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Realizing Reliability in Forensic Science from the Ground Up

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REALIZING RELIABILITY IN FORENSIC SCIENCE FROM THE GROUND UP

JESSICA D. GABEL*

This Article emphasizes that forensic flaws persist and that deficiencies in forensic science have harrowing implications for criminal justice. In the wake of numerous calls for forensic reform, I propose that we use existing models and frameworks already in place to improve the quality and cost of the U.S. forensic science program, rather than creating an entirely new and unaffordable system. At bottom, this Article calls for collaboration between crime labs, universities and research centers, and the criminal justice system with the goal of making forensic science more reliable.

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INTRODUCTION

Forensic science is a fractured and burdened discipline. Five years ago, in 2009, the National Academy of Sciences (NAS) published a revealing report announcing that forensic science is broken.¹ Depending on the audience, reactions to the NAS Report ran the gamut, from calling it predictable to groundbreaking to misleading.² In many respects, although it could hardly be characterized as new information, the NAS Report laid forensic science's shortcomings to bare and brought to the surface the weaknesses that have plagued forensic science for decades.³ Moreover, the NAS Report underscored a harsh truth: faulty forensic science has contributed to convicting innocent people—and will continue to do so if the status quo persists.⁴

¹ COMM. ON IDENTIFYING NEEDS OF FORENSIC SCI. CMTY. ET AL., NAT'L RESEARCH COUNCIL OF NAT'L ACADS., *STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD* 14 (2009) [hereinafter NAS REPORT].

² See Matt Clarke, *Crime Labs in Crisis: Shoddy Forensics Used to Secure Convictions*, PRISON LEGAL NEWS, <http://goo.gl/UXrlgI> (last visited Oct. 14, 2013) (explaining that crime lab officials “reacted with predictable outrage” to the NAS report); Gregory S. Klees, *SWGUN Initial Response to the NAS Report*, SCIENTIFIC WORKING GRP. FOR FIREARMS & TOOLMARKS, <http://goo.gl/PzoH76> (last visited Oct. 14, 2013) (“The [Scientific Working Group for Firearms and Toolmarks] has been aware of the scientific and systemic issues identified in this report . . .”).

³ See 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 laboratories” as two symptoms of the broken state of forensic science).

⁴ JON B. GOULD ET AL., *PREDICTING ERRONEOUS CONVICTIONS: A SOCIAL SCIENCE APPROACH TO MISCARRIAGES OF JUSTICE* 76 (2012), available at <http://goo.gl/hBSsyV>; see also NAS REPORT, *supra* note 1, at 4.

American courts have improperly legitimized various forensic disciplines without subjecting them to the kind of scrutiny that would be required of novel scientific or technical evidence today. Courts accept the untested view that “science,” such as fingerprinting and hair analysis, is (1) generally accepted, (2) science, and (3) reliable. Such unsupported conclusions have lacked adequate scrutiny, whether from a scientific or a legal perspective. Take forensic fingerprint analysis. The common—yet unrealistically romantic—starting point is that there are no two fingerprints exactly alike in the world. That assumption produces the further assumption that fingerprint analysis must be correspondingly reliable. This logic is erroneous.

For example, forensic science and its resulting expert testimony sealed the fate of Bennie Starks during his trial for a brutal rape in 1986.⁵ At trial, the State’s forensic serologist testified that, based on her analysis of a semen sample taken from the victim’s underpants and a sample obtained from Starks, she could not exclude Starks as the source.⁶ The prosecution also hired dentists Dr. Carl Hagstrom and Dr. Russell Schneider (who self-identified as experts in forensic odontology) to testify that bite marks on the victim’s shoulder had been made by Starks.⁷ The dentists testified that after comparing the evidence, photos, X-rays, and a model of Starks’s teeth, the bite marks shared sixty-two similar characteristics with Starks’s teeth.⁸ After hearing these forensic “experts” testify that scientific evidence tied the defendant to the crime, the jury convicted Starks of two counts of aggravated criminal sexual assault, attempted aggravated sexual assault, and aggravated battery.⁹ Starks was sentenced to sixty years in prison.¹⁰

In 2006, after spending nearly twenty years behind bars, a DNA test categorically excluded Starks as the source of the semen.¹¹ Additionally, two other odontologists’ independent examinations of the bite mark evidence completely discredited the conclusions and testimonies presented at trial.¹² Their reports pointed out that the examination method used by the State’s odontologists had since been rejected by its own creators and concluded that the dentists “misapplied the methodology and used flawed

⁵ *People v. Starks*, 975 N.E.2d 71, 72 (Ill. App. Ct. 2012).

⁶ *Id.* at 73, 77.

⁷ *Starks v. City of Waukegan*, No. 09 C 348, 2013 U.S. Dist. LEXIS 71610, at *2, *5–6 (N.D. Ill. May 21, 2013).

⁸ *Starks*, 975 N.E.2d at 73; *see also Starks*, 2013 U.S. Dist. LEXIS 71610, at *2, *5.

⁹ *Starks*, 975 N.E.2d at 72–73.

¹⁰ *Id.* at 72.

¹¹ *Id.* at 77.

¹² *Id.*

preservation and photography techniques.”¹³ The appeals court ordered Starks released on bond pending a new trial.¹⁴ His convictions were vacated and the last charges dismissed in January 2013.¹⁵ Although Starks is free today, the lack of lab oversight and forensic standards leaves forensic science distrusted and vulnerable to manipulation. During the twenty years Starks spent behind bars, advancements in forensic science technology progressed exponentially, yet the system continues to suffer from fatal flaws and a low threshold of reliability.

Indeed, five years after the NAS Report, the so-called “Path Forward” seems murky, and various political logjams have barricaded the road to reliability. I posit that reliability—the bedrock of forensic science—remains a fleeting notion, because efforts at reform have lacked coordination and implementation. The only way to adequately address the flaws brought to light through the NAS Report is to align the various stakeholders and make a concerted effort from all facets of forensic science, rather than waiting for guidance through a frustrated and exhausted legislative and judicial process.

Although impossible to quantify, the number of wrongfully convicted individuals is at least in the hundreds.¹⁶ Unreliable science presents itself in a virtual smorgasbord of ways, 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 lab practices). Regardless of the root causes of the forensic flaws, the NAS Report clearly issued a “call to arms” to reform forensic science from the top down by proposing the creation of a centralized National Institute of Forensic Science (NIFS).¹⁷ Little has been done, however, to achieve reform. Indeed, legislation has crawled to a standstill (i.e., dead in the water) several

¹³ *Id.*

¹⁴ *Id.* at 74.

¹⁵ See *Starks v. City of Waukegan*, No. 09 C 348, 2013 U.S. Dist. LEXIS 71610, at *11 (N.D. Ill. May 21, 2013). Starks brought a civil suit against the two dentists and the forensic serologist (among others) for violating his Fourteenth Amendment right to due process by intentionally misapplying the methodologies that led to their conclusions, knowingly giving false testimony to the jurors, and conspiring to secure Starks’s conviction. See *id.* at *2–3, *6.

¹⁶ See Brandon L. Garrett & Peter J. Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1, 12 (2009).

¹⁷ See *The NAS Report Update*, 7 EVIDENCE TECH. MAG. 12, 13 (March–April 2009) (“The number-one recommendation offered in the NAS report call[ed] for the formation of an independent federal entity, the National Institute of Forensic Science . . .” (citation omitted)).

times in Congress, and certain constituencies have brought stiff resistance to reforms.¹⁸

With the exception of DNA, no single forensic technique yet has the ability to definitively link an evidence sample to its source.¹⁹ Ability is very different from invariable actuality, however; even DNA evidence has its limitations and stress points.²⁰ 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. The reality of wrongful convictions has risen to the forefront of public awareness through the work of the Innocence Project and other organizations.²¹ Of course, there are numerous factors that relate to wrongful convictions outside of faulty forensic evidence—witness misidentification, false confessions, jailhouse snitches²²—but in some ways, the public conception of erroneous convictions, and that DNA will cure them all, represents a somewhat myopic view.

The Innocence Project predominantly accepts cases where biological evidence is available for DNA testing.²³ That only applies to a small subset of cases with potential claims of actual innocence. For each case where DNA is able to definitively exonerate an individual, there are many more

¹⁸ See Bernadette 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 (2012) (outlining issues with the Criminal Justice and Forensic Science Reform Act—which proposes federal oversight in the form of an agency located within DOJ, in stark contrast to the NAS Report’s emphasis on independence from law enforcement—and describing opposition from prosecutors and forensic scientists to defense counsel’s use of the NAS Report).

¹⁹ In *Law and Order* terms, accuracy and precision are “two separate yet equally important” concepts. “Accuracy” evaluates whether 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, 23 (2010); *Quality Assurance Standards for Forensic DNA Testing Laboratories*, FED. BUREAU OF INVESTIGATION, <http://goo.gl/NE3wL4> (last visited Nov. 24, 2013).

²⁰ William C. Thompson et al., *Forensic DNA Statistics: Still Controversial in Some Cases*, 36 CHAMPION 12, 12 (2012) (“[W]hen 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.”).

²¹ Wrongful convictions are also not a creature of the twentieth century. In *Perry’s Case*, 14 How. St. Tr. 1312 (1660), a servant named Perry went to search for his master, Harrison, after Harrison went missing. Perry disappeared, but was found with some of Harrison’s bloody items. *Id.* at 1313–14. Harrison’s body was never found, and Perry gave inconsistent stories. *Id.* at 1314–16. Perry was hanged. *Id.* at 1319. Harrison returned some time later with a story of being robbed, taken by force to Turkey, and forced into slavery. *Id.* at 1313.

²² See GOULD ET AL., *supra* note 4, at iii, xii.

²³ See *About the Innocence Project*, INNOCENCE PROJECT, <http://goo.gl/iLWcRE> (last visited Nov. 24, 2013).

equally innocent people in cases where DNA evidence is lacking.²⁴ Relying on the postconviction process to correct the problem simply puts a Band-Aid on a gaping wound. We can do better. DNA may provide the “get out of jail free” card in certain cases, but its absence in others nearly ensures that both the convictions and any bad forensic practices involved will persist.

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.”²⁵ To be clear, the NAS Report was not the first conscious conclusion that forensic science needs work.²⁶ Moreover, the Report was not the first suggestion that the mechanisms for change should occur at the federal level.²⁷ It probably will not be the last.

The spate of legislation the NAS Report has spawned over the past few years represents a laudable but failed effort to repair a broken system.²⁸ The top-down mentality of restructuring forensics essentially sweeps everything behind a gigantic curtain in an attempt to control all of the loose pieces in a one-size-fits-all manner. But a careful evaluation of the bottom of that curtain reveals the wizard’s feet peeking out: 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 will continue to tabulate wrongful convictions based on bad science.

Having formerly argued that we need a federal agency devoted to the reliable development and distribution of sound forensic science,²⁹ history

²⁴ See Nancy Petro, *Federal Grant Will Target Wrongful Conviction Cases with No DNA*, WRONGFUL CONVICTIONS BLOG (Aug. 11, 2012, 8:50 AM), <http://goo.gl/VnJ84V> (“The vast majority of criminal cases—some estimate up to 90 percent—do not have DNA evidence to help settle claims of wrongful conviction.”).

²⁵ NAS REPORT, *supra* note 1, at xx.

²⁶ See *id.* at xix (noting that the impetus of the report was congressional recognition “that significant improvements are needed in forensic science.”).

²⁷ 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 was that a federal system is necessary to effectuate reform); see also Forensic Science and Standards Act of 2013, H.R. 3064, 113th Cong. (2013).

²⁸ See Donovan & Ungvarsky, *supra* note 18, at 23–26 (outlining the shortcomings of legislation proposed in the wake of the NAS Report).

²⁹ See Jessica D. Gabel & Ashley D. Champion, Response, *Regulating the Science of Forensic Evidence: A Broken System Requires a New Federal Agency*, 90 TEX. L. REV. SEE

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 now 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, in my view, the only currently accessible method. In addition, bringing universities—the bastions of scientific research—into the framework will increase the speed and accuracy, while reducing the costs, of developing 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 only slides deeper into disrepair.

This Article proceeds in five parts. Part I focuses on the science behind forensics and highlights some of the misconceptions regarding the validity of some disciplines. Part II discusses previous attempts at forensic reform in the United States. Part III discusses the obstacles to implementing a federal forensic science entity and national standards, including potential constitutional challenges and the ever-present issue of locating funding for such an endeavor. Part IV proposes that, rather than creating an entirely new framework, we should leverage existing 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, notably the U.K.’s major overhaul, and suggests that we capitalize on lessons already learned from those who have transformed 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.”³⁰

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 forensic evidence is reliable and absolute 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

ALSO 19, 26–27 (2011) (arguing that a federal agency should be created to regulate forensic services nationwide).

³⁰ Richard Willing, *Errors Prompt States to Watch Over Crime Labs*, USA TODAY, Mar. 31, 2006, at 3A (quoting Texas State Senator Juan “Chuy” Hinojosa).

person.³¹ Consequently, we want to be sure that we are convicting the right person. In many cases, forensic evidence closes the confidence gap left open by these concerns and seals the defendant's fate.³² It has the power to move the jury from *maybe* to *guilty*, and everyone can sleep better at night because "science" solidified the conviction.³³ The forensic analysts, then, are the criminal justice system's rock stars, bringing their objective scientific skill and authority to an otherwise emotionally charged process.³⁴ Yet, "public crime laboratories are *not* the sanctuaries of science we believed them to be."³⁵ Even the Supreme Court has recognized that "[s]erious deficiencies have been found in the forensic evidence used in criminal trials."³⁶ It is undeniable, and the "legal community now concedes, with varying degrees of urgency, that our system produces erroneous convictions based on discredited forensics."³⁷

A. "SCIENCE" SHORT OF THE NTH DEGREE

In tracking the 311 cases of postconviction exoneration brought about by DNA testing, the Innocence Project estimates that the average sentence served in those cases is about thirteen years, with eighteen people sentenced to death before DNA was able to prove their innocence.³⁸ Moreover, of those 311 cases, 141 of the original convictions involved "unvalidated or improper forensic science."³⁹ Given the now-universal nature of DNA

³¹ *But see In re Davis*, 557 U.S. 952, 955 (2009) (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.")

³² See NAS REPORT, *supra* note 1, at 4 ("[I]n some cases . . . testimony based on faulty forensic science analyses may have contributed to wrongful convictions of innocent people.")

³³ 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.

³⁴ For example, Dr. Henry Lee is an accomplished forensic analyst who has worked on high-profile cases, including the JonBenét Ramsey case, the O.J. Simpson case, and the Casey Anthony case. See Bianca Prieto & Walter Pacheco, *Star Criminalist Joins Defense Team*, ORLANDO SENTINEL, Nov. 15, 2008, at B1; *Famous Cases*, DRHENRYLEE.COM, <http://goo.gl/Zob0TH> (last visited Oct. 15, 2013).

