdom, anyone arrested can be required to give DNA that can be profiled.\textsuperscript{344} Although the United Kingdom has significantly fewer cases, lower crime, and a lower population, the comparison between the two country’s DNA systems is staggering.\textsuperscript{345} While it is possible the lack of backlog and quick turnaround stem from demographic differences, the more likely answer is that the United Kingdom has succeeded. Within two years of setting up its DNA database, the United Kingdom saw backlogs rise into the six-figures.\textsuperscript{346} But, just two decades later, the United Kingdom has no backlog of its DNA analysis—a foreign concept in the United States.\textsuperscript{347} To address quality issues, in addition to requiring accreditation, the United Kingdom mandated standards for processing crime scenes and transporting samples to laboratories and requires different laboratories to analyze samples from

\textsuperscript{340} Id. at 35.
\textsuperscript{341} Id. at 36–37.
\textsuperscript{342} See Goulka et al., supra note \textbf{Error! Bookmark not defined.}, at 2 (noting that the United States could apply the English system to reduce cost and improve outcomes).
\textsuperscript{343} Id. at 7.
\textsuperscript{344} Id. at 5. I do have deep reservations about the United States embracing a “DNA upon arrest default” and the United States Supreme Court is ruling on that exact issue later this year. See King v. State, 42 A. 3d 549 (Md. 2012), \textit{cert. granted sub nom} Maryland v. King, 131 S. Ct. 594.
\textsuperscript{347} Id.
the accused and the victim.\textsuperscript{348} Additionally, all data is submitted to the United Kingdom Accreditation Service (“UKAS”) to ensure standards are met and the Forensic Science Regulator may, at any time, enter a laboratory to check compliance.\textsuperscript{349}

3. Wishful Thinking: The EU

It might be useful to contrast the “deregulation” of forensic science in the U.K. with the attempt at centralization in continental Europe. The European Network of Forensic Science Institutes (ENFSI) aims to be recognized as the leading authority on forensic science in Europe.\textsuperscript{350} ENFSI endeavors to maintain the quality of forensic science and develop delivery of forensic services throughout the European Union. ENFSI itself is a network of forensic institutes/laboratories, geographically spread across Europe including those from EU Member States and most EU candidate countries. The membership consists of 64 institutes spread across 34 countries.

ENFSI recognizes that the lack of common standards has been identified as a barrier to cooperation between forensic science laboratories. Further, the benefits of common standards in the fight against crime have been a priority for some time.\textsuperscript{351} The call for the harmonization of standards and procedures in forensic practice is made by ENFSI in its policy statement on accreditation.\textsuperscript{352} It states that “ENFSI wishes to promote consistent and reliable scientific evidence through the whole forensic process from the scene of crime to court.”\textsuperscript{353}


\textsuperscript{349} Id.


\textsuperscript{352} ENFSI, POLICY STANDARDS FOR ACCREDITATION 1 (2010).

\textsuperscript{353} Id.
It is obvious—at least from the EU’s point of view—that common standards are essential to the effective investigation of crimes that involve the exchange of forensic information across national borders. For example, the Prum Treaty (now EU Legislation) relies upon the requirement of Member States to make forensic information (DNA and fingerprints) contained in national databases available for searching. To facilitate this process the data must be in a standard format such that such searches become technically feasible.

Yet with all of this centralization, the EU itself lacks the standards in forensic science that it wants. There is no institutional control, and thus “no institution which develops forensic science standards or enforces and supervises their implementation.” Indeed, while Europe’s crime labs acknowledge that the creation of an independent forensic institute is just a matter of time, that time may be well off in the future.

Even with a tested model from the United Kingdom and analogous examples in the United States, several obstacles stand in the way of a change that would revolutionize forensic science in the United States today: fragmentation, a lack of public interest, and drastic demographic differences. Without addressing these issues preliminarily, any attempts would be terminal at worst and a prolonged illness, just as the United Kingdom saw through its two-decade long experiment. Research partnerships—akin to the UK’s grassroots forensic overhaul—could be the drastic (and palatable) change needed.