³⁵ Craig M. Cooley, *Nurturing Forensic Science: How Appropriate Funding and Government Oversight Can Further Strengthen the Forensic Science Community*, 17 TEX. WESLEYAN L. REV. 441, 442 (2011) (emphasis omitted).

³⁶ *Melendez-Diaz v. Massachusetts*, 557 U.S. 305, 319 (2009).

³⁷ Pamela R. Metzger, *Cheating the Constitution*, 59 VAND. L. REV. 475, 491 (2006).

³⁸ See *Know the Cases: DNA Exoneree Case Profiles*, INNOCENCE PROJECT, <http://goo.gl/NckK94> (last visited Apr. 14, 2014).

³⁹ See *Know the Cases: Search the Profiles*, INNOCENCE PROJECT, <http://goo.gl/viN1Z5> (last visited Apr. 14, 2014).

testing, “it is possible to forget that, for decades, law enforcement had to rely on much less accurate forensic methods.”⁴⁰

Although today’s criminal cases often revolve around whether there is DNA—even for low-level property crimes—forensic science traditionally encompasses many different disciplines. Those disciplines include “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 investigation, medicolegal death investigation, and digital evidence.”⁴¹ In many forensic disciplines, “the human examiner is the main instrument of analysis.”⁴² The forensic analyst examines “visual patterns and determines if they are ‘sufficiently similar’ to conclude that they originate from the same source.”⁴³ The forensic disciplines can thus be divided into two main categories: lab disciplines and disciplines based on expert interpretation of observed patterns.⁴⁴ Examples of the former include DNA analysis, toxicology, and drug analysis.⁴⁵ Disciplines based on expert interpretations aim to determine a common source for patterns observed in, but not limited to, fingerprints, writing samples, and toolmarks.⁴⁶

In what may be an oversimplification of the distinction, the lab 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 genetics⁴⁷—i.e., the pervasive “1 in n billion” number. The lab-based forensic disciplines are deemed to be more analytical and thus more reliable than the more subjective “pattern identification” disciplines, which produce qualitative results.⁴⁸ Although consideration of whether the lab disciplines are deserving of such deference is better saved for another article, the

⁴⁰ GOULD ET AL., *supra* note 4, at 16.

⁴¹ NAT’L INST. OF JUSTICE, U.S. DEP’T OF JUSTICE, STATUS AND NEEDS OF FORENSIC SCIENCE SERVICE PROVIDERS: A REPORT TO CONGRESS 2 (2006) [hereinafter STATUS AND NEEDS], available at <http://goo.gl/UKJgzi>.

⁴² Saul M. Kassin et al., *The Forensic Confirmation Bias: Problems, Perspectives, and Proposed Solutions*, 2 J. APPLIED RES. MEMORY & COGNITION 42, 43 (2013).

⁴³ *Id.*

⁴⁴ See NAS REPORT, *supra* note 1, at 6–7.

⁴⁵ See *id.*

⁴⁶ See *id.*

⁴⁷ See *id.* at 40–41. See generally *The Use of DNA in Criminal Investigations: Hearing on S. 775 Before the S. Comm. on the Judiciary*, 2011–2012 Leg., 195th Sess. (Pa. 2011) (statement of David H. Kaye, Professor of Law, Penn State Dickinson School of Law), available at <http://goo.gl/DXdLrE>.

⁴⁸ See NAS REPORT, *supra* note 1, at 7 (“In terms of scientific basis, the analytically based disciplines generally hold a notable edge over disciplines based on expert interpretation.”).

element of subjectivity inherent in the analysis of lab disciplines merits comment. 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 Number DNA,⁴⁹ and degraded evidence.⁵⁰

Distinctions aside, forensic science disciplines lack significant peer-reviewed research of the scientific bases and validity studies that *should* support their methods.⁵¹ Fingerprint-matching techniques, for instance, lack “sufficient data on the diagnosticity and reliability” of even the most basic assumptions.⁵² For pattern-identification methods generally, research establishing the limits and measures of their performance is “sorely needed.”⁵³ Although research in many disciplines would allow for more consistent, quantitative results, research culture has not found a foothold in forensic science.⁵⁴ Without the requisite level of empiricism that grounds scientific endeavors, forensic science devolves into forensic art.

Despite the public desire for certainty and the legal requirement to prove guilt beyond a reasonable doubt, “[f]ew forensic science methods have developed adequate measures of the accuracy of inferences made by forensic scientists.”⁵⁵ It seems to be common sense that every forensic technique should include the applicable level of “uncertainty in the measurements that are made.”⁵⁶ Taken in isolation, the lack of scientifically acceptable standards for such a wide segment of forensic practices that continually calls itself a “science” seems quixotic.

The disconnect between forensic research and forensic practice occurred long ago and is the product of a criminal justice system that misplaces value in that gap. Many of the disciplines evolved solely for the

⁴⁹ Low Copy Number DNA usually refers to DNA from which it is difficult to obtain a full profile due to “damaged or degraded DNA, oligospermic or aspermic perpetrators or from extended interval post coital samples, where sperm have been lost over time due to the effects of drainage or host cell metabolism.” *DNA Analyst Training: Low Copy Number DNA*, NAT’L FORENSIC SCI. TECH. CTR., <http://goo.gl/1ah2Ip> (last visited Apr. 14, 2014).

⁵⁰ See generally Thompson et al., *supra* note 20 (discussing the problems with mixture, low copy DNA, and degraded samples).

⁵¹ See NAS REPORT, *supra* note 1, at 8.

⁵² See Jonathan J. Koehler, *Fingerprint Error Rates and Proficiency Tests: What They Are and Why They Matter*, 59 HASTINGS L.J. 1077, 1079 (2008).

⁵³ See NAS REPORT, *supra* note 1, at 8.

⁵⁴ Jennifer L. Mnookin et al., *The Need for a Research Culture in the Forensic Sciences*, 58 UCLA L. REV. 725, 778 (2011).

⁵⁵ See NAS REPORT, *supra* note 1, at 184.

⁵⁶ *Id.*

purpose of solving crimes,⁵⁷ and I hazard a guess that the inability to challenge forensic techniques' reliability due to the lack of solid research produces more convictions than acquittals. In the absence of validation studies, forensic techniques were initially applied to cases; once their application was established, the ongoing prosecutorial use of forensic techniques (and a good bit of judicial notice) continued unquestioned, and courts cemented their longevity.⁵⁸

With a pile of cases to solve, research, repeatability, and reliability assessments were—quite understandably—not crime labs' priority. Furthermore, implementing research and standards presents costs (in both workload and real dollars) that crime lab budgets simply cannot absorb. This steady progression to deem results acceptable, however, permitted forensic evidence development to continue unimpeded and elevated it to “sure bet” status in criminal trials. Of course, some forensic evidence is more reliable than others,⁵⁹ but that does not excuse a continued culture of “because I said so” testimony that uses loaded terminology such as “match,” “positively,” or “to the exclusion of all others” without the proper considerations of validity and rarity found in other research sciences.

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. In a recent study of the “predictors” of wrongful convictions, Jon Gould et al. concluded that forensic errors most often accumulate in evidence interpretation and the resulting testimony, rather than the “actual scientific testing.”⁶⁰ In some ways, these predictors presuppose that “scientific testing” takes place, as opposed to analysts merely “eyeballing”⁶¹ the evidence. Nonetheless, Gould and colleagues do acknowledge that there is a fundamental lack of foundational research underlying forensic science disciplines. This contributes to the eventual errors in forensic testimony, such as exaggerating the “inculpatory nature of the evidence by

⁵⁷ See *Unreliable or Improper Forensic Science*, INNOCENCE PROJECT, <http://goo.gl/gS5CFA> (last visited Apr. 14, 2014).

⁵⁸ See, e.g., *United States v. Crisp*, 324 F.3d 261, 268 (4th Cir. 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.”).

⁵⁹ 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.

⁶⁰ See GOULD ET AL., *supra* note 4, at xix.

⁶¹ See Jessica D. Gabel & Margaret D. Wilkinson, “Good” Science Gone Bad: How the Criminal Justice System Can Redress the Impact of Flawed Forensics, 59 HASTINGS L.J. 1001, 1003–13 (2008) (outlining examples of faulty testing methods that result in wrongful convictions).

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.”⁶² Indeed, there are no instruments that measure or quantify a reasonable degree of scientific certainty when the “scientific certainty” really boils down to the experience of the witness and not much else.

B. SPLITTING HAIRS: ANATOMY OF A CHEAP FIX

In a 2012 sequence of investigative reports, the *Washington Post* exposed a Department of Justice (DOJ) 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 receiving reports that careless work by analysts at the FBI lab produced unreliable forensic results that were later used in trials. The results of that DOJ review—kept silent from many alleged offenders for more than a decade—demonstrated that flawed hair and fiber evidence was used to garner convictions in numerous cases.⁶³

Hair and fiber evidence has long been the subject of scrutiny.⁶⁴ 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 DOJ deliberately withheld the findings from the defendants whose convictions resulted—at least in part—on that evidence. Instead, DOJ made the findings available only to the prosecutors in the affected cases. The *Washington Post*'s investigation revealed that possibly fewer than half of the defendants whose hair evidence was called into question never learned of the task force's review. Based on this investigation alone, it is clear that numerous individuals may “remain in prison or on parole for crimes that might merit exoneration, a retrial or a retesting of evidence using DNA because FBI hair and fiber experts may have misidentified them as suspects.”⁶⁵

In one such case, Donald E. Gates served twenty-eight years for the rape and murder of a Georgetown University student based on FBI Special Agent Michael P. Malone's testimony that Gates's hair was found on the

⁶² GOULD ET AL., *supra* note 4, at xix–xx, 16–19.

⁶³ See Spencer S. Hsu, *Defendants Left Unaware of Flaws Found in Cases*, WASH. POST, Apr. 17, 2012, at A1.

⁶⁴ See generally Clive A. Stafford Smith & Patrick D. Goodman, *Forensic Hair Comparison Analysis: Nineteenth Century Science or Twentieth Century Snake Oil?*, 27 COLUM. HUM. RTS. L. REV. 227 (1996) (discussing studies showing a propensity for false matches in hair analysis and their role in wrongful convictions).

⁶⁵ Hsu, *supra* note 63.

victim's body.⁶⁶ DNA testing exonerated Gates in 2009.⁶⁷ Even before the DOJ task force reviewed Malone's work, DOJ's Office of the Inspector General (OIG) issued an unsparing report on investigated "allegations of wrongdoing and improper practices within certain sections of the [FBI] Laboratory."⁶⁸ 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.⁶⁹ Although eventually exonerated and released, Gates spent decades in prison for a crime he did not commit.⁷⁰

Benjamin Herbert Boyle was also convicted based on Malone's testimony.⁷¹ 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 1997.⁷² A prosecutor's memo indicated that Boyle never would have been eligible for the death penalty had the problems in the FBI lab work been disclosed.⁷³ The task force would later determine that Malone's conclusions in Boyle's case were flawed.⁷⁴

For years, scholars, attorneys, and scientists have questioned the validity of microscopic hair comparison. The discipline is beset with weaknesses; yet, DOJ only reviewed the work of one FBI analyst—Malone—despite the questions surrounding the integrity of the FBI lab as a whole.⁷⁵ Of course, choosing to focus on one bad apple rather than a holistic repair of the tree is the easier, lower cost option. Moreover, it

⁶⁶ *See id.*

⁶⁷ *See id.*

⁶⁸ MICHAEL R. BROMWICH, U.S. DEP'T OF JUSTICE, THE FBI LABORATORY: AN INVESTIGATION INTO LABORATORY PRACTICES AND ALLEGED MISCONDUCT IN EXPLOSIVES-RELATED AND OTHER CASES: EXECUTIVE SUMMARY (1997) [hereinafter EXECUTIVE SUMMARY], available at <http://goo.gl/vkqYfY>.

⁶⁹ Hsu, *supra* note 63.

⁷⁰ *Id.*

⁷¹ *See id.*

⁷² *See Killer Is Executed in Texas*, N.Y. TIMES, Apr. 22, 1997, at A16. In addition to the faulty hair evidence, the former pathologist who performed the victim's autopsy, Dr. Ralph R. Erdmann, was sentenced to ten years of probation in 1992 for seven felony counts involving falsified autopsies in various Texas counties. *See Bobby Cervantes, DNA Testing Flaws Concern Attorneys*, AMARILLO GLOBE-NEWS, Aug. 18, 2012, at A1; Roberto Suro, *Ripples of a Pathologist's Misconduct in Graves and Courts of West Coast*, N.Y. TIMES, Nov. 22, 1992, at A22.

⁷³ Debra Cassens Weiss, *Review Found FBI Hair Analysis Flaws in 250 Cases, But DOJ Didn't Inform Defendants and Public*, A.B.A. J. (Apr. 17, 2012, 6:00 AM), <http://goo.gl/O2CqKL>.

⁷⁴ *See* EXECUTIVE SUMMARY, *supra* note 68.

⁷⁵ *See id.*

allowed the task force to blame the misconduct or ineptitude of one and ignore the systemic failures of an entire discipline.

The shortsightedness of such limited review, however, is palpable when viewed through the lens of cases that slipped through the cracks. Santae A. Tribble was convicted of killing a taxi driver named John McCormick in 1978.⁷⁶ During the investigation of McCormick's murder in Seat Pleasant, Maryland, a police dog uncovered a stocking mask one block away from the crime scene; the stocking contained thirteen hairs in total.⁷⁷ Of the thirteen, the FBI concluded through hair analysis that one belonged to Tribble.⁷⁸ 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.⁷⁹ 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.⁸⁰

Both in prison and while on parole, Tribble maintained his innocence, and in January 2012, Tribble's lawyer succeeded in having the evidence retested.⁸¹ A private lab concluded through DNA testing that the hairs could not have belonged to Tribble.⁸² A more thorough analysis at the time of the crime—even absent DNA testing—would have revealed the same result: one hair had Caucasian characteristics and Tribble is African-American.⁸³ 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.⁸⁴ And Tribble is, perhaps, "lucky." His case had testable DNA, and he found freedom in 2012, eight years after the task force completed its work.⁸⁵

⁷⁶ See Hsu, *supra* note 63.

⁷⁷ See *id.*; see also Spencer S. Hsu, *2 Jurors Back Exoneration of Man Found Guilty in Death*, WASH. POST, Oct. 18, 2012, at B1.

⁷⁸ See Hsu, *supra* note 63; see also Hsu, *supra* note 77 (describing a juror's suspicion that other jurors wrongly discounted Tribble's detailed alibi).

⁷⁹ See Hsu, *supra* note 63.

⁸⁰ See *id.*

⁸¹ See *id.*

⁸² See *id.*

⁸³ See *id.*

⁸⁴ Spencer S. Hsu, *Conviction Vacated in 1978 D.C. Killing*, WASH. POST, May 17, 2012, at B1.

⁸⁵ See Hsu, *supra* note 63. By contrast, Cameron Todd Willingham received a death sentence and was later executed by the State of Texas on what even staunch death penalty supporters deem faulty arson evidence. *Fire Expert Criticizes Investigation that Led to Execution*, CNN JUSTICE (Jan. 7, 2011, 9:41 PM), <http://goo.gl/80jCzx>; see also Marc Price Wolf, *Habeas Relief from Bad Science: Does Federal Habeas Corpus Provide Relief for Prisoners Possibly Convicted on Misunderstood Fire Science?*, 10 MINN. J. L. SCI. & TECH. 213, 230–31, 246–47 (2009) (analyzing the faulty science on which Willingham was

In another case that escaped the task force's review, Kirk L. Odom was convicted of sexual assault in 1981.⁸⁶ 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 the samples were indistinguishable.”⁸⁷ To illustrate the credibility of the evidence, the agent also testified that he had concluded hairs to be indistinguishable only “eight or 10 times in the past 10 years, while performing thousands of analyses.”⁸⁸ Although Odom presented alibi evidence, the jury convicted him after just a few hours of deliberation. Odom was paroled in March 2003 and was required to register as a sex offender.⁸⁹

That would have been the end of Odom's story had it not been for his lawyer's crusade to right the wrongs attributable to the erroneous hair comparisons.⁹⁰ 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.⁹¹ In response, the government located stained bedsheets, a robe, and the microscopically examined hair from the crime scene.⁹² “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.⁹³ Odom was exonerated on July 13, 2012.⁹⁴

In response to the Gates–Tribble–Odom trifecta, DOJ and the FBI announced a joint effort to review convictions involving FBI (and only FBI) analyses of hair evidence.⁹⁵ 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.

convicted, and subsequently executed); David Grann, *Trial by Fire: Did Texas Execute an Innocent Man?*, NEW YORKER, Sept. 7, 2009, at 42.

⁸⁶ See Hsu, *supra* note 63.

⁸⁷ *Id.*

⁸⁸ *Id.*

⁸⁹ See *Know the Cases: Kirk Odom*, INNOCENCE PROJECT, <http://goo.gl/DIVBNT> (last visited Apr. 14, 2014).

⁹⁰ See Hsu, *supra* note 63; see also Spencer S. Hsu, *After DNA Retesting, Kirk Odom Exonerated*, WASH. POST, July 14, 2012, at B6.

⁹¹ See *Know the Cases: Kirk Odom*, *supra* note 89; *Know the Cases: Santae Tribble*, INNOCENCE PROJECT, <http://goo.gl/FOHLht> (last visited Apr. 14, 2014).

⁹² See *Know the Cases: Kirk Odom*, *supra* note 89.

⁹³ *Id.*

⁹⁴ See *id.*

⁹⁵ See Hsu, *supra* note 77.

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.⁹⁶

The U.S. Attorney for the District of Columbia, Ronald C. Machen, Jr., has stated that his office would conduct “a sweeping review” of past cases “where hair analysis was used in part to secure convictions.”⁹⁷ In addition to being too little, too late for some, this effort again seems to deliberately ignore the fact that flawed hair analysis is a widespread problem.⁹⁸ To believe such errors occur in isolation—confined to just one lab or just one forensic discipline such as hair analysis—is nonsensical when the entire forensic discipline produces wrongful convictions because of analytical and structural defects. In many cases, we continue to allow the criminal justice system to be held hostage by bad science, and those caught in the cross hairs have little recourse from a system designed to reinforce finality over truth.⁹⁹

C. READING THE FINE PRINT

Questionable results may come from weak methodology, misapplication of methods to a specific case, second-rate analysts, 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 understanding errors in 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

⁹⁶ Press Release, Fed. Bureau of Investigation, FBI Clarifies Reporting on Microscopic Hair Comparisons Conducted by the Laboratory (July 13, 2012), *available at* <http://goo.gl/bhoaDC>.

⁹⁷ See Paul Wagner, *DNA Shows Flawed Science Used at Trial*, myFOXdc.com (Mar. 16, 2012, 12:49 PM), <http://goo.gl/L3nMsD>; see also Hsu, *supra* note 63 (noting that “[Machen’s] office would *try* to review all convictions that used hair analysis” (emphasis added)).

⁹⁸ See, e.g., Paul C. Giannelli, *Microscopic Hair Comparisons: A Cautionary Tale*, 46 CRIM. L. BULL. 531 (2010) (examining the judicial history and the lack of empirical basis in the techniques of microscopic hair analysis and its role in wrongful convictions).

⁹⁹ See Gabel & Wilkinson, *supra* note 61. In “*Good Science Gone Bad*,” Margaret Wilkinson and I called upon legislatures to consider avenues for redressing wrongful convictions won through junk science. Notably, Texas responded to that challenge in June 2013 and enacted a law that ensures access to the courts for habeas corpus writs based on science that is later deemed to be unreliable (or new science that did not exist at the time of conviction). TEX. CODE CRIM. PROC. ANN. art. 11.073 (West Supp. 2013). This effort should be applauded, though time will tell if other states follow suit and whether individuals are able to successfully use this mechanism.

systematically classify and compare them, and the average fingerprint contains between 50 and 150 points of comparison (termed “friction ridge analysis”).¹⁰⁰

But fingerprint analysis does not involve a comparison of 150 or even 50 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.”¹⁰¹ Even among fingerprint analysts, the number of points of similarity required for identification varies, ranging from as few as eight points to as many as twelve or more.¹⁰² So, while it may be that on the whole no two fingerprints are alike, there is little to support that six, ten, or even twelve points are a sufficiently discriminating means of identifying a suspect. Moreover, such evidence is never presented with an indication of how accurate it might be (i.e., a quantifiable number that presents the analyst’s confidence in the conclusion). It seems logical that the likelihood that a given print belongs to a suspect increases when there are more points of commonality. Yet, the fingerprint community has never embraced this component because the requisite data (i.e., probability studies) does not exist.¹⁰³

Such a theoretical disconnect became a blatant reality in the case of Brandon Mayfield. On March 11, 2004, a terrorist attack on commuter trains in Madrid, Spain, killed approximately 200 people and injured over 1,400 more.¹⁰⁴ Needing assistance, the Spanish National Police enlisted the help of the world-renowned FBI crime lab and its fingerprint specialists. Just eight days later, on March 19, the FBI identified Mayfield as the source of one of the fingerprints on a bag containing detonators connected with the

¹⁰⁰ See DAVID R. ASHBAUGH, QUANTITATIVE-QUALITATIVE FRICTION RIDGE ANALYSIS: AN INTRODUCTION TO BASIC AND ADVANCED RIDGEOLOGY 1–9 (1999) (outlining the evolution of friction ridge analysis).

¹⁰¹ 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.” (citation omitted)).

¹⁰² See Robert Epstein, *Fingerprints Meet Daubert: The Myth of Fingerprint “Science” Is Revealed*, 75 S. CAL. L. REV. 605, 638 (2002) (noting that the number of matching characteristics sufficient for identification is “entirely subjective”).

¹⁰³ See, e.g., Tamara F. Lawson, *Can Fingerprints Lie? Re-weighing Fingerprint Evidence in Criminal Jury Trials*, 31 AM. J. CRIM. L. 1, 24 (2003) (finding that “[n]o one can say, with any certainty, whether fingerprint identification evidence is always truly accurate” because very little independent data exists); see also *id.* at 32 (recognizing that most “testing” of forensic evidence occurs in adversarial proceedings and is “an insufficient substitute for rigorous empirical study and scientific testing” (emphasis added)).

¹⁰⁴ See OFFICE OF INSPECTOR GEN., U.S. DEP’T OF JUSTICE, A REVIEW OF THE FBI’S HANDLING OF THE BRANDON MAYFIELD CASE 1 (2006), available at <http://goo.gl/xzik2o>.

attacks.¹⁰⁵ A second examiner verified the “match,” and a unit chief reviewed the conclusion and concurred in the results.¹⁰⁶ The FBI then learned on April 13 that the Spanish National Police performed an independent examination of the print comparison but could not positively identify Mayfield as the source.¹⁰⁷ After meeting with FBI representatives, the Spanish National Police agreed it would reexamine Mayfield’s fingerprints.¹⁰⁸

The FBI ultimately arrested Mayfield on May 6.¹⁰⁹ Mayfield was still in detention on May 17 when the court appointed an independent fingerprint examiner to review the FBI’s identification.¹¹⁰ 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.¹¹¹ 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.¹¹² The court released Mayfield the next day to be detained at home; the FBI withdrew its identification on May 24, and the case against Mayfield was dismissed.¹¹³

OIG ultimately found multiple sources for the FBI lab’s error.¹¹⁴ One source of error concerned facts specific to the case—such as the similarity between the identified prints and Mayfield’s religious background.¹¹⁵ Another source concerned general problems with the fingerprint identification process—including its reliance on extremely tiny details, inadequate explanations for differences, failure to assess the poor quality of the similarities, and failure to reexamine the fingerprints after the Spanish National Police investigation returned a negative result.¹¹⁶ While the Mayfield case may seem like an outlier, it remains true that serious errors in supposedly reliable and accurate methodology nearly perpetrated a miscarriage of justice. Brandon Mayfield’s case is a high-profile example of a systemic problem that likely *increases* in frequency when the case is

¹⁰⁵ *See id.*

¹⁰⁶ *See id.* at 2.

¹⁰⁷ *See id.*

¹⁰⁸ *See id.*

¹⁰⁹ *See id.* at 3.

¹¹⁰ *See id.*

¹¹¹ *See id.*

¹¹² *See id.*

¹¹³ *See id.*

¹¹⁴ *See id.* at 6.

¹¹⁵ *See id.* at 6–7, 12 (noting that Mayfield’s religion “likely contributed to the examiners’ failure to sufficiently reconsider the identification after legitimate questions about it were raised”).

¹¹⁶ *See id.* at 8–10.

merely average, neither implicating national security nor requiring multiple reviews of the evidence. Perhaps what makes Mayfield's case the exception is not that forensic science got it wrong but that investigators figured out the errors before the man was convicted. Still, 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 meritless lead.

Even beyond the Mayfield blemish, additional work is beginning to demonstrate that fingerprint analysis has been undermined by its own methodology.¹¹⁷ The NAS Report cites Lyn and Ralph Haber's paper in which they conclude: "We have reviewed the available scientific evidence of the validity of the ACE-V method [of latent fingerprint identification] and found none."¹¹⁸ The development of the ACE-V method¹¹⁹ itself has a curious chronology. It was conveniently adopted after the Supreme Court's decision in *Kumho Tire Co. v. Carmichael*, which refused to distinguish technical testimony (including fingerprint identification) from scientific evidence, making technical testimony subject to the rigors of *Daubert*.¹²⁰ 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.¹²¹

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 indicate. Despite 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

¹¹⁷ For a critique of fingerprint analysis technique, see generally Epstein, *supra* note 102.

¹¹⁸ NAS REPORT, *supra* note 1, at 143 (quoting Lyn Haber & Ralph Norman Haber, *Scientific Validation of Fingerprint Evidence Under Daubert*, 7 L. PROBABILITY & RISK 87, 105 (2008)).

¹¹⁹ One technique used to examine fingerprints is referred to as the "ACE-V" method (Analysis, Comparison, Evaluation, and Verification). At the analysis stage, the examiner inspects the fingerprint at issue and determines if it is suitable for analysis. The comparison stage requires the examiner to visually compare the prints side-by-side under a magnifier. The evaluation consists of the examiner determining whether certain friction ridges agree between the two prints. Finally, the verification stage is meant to require a second examiner independently to conduct the same examination, but often this only amounts to a second examiner reviewing the determination of a "match," rather than conducting an independent investigation. See NAS REPORT, *supra* note 1, at 137–39.

¹²⁰ 526 U.S. 137, 147–49 (1999).

¹²¹ See Epstein, *supra* note 102, at 621; Lawson, *supra* note 103, at 15–16, 33–34.

conclusions about the relative similarity between two prints.¹²² 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 10% of the time.¹²³

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 and it is not 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, pressured by an investigator to find a match between samples, or 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.¹²⁴

The contextual stimuli that permeate forensic science may be subtle or flagrant, but they are omnipresent. Mayfield’s erroneous identification 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.”¹²⁵ Couple the bias component with the possibility for false positives, and 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 encompass errors ranging from mere negligence to outright malfeasance and occur in labs all over the country. Accusations involve evidence tampering,¹²⁶ perjury,¹²⁷ and withholding evidence.¹²⁸ Such charges are often linked to a

¹²² See Jennifer L. Mnookin, *The Validity of Latent Fingerprint Identification: Confessions of a Fingerprinting Moderate*, 7 L. PROBABILITY & RISK 127, 131 (2008).

¹²³ See Bradford T. Ulery et al., *Repeatability and Reproducibility of Decisions by Latent Fingerprint Examiners*, 7 PLoS ONE 1, 6 (2012).

¹²⁴ See Kassin et al., *supra* note 42, at 43.

¹²⁵ *Id.*

¹²⁶ See, e.g., Denise Lavoie, *Ex-state Chemist Pleads Not Guilty*, BOSTON GLOBE, Jan. 31, 2013, at B2.

¹²⁷ See, e.g., Madeleine Baran, *Ramsey County Medical Examiner Michael McGee Under Investigation*, MINN. PUB. RADIO (Sept. 6, 2011), <http://goo.gl/5G5E17>.

¹²⁸ See, e.g., Paul C. Giannelli, *The North Carolina Crime Lab Scandal*, A.B.A. CRIM. JUST. MAG., Spring 2012, at 43, *available at* <http://goo.gl/yL6IEb>.

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. 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.¹²⁹ The crime lab accreditation process—which implies reviews, testing, and audits—is, at best, voluntary and, at worst, a charitable endowment. Many states do not require their crime labs to be accredited.¹³⁰ Those labs that do seek accreditation do so through the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB), the primary certifying body for crime labs. In 1996, Peter Neufeld—cofounder 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.”¹³¹

The NAS Report noted the lack of standards for lab management and administration.¹³² Specifically, it observed:

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.¹³³

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.”¹³⁴ Indeed, by its own terms, ASCLD/LAB does not conduct

¹²⁹ See Justin Peters, *The Unsettling, Underregulated World of Crime Labs*, SLATE (Jan. 14, 2013, 3:46 PM), <http://goo.gl/YZwUSX>.