**B. Acknowledging that Probably Nothing is Perfect**

While the creation of research partnerships is a perhaps a far cry from a massive federal level entity, and in some ways it might verge on the NAS Report’s criticism of the current

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355 *Policing in Europe, supra* note 288, at 99.
conglomerate of forensic science “bodies” out in the ether: “[I]t is not clear how these associations interact or the extent to which they share requirements, standards, or policies. Thus, there is a need for more consistent and harmonized requirements.”

In the research partnership model, this question of interaction will be an issue. Its agencies and sub-agencies do not seem to have adequate means of communication. There would need to be a method by which efforts to improve standardization are communicated to other researchers and crime labs. The risk is that with so many different organizations all attempting to reform forensic science, there is bound to be overlap and inefficiency.

Nonetheless, the work will have to proceed in conversation with the broader criminal justice system. Reforming forensic science—even with the cooperation of crime labs—in a vacuum leaves out the end users of the forensic product. Thus, research must be performed with attention to admissibility and the realities of the criminal justice system. Forensic reform must bear in mind the judges and juries who will analyze and assess the information presented to them. In doing so, reformers must keep in mind that the judiciary is infamously opposed to change.

As Jane Moriarty posits, even when science is clearly inadequate, judges have been so unwilling to rigorously examine forensic science evidence because they are too set in their ways and “cannot seem to imagine” excluding evidence that commonly comes in. In one case where defense counsel challenged his client’s conviction based on the NAS report’s condemnation of the validity of the science, the judge reasoned that the NAS report “merely presents a general picture of the current processes and pitfalls of toolmark identification and identifies possible flaws in the NAS’s methodology.”

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356 NAS REPORT, supra note 1 at 16.
methods of improvement.” 358 Other judges have noted that the NAS Report’s recommendations are important, but still refuse to consider them. 359

Any forensic science reform needs to accept that courts are particularly resistant to change. Because Daubert v. Merrell Dow Pharmaceuticals, Inc. requires judges to act as gatekeepers, admitting “good science” into their courtrooms and turning away everything else, 360 forensic legislation should encourage the dissemination of forensic research to the judiciary in terms non-scientists can understand. Without an understanding of the faulty validity of many of the forensic sciences, judges will continue to allow such evidence to be heard at trial.

The American criminal justice system is made up of counties, cities, states, and the federal government. Despite being seriously underfunded, understaffed, and undertrained in forensic science, state and local organizations handle the vast majority of law enforcement activity. 361 Alongside the lack of training and funding, and most illustrative of the fragmentation, is the lack of unification among the various systems. If there are accreditation and standardization criteria, they differ markedly from jurisdiction to jurisdiction. 362 In fact, most jurisdictions in the United States require no formal certification for their forensic science practitioners. 363 The American government, based on shared responsibility between the federal and state governments, presents its own problems for reworking the system. As the NAS Report noted, the federal government cannot unilaterally mandate a new forensic program without

359 Com. v. Gambora, 933 N.E. 2d 50 (Mass. 2010) (noting that “the issues highlighted in the NAS report are important, and deserve consideration” but refusing to undertake such consideration in this case).
360 Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 589 (1993) (“under the [Federal Rules of Evidence] the trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable.”).
361 NAS REPORT, supra note 1, at 6.
362 Id.
363 Id.
infringing on authorities typically reserved to the states.\textsuperscript{364} Instead, collaboration would be necessary and with a system so divided, the idea of a universal overhaul is enough to send any politician running, and if the workload does not do it, the funding woes certainly would.

While stories of faulty forensics leading to innocent persons spending time in prison have been covered extensively in the news, the focus is on bad science rather than ineffectual standards to regulate science that works when conducted properly.\textsuperscript{365} Unless the focus shifts from blaming science to blaming policies, it is unlikely that Congress will make any significant steps toward unifying the system. We need to invest in a more efficient and quality-friendly framework that has yet to occur in the United States.

C. Setting a Stage for Reform

Even with these obstacles, the stars could still align to allow the United States to achieve a comparable program by utilizing existing frameworks to create research partnerships.