¹³⁰ See *id.*

¹³¹ Becky Beaupre & Peter Eisler, *Crime Lab Crisis: Evidence Backlog Imperils Justice*, USA TODAY, Aug. 20, 1996, at 1A.

¹³² See NAS REPORT, *supra* note 1, at 6.

¹³³ *Id.*

¹³⁴ See Memorandum from Marvin E. Schechter on ASCLD/LAB and Forensic Lab. Accreditation to Members of the N.Y. State Comm’n of Forensic Sci. 23 (Mar. 25, 2011) [hereinafter Memorandum], available at <http://goo.gl/kXZGgs>.

random inspections of crime labs.¹³⁵ Labs always get notice of a visit, and the lab itself selects the case files for review.¹³⁶

Reminiscent of the mortgage industry's countercyclical diversification strategy (which produced the housing bubble), 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."¹³⁷ In other words, when times are bad for a crime lab, ASCLD still reaps benefits from member labs. Crime lab accreditation 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 into a full-blown crime lab scandal? As with any scandal that brings down an organization, it usually includes repetitive misconduct, a failure to respond, and a culture of tolerance of such activity.¹³⁸ The situations that push an incident from the "problem" column to the "scandal" column are varied and diverse. Examiners may lie about test results,¹³⁹ produce misleading data regarding the reliability of their methods,¹⁴⁰ or conceal exculpatory evidence.¹⁴¹ Other cases may involve "dry-labbing," where analysts record data for tests that they never conducted.¹⁴² Protocols may be ignored, forensic scientists may exaggerate their credentials or expertise, or tests may be tampered with.

Whatever the particular problem, it cannot be denied that between 2005 and 2011, authorities identified fifty significant failures at American crime labs.¹⁴³ These types of problems have led to scandals across the

¹³⁵ See Justin Peters, *Crime Labs Botch Tests All the Time. Who's Supposed to Make Sure They Don't Screw Up?*, SLATE (Jan. 17, 2013, 6:08 PM), <http://goo.gl/Z0WRlX> ("Laboratory inspections are always on notice to a laboratory rather than by surprise . . .").

¹³⁶ See *id.*

¹³⁷ See Memorandum, *supra* note 134, at 23.

¹³⁸ See Clarke, *supra* note 2 ("[F]orensic 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.").

¹³⁹ See *id.*; see also Denise Lavoie & Erika Niedowski, *Annie Dookhan, Chemist in Drug Lab Scandal, May Face More Charges*, HUFFINGTON POST (Sept. 29, 2012, 3:05 AM), <http://goo.gl/qqoyCd> (describing the case of 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 master's degree in chemistry from the University of Massachusetts).

¹⁴⁰ See Clarke, *supra* note 2.

¹⁴¹ See *id.*

¹⁴² See *Disturbing Trend of Dry Labbing May Be More Common than Originally Thought*, SENATORS FIRM BLOG (Jan. 12, 2012, 2:35 PM), <http://goo.gl/nYDqYC>.

¹⁴³ See Peters, *supra* note 135 (citation omitted).

nation, resulting in full or partial closures, reorganizations, investigations, or firings at city or county crime labs.¹⁴⁴

To highlight some recent examples of flawed testing, for example, Detroit in 2008 shut down its crime lab when an audit revealed errors in 10% of cases.¹⁴⁵ In 2010, an audit revealed that technicians in a North Carolina lab provided false or misleading results in 190 murder or similarly serious cases.¹⁴⁶ 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 review of 9,000 cases.¹⁴⁷ Authorities were aware of issues with the crime lab as far back as 2008.¹⁴⁸

In some cases, analysts have stolen evidence for personal use.¹⁴⁹ San Francisco crime lab technician Deborah Madden admitted to taking cocaine from evidence.¹⁵⁰ Police arrested Massachusetts chemist Sonja Farak on similar charges related to both cocaine and heroin earlier in 2013.¹⁵¹ The need for standard protocol and oversight in state-run crime labs has never been more apparent.

Other analysts tamper with evidence, effectively committing fraud, to attain professional recognition.¹⁵² Chemist Annie Dookhan (also in

¹⁴⁴ For a list of crime lab scandals, see Mnookin et al., *supra* note 54, at 728 n.5. From 2005 to 2011, there were at least fifty serious failures at U.S. crime labs, with more than half attributable to ASCLD/LAB-certified labs. See Memorandum, *supra* note 134, at 14. Since 2011, crime lab failures continue to mount. See Mark Hansen, *Crime Labs Under the Microscope After a String of Shoddy, Suspect and Fraudulent Results*, A.B.A. J. (Sept. 1, 2013, 5:20 AM), available at <http://goo.gl/BSno1q>.

¹⁴⁵ See *Error-Prone Detroit Crime Lab Shut Down*, USA TODAY (Sept. 25, 2008, 10:34 PM), <http://goo.gl/Ku3Pb2>. 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 [W]hen there are failures of this magnitude, there is a complete betrayal of trust. We feel betrayed, as prosecutors." *Id.*

¹⁴⁶ See John Rudolf, *Scandal-Plagued North Carolina Crime Lab Sued by Exonerated Man*, HUFFINGTON POST (June 30, 2011, 11:03 AM), <http://goo.gl/7fFo13>.

¹⁴⁷ See *New York County Crime Lab Closed Down in Probe*, REUTERS (Feb. 18, 2011, 5:16 PM), <http://goo.gl/TkCScp>.

¹⁴⁸ See STATE OF N.Y. OFFICE OF INSPECTOR GEN., INVESTIGATION INTO THE NASSAU COUNTY POLICE DEPARTMENT FORENSIC EVIDENCE BUREAU 105 (2011), available at <http://goo.gl/HRoKBv>.

¹⁴⁹ See, e.g., *Second Mistrial Declared in SF Crime Lab Scandal*, ABC 7 NEWS (Jan. 31, 2013), <http://goo.gl/GYLIGE>.

¹⁵⁰ See *id.*

¹⁵¹ See Elizabeth Roman, *Chemist Charged; Crime Lab Closed*, THE REPUBLICAN, Jan. 21, 2013, at A1.

¹⁵² See Sally Jacobs, *Chasing Renown on a Path Paved with Lies*, BOSTON GLOBE, Feb. 3, 2013, at A1.

Massachusetts) was responsible for the lab's quality control.¹⁵³ Authorities discovered that she manipulated evidence to obtain false positives.¹⁵⁴ Dookhan was renowned for her "preternatural speed."¹⁵⁵ 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.¹⁵⁶ Her supersonic speed, however, was anything but the result of superior skill. Dookhan admitted that she cut corners and rarely respected lab protocol.¹⁵⁷ One of Dookhan's supervisors noted that she "did not seem to use a microscope, which is necessary to confirm that a substance is cocaine."¹⁵⁸ Dookhan further 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.¹⁵⁹ Her misconduct implicated over 30,000 defendants¹⁶⁰ and as many as 200 cases, which federal officials now must review.¹⁶¹

Ohio toxicologist James Ferguson lied about his credentials on the witness stand hundreds of times.¹⁶² Ferguson claimed to have received his college degree sixteen years prior to his actual graduation date.¹⁶³ Ferguson discounted the magnitude of the deception in light of his twenty-plus-years' experience.¹⁶⁴ One cannot help but wonder what else Ferguson has lied about, given his willingness to perjure himself over something he characterized as minor. If he lied about evidence, Ferguson would not be alone in committing perjury to bolster prosecutors' cases. Michael Hansen

¹⁵³ See Denise Lavoie, *Lawyers Expect Appeals in Mass. Crime Lab Case*, BOSTON.COM (Sept. 13, 2012), <http://goo.gl/wmEAyV>.

¹⁵⁴ See Lavoie, *supra* note 126.

¹⁵⁵ See Peters, *supra* note 129.

¹⁵⁶ See Lavoie & Niedowski, *supra* note 139.

¹⁵⁷ See Matt Murphy, *Chemist at Center of Drug Lab Case Told Police She "Messed Up Bad,"* EAGLE TRIB. (Sept. 27, 2012), <http://goo.gl/SbjcvD>.

¹⁵⁸ Justin Peters, *No National Crime Lab Standards*, THE REPUBLICAN (Jan. 20, 2013, 6:05 PM), <http://goo.gl/MleA5w>.

¹⁵⁹ See Lavoie & Niedowski, *supra* note 139.

¹⁶⁰ See Peters, *supra* note 158.

¹⁶¹ Milton J. Valencia et al., *Scope of Lab Scandal Widens*, BOSTON GLOBE, Oct. 13, 2012, at B1.

¹⁶² See *Former Toxicologist Sentenced for Lying About Credentials*, 10TV.COM (May 18, 2010, 11:07 AM), <http://goo.gl/Kwm1UI>. Dookhan also lied about her credentials at various stages of her career. See Jacobs, *supra* note 152. Dookhan at one point claimed to have a master's degree and said she was working toward a doctoral degree from Harvard—neither of which was true. See *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.*

¹⁶³ See *Former Toxicologist Sentenced for Lying About Credentials*, *supra* note 162.

¹⁶⁴ See *id.*

served six years for the murder of his daughter before a judge found that the medical examiner, Dr. Michael McGee, testified falsely in Hansen's trial.¹⁶⁵ The prosecution ultimately dropped the charges.¹⁶⁶

In addition to problems spawning from overt misconduct in crime labs, their close connection to law enforcement 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.¹⁶⁷ In situations where an initial sample tested positive as blood, the lab would withhold any subsequent negative tests—even where the later tests were more specific.¹⁶⁸ According to an FBI report, the “North Carolina crime lab workers omitted, overstated or falsely reported blood evidence over a 16-year period.”¹⁶⁹

The harms caused by errant crime labs are often compounded by their lack of transparency, and some are outright attributable to hiding evidence.¹⁷⁰ Labs often can be more concerned with reputation than with rectifying wrongs (which requires informing defendants of the error(s)). These troubling issues exact enormous costs. When scandals do come to light, the criminal justice system must reexamine huge numbers of past convictions.¹⁷¹ Annie Dookhan, for example, was directly involved with at least one hundred cases in one federal district court alone.¹⁷² As many as 500 or more cases in which she was involved may eventually have to be reviewed.¹⁷³ Ultimately, once state court cases and cases invoking the mandatory minimum sentencing requirements based on state convictions

¹⁶⁵ See Baran, *supra* note 127.

¹⁶⁶ See Madeleine Baran, *Court Drops Charges Against Man Awaiting Retrial for Daughter's Murder*, MINN. PUB. RADIO (Sept. 16, 2011), <http://goo.gl/yOOZhZ>.

¹⁶⁷ See Giannelli, *supra* note 128. 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 e-mails between the disgraced chemist and state prosecutors revealed that Dookhan saw her role as anything but a neutral scientist. See Andrea Estes & Scott Allen, *Chemist Built Up Ties to Prosecutors*, BOSTON GLOBE, Dec. 21, 2012, at A1 (“Dookhan . . . viewed herself as part of the prosecution team, the e-mails show. She coached assistant district 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 e-mails with Dookhan. See *id.*

¹⁶⁸ See Giannelli, *supra* note 128.

¹⁶⁹ Jessica Hopper, *Feds: North Carolina Crime Lab Buried Blood Evidence*, ABC NEWS (July 18, 2010), <http://goo.gl/ejqesP>.

¹⁷⁰ See *id.*

¹⁷¹ See, e.g., *Massachusetts Forensics Chief Tells Legislators Crime Lab Scandals Contributed to Two-year Backlog*, THE REPUBLICAN (Feb. 20, 2013, 2:03 PM), <http://goo.gl/9cfSn3>.

¹⁷² See Valencia, *supra* note 161.

¹⁷³ See *id.*

are considered, the toll for review is estimated to reach approximately 34,000 cases.¹⁷⁴ In the cases that had been reviewed as of January 2013, courts overturned 1,141 convictions where Dookhan handled evidence.¹⁷⁵ The scandal was expected to cost the state more than \$40 million.¹⁷⁶ Of that, the Massachusetts judiciary reportedly requested about \$13.6 million to deal with the scandal.¹⁷⁷ These figures likely exclude the expenses for the public defenders needed in many of these cases.¹⁷⁸

At a time when the federal and state 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. But no matter their gravity, the problems that plague crime labs also exact substantial nonmonetary costs. Not only are internal investigations still required to ferret out tainted samples,¹⁷⁹ but more importantly, the integrity of the criminal justice system is eroded. These scandals undermine society's faith in a fair and just system. And, of course, the human cost of forensic errors is greatest of all. There is no way to quantify the pain suffered by innocent people incarcerated for crimes they did not commit. It is also well worth remembering that in crimes where there is a victim, every innocent person wrongfully convicted means a guilty person is allowed to go free.

While these are but a few in a laundry list of crime lab errors, collectively, they underscore the need for greater oversight and increased accountability. The continued failure to address these problems exacts too high a toll.

¹⁷⁴ See Jacobs, *supra* note 152. Some estimates run as high as 34,000 tainted cases. See Valencia, *supra* note 161. As of February 2013, nearly 300 offenders had been released. See Jacobs, *supra* note 152.

¹⁷⁵ See Peters, *supra* note 129.

¹⁷⁶ See John R. Ellement, *Costs Climb in State Drug Lab Scandal*, BOSTON GLOBE, Oct. 26, 2012, at A1.

¹⁷⁷ See *id.*

¹⁷⁸ See *id.* (detailing only that expenses would be used to hire retired judges, assistant clerk magistrates, case specialists, law clerks, probation officers, and associate probation officers).

¹⁷⁹ Cf. Roman, *supra* note 151.

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

“Insanity is doing the same thing over and over again, but expecting different results.”¹⁸⁰

In the aftermath of the NAS Report and the rise in reporting of crime lab errors (whether it is a true increase versus an uptick in reporting is subject to debate), it seems that U.S. forensic reform is in its infancy stages. While the NAS Report proposed a federal reshaping of 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 legislation targeted labs rather than forensic science as an industry. The year 2012, however, saw a shift in legislation proposing research, 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 Commission on Law Enforcement and the Administration of Justice found that many police labs lacked both equipment and expertise.¹⁸¹ During the Nixon Administration, a 1973 commission echoed many of these same concerns.¹⁸² 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.¹⁸³ Identifying weaknesses, however, does little to actually effectuate change in the absence of funds to accomplish those improvements. This lack of funding is a continuous theme in the chronology of forensic reform legislation.

In the 1970s and 1980s, the answer to performance issues seemed to be a differential diagnosis of treating symptoms rather than causes by the provision of “grants” to fund “assessments.”¹⁸⁴ Such an ad-hoc approach essentially threw some cash at various problems to incentivize and compel improvements. Of course, that rarely works, and the early attempts at reform were just that—attempts.

¹⁸⁰ RITA MAE BROWN, *SUDDEN DEATH* 68 (1983) (reciting a quote often misattributed to Albert Einstein, Benjamin Franklin, or Mark Twain).

¹⁸¹ See Kenneth E. Melson, *Embracing the Path Forward: The Journey to Justice Continues*, 36 *NEW ENG. J. ON CRIM. & CIV. CONFINEMENT* 197, 199 (2010).

¹⁸² See *id.*

¹⁸³ See *id.*

¹⁸⁴ See *id.*

B. THE CASH COW: FUNDING LINKED TO DNA TESTING

Despite the evidence of widespread performance lapses among crime labs, Congress largely remained silent on the issue until the use of DNA in criminal investigations gained prominence.¹⁸⁵ Competing views over DNA evidence admissibility led to a 1992 report by the National Academy of Sciences.¹⁸⁶ A 1996 follow-up report revealed that DNA tests were both scientifically valid and reliable.¹⁸⁷ The follow-up report, in concert with the standards for admissibility established by *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,¹⁸⁸ resulted in a rise in the use of DNA in criminal trials—and a corresponding uptick in regulating legislation.¹⁸⁹

After the follow-up report, 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.”¹⁹⁰ The summit resulted in a report outlining persistent deficiencies in most public crime labs.¹⁹¹ The report called for greater standardization, increased research, and quality controls in labs.¹⁹²

The report notwithstanding, DNA continued to become the so-called gold standard in law enforcement and this new reverence—bordering on obsession—meant the vast majority of federal funding allocated to crime labs was tied to DNA research.¹⁹³ For example, Congress in 2000 enacted the DNA Analysis Backlog Elimination Act of 2000¹⁹⁴ and the Paul Coverdell National Forensic Sciences Improvement Act of 2000,¹⁹⁵ both

¹⁸⁵ Although little federal legislation was introduced in this area, Senator Abraham Ribicoff did present a joint resolution designating Wednesday, February 21, 1973, as a day of honor celebrating the twenty-fifth anniversary of the American Academy of Forensic Sciences. 93 CONG. REC. 425 (1973).

¹⁸⁶ COMM. ON DNA TECH. IN FORENSIC SCI., NAT’L RESEARCH COUNCIL, DNA TECHNOLOGY IN FORENSIC SCIENCE (1992); see also Paul C. Giannelli, *Daubert and Forensic Science: The Pitfalls of Law Enforcement Control of Scientific Research*, 2011 U. ILL. L. REV. 53, 58; Melson, *supra* note 181, at 202.

¹⁸⁷ COMM. ON DNA FORENSIC SCI.: AN UPDATE, NAT’L RESEARCH COUNCIL, THE EVALUATION OF FORENSIC DNA EVIDENCE (1996); see also Melson, *supra* note 181, at 202.

¹⁸⁸ 509 U.S. 579 (1993).

¹⁸⁹ See Giannelli, *supra* note 186, at 58–59; Melson, *supra* note 181, at 202–03.

¹⁹⁰ See Melson, *supra* note 181, at 199.

¹⁹¹ See *id.* at 199–200.

¹⁹² See *id.*

¹⁹³ See Giannelli, *supra* note 186, at 58; Melson, *supra* note 181, at 203.

¹⁹⁴ Pub. L. No. 106-546, 114 Stat. 2726 (2000) (codified at 10 U.S.C. § 1565 (2012) and in scattered sections of 42 U.S.C.).

¹⁹⁵ Pub. L. No. 106-561, 114 Stat. 2787 (2000) (codified in scattered sections of 10 U.S.C. and 42 U.S.C.). Both Acts were first introduced in 1999. See DNA Backlog Elimination Act, H.R. 3087, 106th Cong. (1999); National Forensic Sciences Improvement Act of 1999, S. 1196, 106th Cong. (1999).

meant to improve the quality of forensic science services.¹⁹⁶ The funding mechanisms for DNA testing far outstripped any other allotments, despite the fact that DNA testing represents a mere fraction of crime lab work.¹⁹⁷ Moreover, this preference for DNA-related spending did nothing to address the persistent issues within crime labs.

The sad state of forensic labs again gained national attention a few years later when President George W. Bush spearheaded the formation of a forensic science commission.¹⁹⁸ Two mechanisms created in 2004 were supposed to carry out the President's mandate.¹⁹⁹ The Consolidated Appropriations Act obligated NIJ to provide Congress with a report on the forensic science and medical examiner communities' needs beyond DNA initiatives.²⁰⁰ That same year, the DNA Sexual Assault Justice Act of 2004 (part of the Justice For All Act) tasked the Attorney General with creating a national forensic science Commission, which would identify resource needs beyond DNA, in addition to making recommendations, disseminating best practices, and researching privacy issues around using DNA samples.²⁰¹ Although the bill passed, the commission was never funded.²⁰²

The situation again appeared hopeful with the passage of the Science, State, Justice, Commerce, and Related Agencies Appropriations Act of 2006, which authorized NAS to create a forensic science committee and issue a report with findings and recommendations to improve the state of forensic science.²⁰³ Among the findings previously mentioned, the NAS Report noted "great disparities among existing forensic science operations in federal, state, and local law enforcement jurisdictions and agencies."²⁰⁴ The differences pertained to funding, access to analytical instrumentation, the availability of skilled and well-trained personnel, certification, accreditation, and oversight.²⁰⁵ In the chronology of forensic reform, the NAS Report did much to gain national attention to an issue first acknowledged—but not much improved—since the Johnson Administration.²⁰⁶

¹⁹⁶ See Melson, *supra* note 181, at 201–02.

¹⁹⁷ See *id.* at 203.

¹⁹⁸ See *id.* at 200.

¹⁹⁹ See *id.* at 200–01.

²⁰⁰ See *id.*

²⁰¹ See *id.* at 201; see also 42 U.S.C. § 14136c(b)(1)–(9) (2006).

²⁰² See Melson, *supra* note 181, at 201–02.

²⁰³ See NAS REPORT, *supra* note 1; see also Science, State, Justice, Commerce, and Related Agencies Appropriations Act of 2006, Pub. L. No. 109-108, 119 Stat. 2290 (2005).

²⁰⁴ See NAS REPORT, *supra* note 1, at 5.

²⁰⁵ See *id.* at 6.

²⁰⁶ See Melson, *supra* note 181, at 204–05.

C. FORENSIC REFORM 3.0: A GRAVEYARD OF GOOD IDEAS

If the NAS Report's release can be viewed as a watershed moment, then the legislation it spawned might be viewed as the third iteration of proposed 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 2009.²⁰⁷ Despite the national attention garnered by the NAS findings, the bill never made it out of committee. President Barack Obama responded by chartering a subcommittee on forensic science.²⁰⁸ That subcommittee's role was to make recommendations to achieve the goals the NAS Report outlined.²⁰⁹ But DNA testing remained the focus of most legislation and received the lion's share of funding through the 111th Congress.²¹⁰

Two years later, Senator Patrick Leahy introduced the Criminal Justice and Forensic Science Reform Act of 2011.²¹¹ The bill, which also died in committee,²¹² would have established an Office of Forensic Science within DOJ.²¹³ In 2012 and again in 2013, Representative Eddie Bernice introduced legislation to "establish scientific standards and protocols across forensic disciplines."²¹⁴ The Forensic Science and Standards Act of 2013 (Standards Act)—and its 2012 predecessor²¹⁵—intends to create "a national

²⁰⁷ H.R. 898, 111th Cong. (1st Sess. 2009). A previous version was introduced in 2007. H.R. 3151, 110th Cong. (1st Sess. 2007).

²⁰⁸ COMM. ON SCI., NAT'L SCI. & TECH. COUNCIL, CHARTER OF THE SUBCOMMITTEE ON FORENSIC SCIENCES ([hereinafter CHARTER OF THE SUBCOMMITTEE ON FORENSIC SCIENCE], available at <http://goo.gl/VYNFqf>; see also Paul C. Giannelli, *The 2009 NAS Forensic Science Report: A Literature Review 2* (Case W. Reserve Univ. Sch. of Law, Working Paper No. 2012-11, 2012), available at <http://goo.gl/s1r4sY>.

²⁰⁹ See CHARTER OF THE SUBCOMMITTEE ON FORENSIC SCIENCE, *supra* note 208, at 1–2. The charter for the subcommittee was renewed in March 2012. See COMM. ON SCI., NAT'L SCI. & TECH. COUNCIL, CHARTER OF THE SUBCOMMITTEE ON FORENSIC SCIENCES, available at <http://goo.gl/8sulyA>.

²¹⁰ Aside from the COPS Improvement Act of 2009, H.R. 1139, 111th Cong. (2009), which also died in committee, see *H.R. 1139 (111th): COPS Improvements Act of 2009*, GOVTRACK, <http://goo.gl/kysjEM> (last visited Apr. 14, 2014), the majority of legislation pertaining to forensics centered on DNA. See, e.g., Sexual Assault Forensic Evidence Registry (SAFER) Act of 2010, H.R. 6085, 111th Cong. (2010) (stating an intention to amend the DNA Analysis Backlog Elimination Act of 2000 and establish a forensic evidence registry for sexual assault).

²¹¹ S. 132, 112th Cong. (2011).

²¹² See *S. 132 (112th): Criminal Justice and Forensic Science Reform Act of 2011*, GOVTRACK, <http://goo.gl/olr4GE> (last visited Apr. 14, 2014).

²¹³ See S. 132 § 101(a).

²¹⁴ See Forensic Science and Standards Act of 2013, H.R. 3064, 113th Cong. (2013); Forensic Science and Standards Act of 2012, H.R. 6106, 112th Cong. (2012).

²¹⁵ In 2012, Senator John D. "Jay" Rockefeller IV and Representative Eddie Bernice introduced companion legislation in the House and the Senate. See S. 3378, 112th Cong.

forensic science research program to improve, expand, and coordinate Federal research in the forensic sciences.”²¹⁶ In addition, the Standards Act would establish both a national forensic science coordinating office at the National Institute of Standards and Technology (NIST) and a forensic science advisory committee.²¹⁷ Unlike in Senator Leahy’s bill, which would place the forensic science office within DOJ, both the NIST director and the Attorney General would create the advisory committee, which, in turn, would advise DOJ and NIST.²¹⁸

Notwithstanding the failed 2012 Standards Act, the resurrected Standards Act is notable for its trailblazing approach to tackling forensic reform in a manner that prior legislation had not. The Act aims to fix forensic science by encouraging research, adopting standards, and creating accreditation requirements. The legislation, however, suffers from its corpulent proportions, despite its ambitious objectives. Aside from the historical failure rate of forensic reforms, the legislation is problematic because it would effectively birth a Lernaean Hydra with a multitude of agencies, committees, and other entities that border on redundancy and grandiosity. It would create a chaotic assemblage of organizations by establishing new entities under the auspices of the existing National Science Foundation (NSF) and NIST.

The NAS Report observed that a lack of quality, peer-reviewed forensic science research stymies advancements in the field. To address this deficit, the Standards Act would create a research program, which would direct research efforts in the forensic sciences from a variety of federal groups.²¹⁹ In addition to the research program, NIST would house a coordinating office, the purpose of which would be to produce a “unified Federal research strategy” that identifies and prioritizes research goals consistent with the NAS Report and to develop a roadmap to achieve them.²²⁰ Specifically, the roadmap is intended to establish the criteria that the coordinating office would use to assess research progress. The

(2012). Senator Rockefeller again introduced the bill before the 113th Congress on Feb. 12, 2014. The bill, S. 2022, was reported out of committee on April 9, 2014. *See S. 2022: Forensic Science and Standards Act of 2014*, GOVTRACK, <http://goo.gl/esJ7EK> (last visited Apr. 14, 2014).

²¹⁶ H.R. 3064 § 4(a).

²¹⁷ *See id.* §§ 4, 8. The prognosis for the bill’s success appeared bleak; a legislation tracking website reported that the House bill had a 1% chance of being enacted. *See H.R. 3064: Forensic Science and Standards Act of 2013*, GOVTRACK, <http://goo.gl/0973CJ> (last visited Apr. 14, 2014). The Senate bill had a 28% of being enacted. *See S. 2022: Forensic Science and Standards Act of 2014*, *supra* note 215.

²¹⁸ *See* H.R. 3064 § 8(b), (d).

²¹⁹ *See id.* § 4(a).

²²⁰ *See id.* § 4(c)(2).

coordinating office also would have oversight responsibility for the research program and would submit reports to Congress to identify and make recommendations regarding areas of forensic science that would benefit from further research.

The Standards Act also would provide NSF with a research grant program at an operating budget of \$34 million for fiscal year 2014, increasing by \$3 million each year until 2018.²²¹ On top of the tremendous budget allocation, the most ambitious aspect of the Standards Act would be the creation of one or more new forensic science research centers under the auspices of the NSF.²²² The Standards Act would establish the research center for four specific purposes: (1) to develop a plan to unify forensic research across federal agencies; (2) to “build relationships between forensic science practitioners and members of the research community”; (3) to promote education of individuals with the aim of creating leaders in the forensic sciences; and (4) to disseminate their work.²²³

Collecting a few more federal entities to add to the convention-like atmosphere, the Standards Act provides for additional forensic roles within the confines of the NIST. Responding to the NAS Report’s concerns about disparate forensic science results, the Standards Act requires NIST to develop “forensic science standards to enhance the validity and reliability of forensic science activities.”²²⁴ Such activities encompass uniform measurements and criteria both for the methods and tools forensic scientists use.²²⁵ Further, the Standards Act would saddle NIST with standardizing the terminology forensic scientists use in their reports, providing for interoperability of forensic science databases, testing and validating existing standards, and independently validating “forensic science measurements and methods.”²²⁶

To add to the confusion, the Standards Act would establish an advisory committee under the supervision of NIST, the NSF, and the Attorney General to counsel federal departments, agencies, and offices. The committee would consist of an interdisciplinary array of scientists and lawyers. To achieve these ends, the NIST director would be given free rein to establish working groups to “identify gaps, areas of need, and opportunities for standards development.”²²⁷ The Standards Act would

²²¹ *See id.* § 5.

²²² *See id.* § 5(c)(1).

²²³ *See id.*

²²⁴ *Id.* § 7(a)(1)(B).

²²⁵ *See id.*

²²⁶ *See id.* § 7(a)(1)(B), (C).