The United Kingdom’s forensic science program, once a predominantly public entity, thrived after the government released control in favor of the competition and cost effectiveness that come with private markets.\textsuperscript{366} Although many fought back, arguing that closing the FSS favored cost at the expense of quality, data suggests that is not the case.\textsuperscript{367} It is doubtful that research partnerships might ultimately privatize the system of forensic science in the U.S. (or at least decouple crime labs from law enforcement agencies). After all, the U.K. is far smaller with

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\item \textsuperscript{364}\textit{Id.} at 13. The United States boasts a system of limited federal government. U.S. CONST. Amend. X As stated in the Constitution, “The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.” \textit{Id.} The Tenth Amendment is the primary vehicle for arguments that the federal government is overstepping its authority and encroaching on states’ rights. \textit{See Reserved Powers of the States, THE HERITAGE FOUNDATION, http://www.heritage.org/constitution#!/amendments/10/essays/163/reserved-powers-of-the-states} (last visited 2/3/2013).
\item \textsuperscript{365} \textit{See, e.g., Wrongly Convicted Man Now Free Thanks to DNA Evidence, WSBTV ATLANTA, NOV. 12, 2007, http://www.wsbtv.com/news/14575783/detail.html.}
\item \textsuperscript{366} \textit{FORENSIC SCIENCE SERVICE, WRITTEN EVIDENCE SUBMITTED BY DR. FIONA PERRY, 2010–11, FSS 21 (U.K.), available at http://www.publications.parliament.uk/pa/cm201011/cmselect/cmsctech/writev/forensic/m21.htm.}
\end{itemize}
fewer jurisdictions and crime. Moreover, in the United States, similar privatization occurred in the prison system, as the government contracts with private companies for incarceration services to reduce costs and has been widely criticized.\textsuperscript{368} Finally, The U.K. system could be characterized as capitalism all dressed up, it requires much more than a new dress and some shoes. To decrease costs while improving quality standards, as the United Kingdom did, the traditional idea behind capitalism—privatizing industry to increase competition—would probably require significant government regulation.

In the realm of forensic science, there are only so many samples involved and when coupled with quality regulation and government funding, the same incentives would be kept in check. In this respect, taking the testing away from those responsible for enforcing the results would add additional layers of protection. As one former FBI assistant director explained, investigations showed that laboratories controlled by law enforcement often reported results biased in favor of the prosecution.\textsuperscript{369} Whether intentional or not, the bias decreases credibility in the system, calling into question reliable techniques and reducing confidence in forensics as a whole.

Coupled with the decreased costs and increased efficiency that would follow a system of research partnerships, sets the “path forward” that the NAS Report called for. Moreover, forensic science is not prepared for its own version of an FDA, and the use of something less drastic than a federal watchdog is a good incentive to induce action. While the specter of wrongful

\textsuperscript{368} As one study demonstrated, California state-run prisons spend about $162 per inmate per day, compared with only $72 in privately run prisons. \textit{Private Prisons Save Money, Report Says}, CORRECTIONAL NEWS, July 28, 2011, http://www.correctionalnews.com/articles/2011/07/28/private-prisons-can-save-california-money-report-says. While the prison system has largely been criticized in the United States, the two situations are less analogous than it might readily appear. The issue with privatization of prisons is that to turn a profit, more prisoners are needed. \textit{Private Prisons, AMERICAN CIVIL LIBERTIES UNION}, http://www.aclu.org/prisoners-rights/private-prisons (last visited 2/3/2012).

convictions should be (although I acknowledge it isn’t) a good enough reason to consider a change in course, there are other incentives. If forensic science as an industry would adopt a research partnership platform, then we could finally begin to set baseline requirements for standards and quality while simultaneously increasing efficiency and decreasing costs.

CONCLUSION

The admissibility of evidence is largely dependent on the implementation and enforcement of comparable standards, which should be achieved for the entire forensic process, from crime scene to courtroom. Yet consistency and predictability are few and far between. Ultimately, we can do better. Research partnerships will improve efficiency, foster communication, and unify oversight Improving crime labs would directly correlate to keeping innocent defendants out of jail, and in some cases, alive. A federal entity attempts to accomplish too much in a sector that remains fragmented and impervious to change. Research partnerships should prioritize the recommendations made by the NAS Report to streamline, simplify, and accelerate forensic reform. Only when all crime labs speak the same language, use the same methodologies and protocols, and embrace the science component of its name, will forensic science be better. Reforming forensics is no small task. It will take cooperation from scientists, lawyers, judges, and policymakers, but it can be done. Forensic science should prevent wrongful convictions not cause them. This is our opportunity to set forensics right before it get the result wrong and it stays that way.