²²⁷ *See id.* § 7(b)(1).

allocate NIST a budget of \$5 million for 2014, \$12 million for 2015, \$20 million for 2016, \$27 million for 2017, and \$35 million for 2018.²²⁸

The final piece to this forensic puzzle concerns the Attorney General's role. The Standards Act would provide the Attorney General with lackluster enforcement powers. While the Act requires the Attorney General to enforce forensic standards developed under the Act at the federal level, the Attorney General is relegated in nonfederal labs to "encouraging" and "promoting" powers that (in a better translation) merely suggest that nonfederal labs adopt the standards and promote certification and accreditation criteria.²²⁹ Since the Standards Act effectively holds the cash hostage at the federal level, all other labs would have little incentive to implement any new standards or accreditation measures. Simply put, the Act lacks any "buy in" for the little (i.e., nonfederal) guys.

On the one hand, the Standards Act's broad agenda would accomplish several things. It identifies the need for research, showcases the utility of research centers, and underscores the basic requirement of standards. Unfortunately, similar earlier versions of the bill died in committee, so this iteration may become another obituary in the history of forensic reform, likely doomed by a lack of political capital and a steep price tag. Consequently, the Act may very well be 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 of 2012, Senator Leahy indicated his commitment to forensic reform in an early 2013 speech.²³⁰ This afterthought, at the very least, dovetailed into a development where, pursuant to the Federal Advisory Committee Act, DOJ announced that it would partner with NIST to create a National Commission on Forensic Science.²³¹ The role that commission will play in the ongoing debate on forensic reform remains unclear.

III. TOO BIG TO FAIL: OBSTACLES TO FEDERAL FORENSIC OVERSIGHT

Against the backdrop of failed forensic legislation, a myriad of forensic standards remain across the multitude of forensic science disciplines.²³² The NAS Report concluded that these problems could "only

²²⁸ See *id.* § 7(c).

²²⁹ See *id.* § 9(1), (2); S. 3378, 112th Cong. § 9(1)(B) (2012).

²³⁰ Senator Patrick Leahy, The Agenda of the Senate Judiciary Committee for the 113th Congress, Address at Georgetown University Law Center (Jan. 16, 2013), available at <http://goo.gl/j1UsTR>.

²³¹ Notice of Establishment of the National Commission on Forensic Science and Solicitation of Applications for Commission Membership, 78 Fed. Reg. 12355 (Feb. 22, 2013).

²³² See 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.").

be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country.”²³³ After the Report’s release, other scholars and forensic science experts called for a national entity or entities to provide national forensic science standards,²³⁴ but consensus on how to best accomplish this has remained an uncatchable shadow. Indeed, many forensic science practitioners disagreed with a federal entity running the show.²³⁵ Consequently, the Standards Act highlights the problem of too many ideas floating about to translate into one workable system.

Even assuming a slight consensus that a federal entity should (or could) promulgate national forensic standards,²³⁶ 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 Part offers attempts to answer both. 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 enforce the standards it promulgates. Second, I submit that even with judicial support and the express authority to cram federal legislation down the state pipeline, resistance would be stiff, and the requisite buy-in from crime labs and forensic organizations is lacking.

A. FEDERAL POWER TO MANDATE STANDARDS

Congress could attempt to mandate federal standards on its own. Under *Gonzales v. Raich*, Congress has the power to regulate even noneconomic goods if it does so as part of a commercial regulatory scheme.²³⁷ This could give Congress some latitude to regulate parts of the

²³³ See *id.* at xx.

²³⁴ See Gabel & Champion, *supra* note 29, at 26–27 (arguing that a federal agency should be created to regulate forensic services nationwide now, before states establish their own schemes); Melson, *supra* note 181, at 207 (arguing in favor of a national forensic science agency to reside within DOJ); see also Donovan & Ungvarsky, *supra* note 18, at 27 (“[T]he NAS Report has created a window of opportunity for defense counsel to demand meaningful reform on all fronts . . .”).

²³⁵ See, e.g., Ryan M. Goldstein, Note, *Improving Forensic Science Through State Oversight*, 90 TEX. L. REV. 225, 234 (2011) (arguing that stronger state-level oversight would help with current problems in forensic sciences).

²³⁶ Several national forensic science organizations already exist in different disciplines, including the American Academy of Forensic Sciences (AAFS), the American Society of Crime Laboratory Directors (ASCLD), the International Association for Identification (IAI), and the National Association of Medical Examiners (NAME). See STATUS AND NEEDS, *supra* note 41, at 2. 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.

²³⁷ See 545 U.S. 1, 23 (2005).

forensic science community. For example, Congress might choose to regulate instruments used in forensic science analysis, because it would have a rational basis for regulating their creation and use. But the power to regulate commerce would have its limits,²³⁸ especially related to research. One of the most critical needs in the forensic science community is for research into standards and protocols.²³⁹ Congress could perhaps fund its own research into these areas (as it suggests in Forensic Science Standards Act), but mandating the direction of university-level research likely would be beyond the scope of Congress's power, even if it were politically feasible.

Congress is also limited either politically or constitutionally in what it can do to mandate what state and local courts admit as evidence.²⁴⁰ Even if Congress could significantly affect the landscape of the forensic science community through mandates, much of its effect would diminish if state and local courts did not adopt the same standards.

B. FEDERAL ENFORCEMENT CREATES NATIONAL STANDARDS

Enforcing national standards in federal courts is a direct method of encouraging their adoption in the states. To make this happen, a federal forensic science agency first could consider the current Federal Rules of Evidence (FRE) and advise Congress on changes needed for properly implementing national standards in federal courts. Next, mandating these modifications as forensic evidence standards in federal courts would provide for significant, positive changes. 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 litigating. Further, many of the federal-level changes would positively impact standards at state and local levels, because some state and local agencies rely on the same labs as federal law enforcement agencies.²⁴¹ Thus, changing standards in the shared labs would benefit agencies at all levels. Finally, federally mandating crime lab

²³⁸ I make no guarantees regarding the ultimate constitutionality of such regulations. That debate is better saved for a far-off day when the passage of such legislation appears realistic.

²³⁹ See NAS REPORT, *supra* note 1, at 15.

²⁴⁰ 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").

²⁴¹ See, e.g., *Crime Laboratory*, NEBRASKA.GOV, <http://goo.gl/awzdMy> (last visited Apr. 14, 2014) ("The Division . . . serves all local, county, state, federal and military law enforcement agencies in Nebraska."); *Rhode Island State Crime Laboratory*, UNIV. R.I., <http://goo.gl/5AVYHN> (last visited Apr. 14, 2014) ("The RISCL has defined its customer base as all appropriate agencies investigating evidence relating to federal, state or local crimes.").

technician certifications as part of this process would result in an increased demand for colleges and universities to offer courses for 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 evidentiary standards in federal courts would only be the first positive step in achieving national forensic standards. Perhaps some states would adopt the FRE changes, but not all states base their rules of evidence on the FRE;²⁴² thus the changes may not receive universal, or even significant, adoption. Moreover, states' lack of resources would also slow adoption. As it is, local and state forensic science services are underfunded and backlogged.²⁴³ Many labs have neither the time nor the funds to transition to a uniform, FRE-guided system. Finally, implementing national evidence standards would also create political resistance in many states, especially under current economic conditions.

Without an ability to truly mandate the same changes at the state and local level, imposing new forensic evidence standards would only get part of the way toward a truly national system of forensic science. Moreover, adopting and applying standards and practices rooted in federal origins takes time.²⁴⁴ This FRE 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 standards is another, less direct method to create effective national forensic standards. Congress employed this method before to coerce states to adopt a drinking age of twenty-one. Passed in 1984, the National Minimum Drinking Age Act

²⁴² 6 JACK B. WEINSTEIN & MARGARET A. BERGER, WEINSTEIN'S FEDERAL EVIDENCE T-1 (Joseph M. McLaughlin ed., Matthew Bender 2d ed. 2013) ("Forty-two states . . . have adopted rules of evidence patterned on the Federal Rules of Evidence.").

²⁴³ Jackson Holtz, *Backlog Swells at Washington State Crime Lab*, SEATTLETIMES.COM (Jan. 17, 2010, 8:39 PM), <http://goo.gl/ka3xCc> ("On average, it takes state experts more than six months to complete ballistics tests in cases involving firearms."); Melissa Maynard, *Collection of DNA Evidence Grows, As Does Need for Federal Funding*, WASH. POST, Mar. 19, 2012, at A13 (noting that "major backlogs persist"). *But see Maryland v. King*, 133 S. Ct. 1958, 1977 (2013) (asserting that technological advances are substantially reducing delays in processing DNA from arrestees).

²⁴⁴ By way of example, Georgia changed its rules of evidence in May 2011 to reflect the federal rules. H.B. 24, 2011–2012 Leg., Reg. Sess. (Ga. 2011). The new rules did not go into effect until January 1, 2013.

provided that any state that lowered its drinking age below twenty-one lost 10% of its federal highway funding.²⁴⁵

South Dakota challenged the National Minimum Drinking Age Act's constitutionality in *South Dakota v. Dole*.²⁴⁶ 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";²⁴⁷ (2) Congress must make its conditions on federal funds unambiguous; (3) any condition might be illegitimate if it does not relate "to the federal interest in particular national projects or programs"; and (4) other constitutional provisions might create independent bars to Congress's conditional grants.²⁴⁸ Thus, any attempt to coerce states to adopt national forensic standards must fall within these restrictions.²⁴⁹

Utilizing federal spending power to create national forensic standards would likely pass constitutional muster. First, a national forensic standards program would be in pursuit of the general welfare. National forensic standards would help place factually guilty criminals in jail sooner, providing for safer communities. Relatedly, wrongful convictions would decrease, resulting in fewer resources wasted litigating and fewer innocent citizens behind bars. 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 into the legislation the conditions for federal funding. Further, the third restriction—ensuring that the condition relates to the particular federal interest—would also be easily met. In *Dole*, the condition placed on federal highway funds was that states keep the legal drinking age at or above twenty-one, and the Court found that this requirement directly related to safe interstate travel, the main purpose of highway funding.²⁵⁰ Here, the condition would be to follow 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 program would likely violate other constitutional provisions. Thus, satisfying all four restrictions, a program that tied federal funds to state participation would be a constitutionally viable option to encourage states to adopt national forensic standards.

²⁴⁵ 23 U.S.C. § 158 (2012).

²⁴⁶ *South Dakota v. Dole*, 483 U.S. 203, 203 (1987).

²⁴⁷ *Id.* at 207 (internal quotation marks omitted).

²⁴⁸ *Id.* at 207–08 (quoting *Massachusetts v. United States*, 435 U.S. 444, 461 (1978) (plurality opinion)).

²⁴⁹ Each portion of a national forensic standards program could theoretically be challenged, but the analysis here covers only a national forensic standards program as a whole.

²⁵⁰ *Dole*, 483 U.S. at 208.

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

Because tying federal funding to national forensic standards might be constitutionally permissible does not mean that it is the best or easiest method for encouraging their adoption. There are also practical challenges, such as getting states to act and securing a source of funding. Examining similar programs already in place can provide guidance.

a. Adoption

The strength of a national forensic standards program would come from it being truly national, which would (eventually) require every state to adopt the standards. To this end, federal funding can be a powerful motivator. For example, after the National Minimum Drinking Age Act tied only 5% of a state's federal highway funds to the drinking age requirement, all fifty states complied with the condition.²⁵¹ Perhaps this quick compliance 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 granting this assumption, there is little evidence of strong moral resistance among the states to the idea of national forensic standards.

Greater resistance to a federal funding program might come from states that will not benefit from it. It is unlikely that federal funding could cover every state's forensic science expenditures, especially when the initial costs to raise a state's forensic standards to a proposed federal level are great. Thus, some states will lack resources to effectively implement national forensic requirements, even with federal funding.

To close the gap between current state forensic science standards and the standards a national program would require, multiple methods of fund distributions 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 disparities between their current standards and those that would be required under a federal system. Assuming adoption could be achieved through funding, discovering a means to pay for that funding could still present a problem.

²⁵¹ KATHLEEN M. SULLIVAN & GERALD GUNTHER, CONSTITUTIONAL LAW 166 (17th ed. 2010).

b. Source of Funds

In light of the current economic conditions and approaches to federal spending,²⁵² finding significant sources of funds to support a national forensic standards program would be challenging. Arguments for such a program should include both any cost savings and any economic stimulus such a program would create.

As discussed, national standards would address the current forensic systems' inefficiencies. Erroneous criminal convictions cost the country both in terms of what wrongly convicted defendants could otherwise provide for society and the damage criminals who escape conviction can cause. Moreover, the myriad of inconsistent forensic standards across the country prevents labs, investigators, prosecutors, and defense attorneys from seeking out more efficient and effective methods for resolving frequently litigated forensic issues. Consistent national standards would streamline forensic processes.

A national forensic standards program would also provide economic stimulus. Research funding would advance our universities and research institutions. A clear (and nationally consistent) career path for forensic scientists would draw more students to STEM subjects and to the forensic science field. Focusing the nation's forensic science standards on common goals might also create new industries and allow the United States to become a leader in others.

c. Previous Attempts

In addition to considering the potential funding and adoption problems, a survey of previous attempts to develop a national set of forensic standards can provide guidance for a new endeavor. As previously mentioned, Congress has already tied federal funds to some forensic science initiatives. From 2000 to 2004, Congress created and expanded the aforementioned Paul Coverdell National Forensic Sciences Act.²⁵³ 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."²⁵⁴ In 2009 and 2010, roughly \$23 million and \$33

²⁵² President Obama's budget mentions making "tough choices to cut spending" and needing to "put our Nation's finances in order." OFFICE OF MGMT. & BUDGET, FISCAL YEAR 2014 BUDGET OF THE UNITED STATES GOVERNMENT 5, 41 (2013).

²⁵³ See Justice for All Act of 2004, Pub. L. No. 108-405, 118 Stat. 2260 (2004); 21st Century Department of Justice Appropriations Authorization Act, Pub. L. No. 107-273, 116 Stat. 1758 (2002); Paul Coverdell National Forensic Sciences Improvement Act of 2000, Pub. L. No. 106-561, 114 Stat. 2787 (2000).

²⁵⁴ *Coverdell Forensic Science Improvement Grants Program*, NAT'L INST. OF JUSTICE, <http://goo.gl/3HvVo4> (last visited Apr. 14, 2014).

million were given out in Coverdell grants, respectively, but that amount fell to less than \$11 million in 2012.²⁵⁵

The Coverdell grant program has faced two problems that any national forensics standards program would need to overcome. The first is its total funding level, which would need to be significantly higher than the Coverdell program's \$33 million high point to initiate and ultimately maintain a national forensic standards program. The second problem is the Coverdell system's administration. An Innocence Project report found enough significant problems with the program's administration to call into question whether it even ensured that the law's most basic requirements were being followed.²⁵⁶ Again, history does not bode well for establishing a federal forensic agency that has authority over nonfederal forensic stakeholders.

D. THE BUY-IN: RESISTANCE TO REFORM

Assuming that a more tempered, fiscally palatable, and constitutional approach to a federal forensic agency is possible, the problem of "buy-in" still has not been overcome. Stakeholders across all levels of the forensic process would need to commit to reform. Given that the forensic process—from crime to conviction—requires coordination and communication across the complexity of the criminal justice system, it functions much like a nervous system. And just as a nervous system is vulnerable to malfunction in multiple ways, so too is the forensic process. Consequently, absent choreographed interplay of all the individuals in the forensic nervous system, forensic reform (let alone establishing 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 circuit.

Immediately after the NAS Report's release, several specialty forensic organizations promulgated rapid-fire statements condemning the report, the representative groups of the NAS committee, and the methodology that led to their long list of recommendations. Rather than responding with reason and authority, the organizations resorted to defensive rhetoric. In an obvious attempt at damage control, the organizations demonstrated that any attempt to overhaul forensic science would be met with swift and strong

²⁵⁵ See *Coverdell Forensic Science Improvement Grants Program: Applications and Awards*, NAT'L INST. OF JUSTICE (Apr. 2, 2013), <http://goo.gl/1ioivS> (reporting \$23.4 million in 2009; \$33.3 million in 2010; \$27.6 million in 2011; and \$10.6 million in 2012).

²⁵⁶ See INNOCENCE PROJECT, INVESTIGATING FORENSIC PROBLEMS IN THE UNITED STATES: HOW THE FEDERAL GOVERNMENT CAN STRENGTHEN OVERSIGHT THROUGH THE COVERDELL GRANT PROGRAM 3 (2009), available at <http://goo.gl/O5vXNd>.

resistance.²⁵⁷ Indeed, if these groups possessed the lobbying prowess of, for example, the National Rifle Association, they probably would have been able to get legislation moving in the opposite direction and perhaps would have sought to declare forensic reform unconstitutional.

As already noted, the NAS Report singled out fingerprinting and firearms analysis, among a host of others. With regard to fingerprinting's 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 Report found that the process "does not guarantee that two analysts following it will obtain the same results."²⁵⁸ In response, the International Association of Identification (IAI) issued a statement, noting 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 from whom they originated."²⁵⁹

To a lesser degree, this sentiment was echoed by the Association of Firearm and Toolmark Examiners (AFTE). The AFTE agreed 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."²⁶⁰ These examples are but two in a larger pool of responses focused on maintaining the status quo,²⁶¹ and they reveal reluctance, resistance, or even resentment towards 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. While perhaps falling short of love letters, they acknowledge at least an interest in performing research to establish statistical measures for the evidence. In fact, the IAI's Standardization II Committee more recently recommended that the organization:

²⁵⁷ OFFICE OF WIS. STATE PUB. DEFENDER, 2011 ANNUAL CRIMINAL DEFENSE CONFERENCE, A PATH FORWARD: WHERE ARE WE NOW? 1–2 (2011) [hereinafter A PATH FORWARD], available at <http://goo.gl/Uvzslb>.

²⁵⁸ See NAS REPORT, *supra* note 1, at 142.

²⁵⁹ Letter from Robert J. Garrett, President, Int'l Ass'n for Identification (Feb. 19, 2009), available at <http://goo.gl/1Nw6Ws>.

²⁶⁰ See Response of AFTE to the NAS Report (June 22, 2009), reprinted in A PATH FORWARD, *supra* note 257, at 2.

²⁶¹ *The ASCLD/LAB Board Reacts to the NAS Study*, ASCLD/LAB NEWSLETTER (Am. Soc. of Crime Lab. Dirs., Lab. Accreditation Bd., Garner, N.C.), Mar. 26, 2009, at 3, available at <http://goo.gl/d3VV2A>.

create 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.²⁶²

The Committee also recommended that the IAI support the “pursuit of a single internationally accepted examination methodology and standard for conclusions.”²⁶³ Of course, one committee rarely speaks for the body as a whole, so while there is some acquiescence to forensic reform, it is also clear that centralized, unilateral reform may disenfranchise the very groups that are needed to effectuate that change. But, as the following Part demonstrates, there are other ways to accomplish a paradigm shift in forensic science.

IV. ORGANIC CHEMISTRY: REFORMING FORENSIC SCIENCE FROM ITS BASE

Given the political stalemate that likely will persist, we need to shift the dynamic of forensic analysis from static observation to active experimentation. This transition 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 crime labs to take accountability and ownership of their shortcomings. Together, this would facilitate the implementation of science-based practices and policies and would change the fundamental relationship between research and practice, which often exist on opposite sides of a deep chasm.

While creating a single, central entity to accomplish such cooperation would be optimal, it also is an elusive (and perhaps imaginary) ambition at this point. Accepting the practical obstacles for what they are and starting at the bottom “on the frontline” of forensic science by creating research partnerships is a more realistic and workable model. Research partnerships would accomplish what a federal entity perhaps could not: marrying underlying theories of forensic science with its application and practice. These partnerships—whether with universities or research nonprofits—would facilitate the simultaneous, informed development of forensic science standards and frameworks in collaboration with crime labs where actual casework is performed. By comparison, divorcing research from the

²⁶² JOSEPH POLSKI ET AL., THE REPORT OF THE INTERNATIONAL ASSOCIATION FOR IDENTIFICATION, STANDARDIZATION II COMMITTEE 35–36 (2010), *available at* <http://goo.gl/g3Ls8x>.

²⁶³ *Id.* at 36.

practice of forensic science would have a chilling effect, because it would become suspect to the very entities that it would be thrust upon—the forensic labs. Thus, making crime labs part of the solution instead of telling them that they are the problem would go a long way toward reforming forensic science. Part IV.A first explains how research partnerships could advance areas requiring necessary improvements, including by promoting research and by developing standards for methodology and terminology. Part IV.B then discusses secondary benefits that could be attained.

A. APPRECIATING THE BIG PICTURE: NONNEGOTIABLES

Until recently, most practice-driven studies of forensic techniques were based on very simplistic methodologies and focused on implementation rather than design.²⁶⁴ These studies often failed to address key issues around technique repeatability or, equally crucial, fallibility. After assessing whether the methodology worked, forensic labs then diffused techniques more widely within their agencies and across agencies, without adequately researching the real effects. Some inroads into the process have been accomplished, but it could hardly be called a trend toward transparency. Rather, the framework for testing forensic techniques has traditionally been more of a symbolic activity than a real scientific activity. By developing a transparent interpretational architecture, we may reconstruct the forensic science technique process and understand why issues, such as reproducibility, are not present in each and every case.

Given the increase in requests for forensic analysis in everything from murder cases to low-level property crimes, it is becoming progressively more expensive for crime labs to carry out the necessary work. But without scientific bases to legitimize the value and reliability of their analyses, it is likely that forensic evidence will continue to not only be vulnerable but also untrustworthy. When crime labs see little value in university-level research, there will also be few serious scientists who are interested in or know about forensic sciences.

As compared to other public services, such as health and education, forensic science receives little research funding outside of that provided for DNA technology, meaning (Hollywood glamour aside) that young scientists are unlikely to see forensics as an area of study with promise.²⁶⁵ This is a

²⁶⁴ See NAS REPORT, *supra* note 1, at 8 (outlining the need for more extensive and scientific research in most disciplines of forensic science).

²⁶⁵ As previously mentioned, nearly the entire NIJ budget has reflected such developments, with DNA testing reaping the most federal investment in research that NIJ has carried forward. See *supra* Part II.B. The same could be said for the U.K. government, which invested heavily in a DNA expansion program from 1999 to 2007. See ROBIN

vicious cycle: the lack of priority accorded to forensic science translates into limited investment and rewards (i.e., grant funding) and, 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 to date, and though much more is known today than even just a decade ago, what is most striking is that we know little about what makes forensic practices effective—what works, in what contexts, and at what cost.

In a system that habitually pairs crime labs with law enforcement agencies, it makes no sense to have budgets that fail to allocate for forensic science research and development. 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. The following Section identifies the need for research before delving into means of accomplishing that research through partnerships.

1. *The Need for Research: From Butchers to Bakers*

The NAS Report characterized the current research situation in forensic science as a “serious problem.”²⁶⁶ The Report noted that although some research has been conducted in some disciplines, “the simple reality is that the interpretation of forensic evidence is not always based on scientific studies to determine its validity.”²⁶⁷ Many forensic evidence disciplines lack significant peer-reviewed research of the scientific bases for and validity of the forensic methods.²⁶⁸ Fingerprint identification is one such discipline where “sufficient data on the diagnosticity and reliability . . . do not exist.”²⁶⁹

Unfortunately, not much has changed since the Report revealed this dearth of research. As Paul Giannelli notes, the very government agencies tasked with researching forensic sciences have manipulated their craft in the areas of DNA profiling, fingerprint analysis, and bullet lead analysis.²⁷⁰

WILLIAMS & PAUL JOHNSON, GENETIC POLICING: THE USE OF DNA IN CRIMINAL INVESTIGATIONS 115–16 (2008).

²⁶⁶ NAS REPORT, *supra* note 1, at 8.

²⁶⁷ *Id.*

²⁶⁸ *See id.*

²⁶⁹ Koehler, *supra* note 52, at 1079.

²⁷⁰ *See* Giannelli, *supra* note 186, at 57.

These scholarly shortcomings, he posits, may be attributable to tight budgets and a lack of training.²⁷¹ The profound—and potentially dangerous—absence of peer-reviewed research mutes courts’ abilities to act as gatekeepers. Instead of properly keeping from the jury misleading “expert evidence,” the only mechanism by which to undo the harm caused is by cross-examining the “expert.”²⁷² Instead of being able to easily identify the shortcomings of self-proclaimed “experts” and properly exclude them from the witness stand, jurors’ misconceptions about the reliability of certain forensic analysis procedures is further strengthened by testimony from “pseudo-experts who . . . appear legitimate.”²⁷³

Research, therefore, must become an important part of forensic science’s infrastructure. Crime labs have the ability to create research partnerships with outside entities. In the same sense that the teaching hospital model combines patient care, professional training, and medical research, we must bring universities and other research partners into crime labs. New partnerships between forensic scientists and forensic science researchers can build upon the university medical center model.²⁷⁴ Fostering these relationships may ultimately prove more fruitful than the federal funding scramble. Examiner training and experiences remain valuable for the assessment of tolerance and rarity; however, examiners cannot reliably demonstrate this in a transparent manner. Furthermore, examiners’ cognitive abilities cannot outperform the computational power of computers. These tools can be utilized to provide measures of whether the features, as observed and annotated, are within expected tolerance and whether the rarity of the evidence is one that warrants a decision of “suitability” or “identification” (when all features correspond in the comparison). While these tools are not readily available (as they are currently being researched and developed), once they have been appropriately researched and validated, then those technologies may support the decisionmaking processes inherent in forensic analysis. At

²⁷¹ See Paul C. Giannelli, *Forensic Science: Why No Research?*, 38 FORDHAM URB. L.J. 503, 517 (2010). Justice Antonin Scalia, writing for the majority in *Melendez-Diaz v. Massachusetts*, observed how unsatisfactory training makes its way from the crime lab to the witness stand. 557 U.S. 305, 318 (2009). He noted that forensic science is not perfect but that some of its shortfalls could be remedied through cross-examination. See *id.* Justice Scalia noted that, for example, an analyst with insufficient training could be confronted on the stand. See *id.* at 320. He did not take note of the fact that a jury would not likely be persuaded to discredit that expert’s testimony when such insufficient training is the norm.

²⁷² See Simon A. Cole, *Where the Rubber Meets the Road: Thinking About Expert Evidence as Expert Testimony*, 52 VILL. L. REV. 803, 805 (2007).

²⁷³ *Id.* at 807.

²⁷⁴ See Mnookin et al., *supra* note 54, at 767–68.

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—such as 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. Unlike institutions dedicated to the hard sciences, crime labs do not, on the whole, encourage their scientific staff to publish in scientific journals on criminalistics. Instead, publication is generally discouraged, because it might negatively affect the lab or the law enforcement agency to which it is linked.²⁷⁵

Science, in this sense, is not a part of many crime labs—whether large or small. As a result, the scientific quality of forensic analysis is often relatively low. Crime labs do not have the resources to develop research while also managing caseloads, tight budgets, and backlogs. In addition, many of the issues with forensic science research stem from crime labs' 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.²⁷⁶ 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.²⁷⁷ 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. Memorandums of understanding, a bit of politicking, and some compromises would be needed all the way around. Starting small and incrementally tempering the partnership through collaboration would be a step in the right direction. Thus, the research partnerships might choose to focus their efforts on more specific and narrow subject matter with directed research, establishing forensic frameworks, or standardizing terminology and reporting.

²⁷⁵ See generally James R. Acker & Catherine L. Bonventre, *Protecting the Innocent in New York: Moving Beyond Changing Only Their Names*, 73 ALB. L. REV. 1245 (2010) (addressing the general failure of crime labs to compile data and report methodology for analysis by research scholars charting lab errors).

²⁷⁶ See Giannelli, *supra* note 186, at 56–57.

²⁷⁷ See *id.* at 56 (quoting NAS REPORT, *supra* note 1, at 18).

3. Directed Research Efforts

One of the most pressing needs in nearly every forensic science discipline is more research.²⁷⁸ Outside DNA analysis, very little research has been carried out. But more consensus in other disciplines is needed regarding the merits of the science, the protocols that should be used, and the standards and terminology that should be adopted.²⁷⁹ Both areas of forensic practice—lab-based disciplines and disciplines based on the subjective observations of experts—likely would require different research approaches.

Lab-based disciplines necessitate traditional, peer-reviewed research, which is common in other disciplines outside of forensic sciences.²⁸⁰ Educational institutions often perform such research. Thus, a research partnership intent on advancing forensic *science* in the lab-based disciplines will need to encourage (which typically means fund) research at the university level. To promote this research, crime labs and universities would need to establish strong ties.²⁸¹ For example, issues regarding transparency could be addressed by clearly documenting and defining observations and interpretations based on the evidence. Other issues, primarily related to assessing the weight or strength of evidence (e.g., “suitability,” “tolerance,” and “rarity”) will require considerable support from both the practitioner and research communities to determine the most appropriate course of action.

Disciplines that involve subjective review of expert observations particularly suffer from a lack of a research culture.²⁸² Judges, for example, are prone to inferring “scientific validity from the fact of longstanding use.”²⁸³ Given the fact that these methods are often accepted in the courtroom at first blush, developing a research culture for the more subjective forensic disciplines will not only require traditional, peer-reviewed research at the university level but also a focus on the scientists’

²⁷⁸ As Judge Harry T. Edwards, cochair of the NAS Report committee and a judge on the U.S. Court of Appeals for the D.C. Circuit, stated, “[T]he 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, 9 (2010).

²⁷⁹ 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.”).

²⁸⁰ *Id.* at 8.

²⁸¹ See *id.* at 16 (“Governance . . . must be well connected with the Nation’s scientific research base to effect meaningful advances in forensic science practices.”).

²⁸² See Mnookin et al., *supra* note 54, at 744.

²⁸³ *Id.* at 747.

role in evidence analysis.²⁸⁴ 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 scientist biases in this process and how the scientist's role as a possibly partial observer can be limited.²⁸⁵ Some scholars suggest moving away from the "eyeballing" method altogether by ensuring that an emphasis on empirical data drives the reform of these fields.²⁸⁶

4. *Adopting 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 the quality and relevance of the programs.²⁸⁷ Moreover, without first establishing a cohesive relationship between forensic research and forensic practice, the system will continue to produce preventable errors, employ outdated procedures and methodologies, and struggle with internal disputes as to where the line between acceptable and unacceptable procedures is to be drawn. As a result, until standards are established, there can be no consistent method for granting crime lab accreditation.²⁸⁸

The forensic sciences should look to the medical community and university research hospitals as a model. By way of example, consider a cancer researcher working side-by-side with an oncologist. The oncologist practices medicine and the researcher documents, analyzes, and works on ways to improve treatments. The research is then shared across hospitals and universities and published in medical journals. The entire medical community then advances by better understanding the disease and, accordingly, adjusting the standards for treatment.

A similar partnership would be a perfect fit for forensic science and would meet key benchmarks for setting research standards under the Standards Act. First, it would establish standards for measurements, analysis, and interpretation.²⁸⁹ This standardization would ensure that labs are uniform in their determination of what results mean. Second, it creates

²⁸⁴ See 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.").

²⁸⁵ See *id.*

²⁸⁶ See generally Mnookin et al., *supra* note 54.

²⁸⁷ See *id.* at 237.

²⁸⁸ See *id.* at 25 ("Standards should reflect best practices and serve as accreditation tools for laboratories and as guides for the education, training, and certification of professionals.").

²⁸⁹ See Forensic Science and Standards Act of 2013, H.R. 3064, 113th Cong. § 7(a)(1)(B)(i) (2013).

standardization in the products and services forensic scientists supply to the criminal justice system.²⁹⁰ 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.²⁹¹ By addressing those disparities, the forensic science community would have a clear foundation—one recognized at the macro level—for establishing standards for crime lab accreditation. Finally, the resulting standards would accomplish the same objectives in the forensic science community that standards have accomplished in the medical community: quality assurance, ethics policing, reducing errors, and inspiring faith from the community it serves.

I should underscore that researching and developing standards cannot occur overnight. Relationships between crime labs and universities would take time to establish, and agreeing on a specific research agenda is no easy task. There would be setbacks, frustrations, and unforeseen issues that develop. Moreover, research, standards and empirical studies for specific forensic sciences would not be a one-size-fits-all fix to forensic sciences generally. The frameworks of each individual discipline require different methodologies and, indeed, different approaches to conducting research. The NAS Report's indictment created an "us vs. them" mentality that still lingers. But the notion that "we're in this together" is what forensic science needs. Understanding the limitations and longevity of the research partnerships is critical to their success.

5. Standardizing Terminology and Reporting

Forensic sciences have very few, if any, national standards for terminology and reporting.²⁹² Terminology plays a significant role in many court settings. A jury can hear that two samples are a "match," are "consistent with," are "identical," are a "likely" match, or are of many other kinds of relation to each other, and the jury can take all these relations to mean the same thing, even when they do not.²⁹³ Worse, without a standard language for reporting results, the meanings of the relationship titles can

²⁹⁰ See *id.* § 7(a)(1)(B)(ii).

²⁹¹ The NAS Report notes that underfunded crime labs are in dire need of up-to-date equipment. See NAS REPORT, *supra* note 1, at 6, 59. Such inconsistencies in funding necessarily lead to inconsistencies in results. Further, insufficient equipment maintenance is also a common problem facing labs. See *id.* at 59–60. Even the FBI lab, which holds itself out as using "cutting-edge science," reported a need for additional equipment. See *id.* at 66; *Using Cutting-Edge Science to Solve Cases and Prevent Acts of Crime and Terror*, FED. BUREAU OF INVESTIGATION, <http://goo.gl/U79DOF> (last visited Apr. 14, 2014).

²⁹² See NAS Report, *supra* note 1, at 21.

²⁹³ See *id.*

vary from scientist to scientist, depending on what standards, if any, the scientist operates under. A “negative” fingerprint analysis, for example, could mean that it was “excluded,” “inconclusive,” “unable to locate,” or a poor sample, depending on the agency or individual conducting the analysis²⁹⁴—all of which are likely indistinguishable to the average layperson juror.

Reporting standards also differ between labs.²⁹⁵ While some reports include detailed accounts of the tests and protocols performed, others contain barely more than the scientist’s brief conclusory statements regarding the test results (which, as stated, could have many different meanings).²⁹⁶ Further, reports can differ widely, including what, if any, error rates they list and whether and to what extent the reports list the tests performed and protocols followed.²⁹⁷ The decision to provide a court with a conclusory report, as opposed to a detailed report, falls to the lawyer and her client. To ensure transparency in different scientists’ comparison of evidence, they should clearly define what they observe and interpret it as “consistent” or “in disagreement.” They should also document and be able to explain re-analyses of what they originally observe and, if they have reviewed other evidence in the cases, acknowledge the potential impact of their biases. Without documenting changes in subsequent analyses, additional analyses misplace what the examiners originally observed and interpreted versus what they might now believe after comparing it with the record.

A forensic research partnership could pioneer standardized terminology and reports. Such standardization would allow juries to hear consistent, reliable, and clear testimony with respect to forensic evidence. It would also prevent forensic witnesses from obfuscating results through exaggerated reporting methods. As a baseline, the International Organization for Standardization has already promulgated some international guidelines for general competence requirements to carry out certain tests or calibrations, which include standards for data reporting.²⁹⁸ While adopting these international guidelines throughout the United States would not necessarily solve all terminology and reporting issues, it would, at the very least, provide some reference points for uniform vocabulary and reporting protocols.

²⁹⁴ See *id.* at 141.

²⁹⁵ See *id.* at 21 (“Some forensic science laboratory reports meet [a high] standard of reporting, but many do not.”).

²⁹⁶ See *id.*

²⁹⁷ Cf. *id.*

²⁹⁸ *Id.* at 21, 113–14.

B. DRILLING DOWN ON THE DETAILS: LONGER-TERM GOALS

While the primary efforts of research partnerships—such as directed research and standardizing terminology—are broad, big picture accomplishments, there are other (I hesitate to say “secondary”) significantly needed benefits that would take some time to realize.

1. *Certifying Practitioners and Labs*

The lack of certification programs for both practitioners and labs engenders inconsistencies. Currently, lab accreditation is only required in a handful of states,²⁹⁹ and judges and juries are often unfamiliar with the certification processes used by different organizations. In Texas, for example, forensic labs must meet statutory accreditation requirements for forensic evidence to be admissible.³⁰⁰ Still, a roof leak in a Houston DNA lab went unchecked for years, contaminating evidence maintained in a storage facility and rendering it unusable.³⁰¹

The absence of required certifications for practitioners is problematic as well. Very few states have any sort of mandatory accreditation or accountability programs for their scientists.³⁰² ASCLD/LAB offers accreditation that aligns with the international guidelines described above,³⁰³ but in most jurisdictions accreditation is not mandatory.³⁰⁴ According to ASCLD/LAB, the United States has 383 crime labs accredited in its program.³⁰⁵ Even in disciplines where some organizations do offer certifications, many extremely experienced practitioners choose not to even

²⁹⁹ Although accreditation is not mandatory, “[o]ther states with various types of forensic [oversight] boards include: Arizona, Minnesota, Missouri, Montana, New Mexico, New York, Rhode Island and Washington.” TEX. FORENSIC SCI. COMM’N, JUSTICE THROUGH SCIENCE (2011), available at <http://goo.gl/2y9v0L>; see also Paul C. Giannelli, *Wrongful Convictions and Forensic Science: The Need to Regulate Crime Labs*, 86 N.C. L. REV. 163, 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.” (citations omitted)).

³⁰⁰ See TEX. CODE CRIM. PROC. ANN. art. 38.35 (West Supp. 2013). Labs are not, however, required to be accredited to admit into evidence latent print examinations and various other forms of forensic analysis. *Id.* art. 38.35(a)(4).

³⁰¹ See Giannelli, *supra* note 299, at 190–91 (citation omitted).

³⁰² See NAS REPORT, *supra* note 1, at 6.

³⁰³ *Quality Policy*, AM. SOC’Y OF CRIME LAB. DIRS./LAB. ACCREDITATION BD., <http://goo.gl/WUFaIE> (last visited Apr. 14, 2014).

³⁰⁴ See NAS REPORT, *supra* note 1, at 199–200.

³⁰⁵ As of November 21, 2013, out of the 402 accredited labs, 194 are state labs, 132 are local agency labs, 31 are federal labs, 19 are international labs, and 26 are private labs. *Accredited Laboratory Index*, AM. SOC’Y OF CRIME LAB. DIRS. / LAB. ACCREDITATION BD., <http://goo.gl/tyeZXX> (last visited Apr. 14, 2014).

pursue the certifications.³⁰⁶ 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 results in practitioners with disparate proficiencies. In 1978, the Law Enforcement Assistance Administration (LEAA) sponsored a lab proficiency testing program, and more than 200 crime labs throughout the country participated.³⁰⁷ The program showed a wide range of proficiency levels.³⁰⁸ Labs operating at lower proficiency levels failed most often in interpreting test results because of careless error, lack of experience, utilizing improper methodology, standard contamination or mislabeling, and inadequate databases or standard spectra.³⁰⁹ Another entity that conducted further testing from 1978 to 1991 found similar results.³¹⁰ Despite these glaring errors dating back to 1978, there has been no comprehensive reform.³¹¹

A national forensic science standards entity could provide for certifications for both labs and practitioners. Providing one national certification program would ensure baseline standards for all labs and enhance predictability in courtrooms. Further, the entity could create certification systems for specific forensic science disciplines. Such certification requirements could provide for a base level of education, experience, and expertise, making the voir dire stage of tendering a witness as an expert much simpler and the results much more reliable. Requiring certain educational steps before one is able to practice in the forensic sciences would encourage universities to create forensic science courses. This increased demand would also help encourage forensic science research and promote education programs to broadly disseminate results.³¹²

³⁰⁶ See, e.g., Diane L. France, *Forensic Anthropology: A Brief Review*, CENGAGE LEARNING, <http://goo.gl/KUB5s3> (last Apr. 14, 2014) (“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.”).

³⁰⁷ See Giannelli, *supra* note 299, at 213.

³⁰⁸ See *id.* at 213–14 (“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.” (citation omitted)); *id.* at 214 (noting that “[a] wide range of proficiency levels among the nation’s laboratories exists, with several evidence types posing serious difficulties for the laboratories” (internal quotation marks and citation omitted)).

³⁰⁹ See *id.* at 214.

³¹⁰ See *id.* at 215.

³¹¹ See *id.* at 214.

³¹² See Forensic Science and Standards Act of 2012, H.R. 6106, 112th Cong. § 5(d)(1)(D) (2012).

2. Codes of Ethics

Forensic scientists frequently encounter ethical issues because they may be paid by the government but offer their services in criminal trials to both the government and the defense. Practitioners also need to be able to operate in situations where there will be little, if any, oversight and where biases might be significant motivators. To address these concerns, several forensic science organizations have adopted codes of ethics,³¹³ but currently, “there are no consistent mechanisms for enforcing any of the existing codes of ethics.”³¹⁴ A federal entity 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. Coordinating 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 exclusion.³¹⁵ The probability of matching an unknown sample to a known person or thing increases with the amount of known samples available to search against. More far-reaching 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 (CODIS).³¹⁶ The FBI also manages a database, which includes fingerprints, criminal histories, mug shots, and other information associated with individuals.³¹⁷ Another example is the Bureau of Alcohol, Tobacco, Firearms, and Explosives’ database for ballistic imaging.³¹⁸

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

³¹³ See, e.g., *American Academy of Forensic Sciences Bylaws*, AM. ACAD. OF FORENSIC SCIS., <http://goo.gl/6lMgGx> (last visited Apr. 14, 2014).

³¹⁴ See NAS REPORT, *supra* note 1, at 26.

³¹⁵ See Allan Sincox & Marijane Hemza-Placek, *Challenging the Admissibility of DNA Testing*, 83 ILL. B.J. 170, 171 (1995) (outlining the steps of DNA testing typically used by police agencies, called Restriction Fragment Length Polymorphism testing).

³¹⁶ See *Laboratory Services*, FED. BUREAU OF INVESTIGATION, <http://goo.gl/XlzG6D> (last visited Apr. 14, 2014).

³¹⁷ *Integrated Automated Fingerprint Identification System*, FED. BUREAU OF INVESTIGATION, <http://goo.gl/B5nvNW> (last visited Apr. 14, 2014).

³¹⁸ *National Integrated Ballistic Information Network*, BUREAU OF ALCOHOL TOBACCO & FIREARMS, <http://goo.gl/V82d2J> (last visited Apr. 14, 2014).

the local, state, and national data.³¹⁹ One FBI report revealed that the average time it takes for the FBI to provide DNA results is approximately 150 to 600 days.³²⁰ Related to this steep turnaround time is the backlog of samples. In 2009, the United States had a backlog of 300,000 DNA samples.³²¹ And despite its wealth of data, the FBI's fingerprint database still poses problems for forensic scientists. The database's equipment vendors do not follow the same standards for importing data; law enforcement agencies and labs do not always have the resources to interact with it, and jurisdictional disagreements and differences in policies prevent agencies from sharing fingerprint data more broadly.³²²

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. This would allow a central authority to apply best practices in database management from one discipline to another.

4. Independence of Forensic Labs

Forensic labs currently maintain a cozy relationship with law enforcement and prosecution offices, both financially and geographically. In fact, a survey found that approximately 79% of 300 forensic labs studied were located within law enforcement or public safety agencies, and 57% worked exclusively with evidence submitted by law enforcement.³²³

In addition, there is a wide disparity in the resources available to defense counsel compared with prosecutors and law enforcement agencies.³²⁴ Prosecutors often have cost-free access to their local or branch crime labs.³²⁵ And while indigent defendants secured the due process right

³¹⁹ See JEREMIAH GOULKA ET AL., RAND CTR. ON QUALITY POLICING, TOWARD A COMPARISON OF DNA PROFILING AND DATABASES IN THE UNITED STATES AND ENGLAND 4 (2010).

³²⁰ See OFFICE OF THE INSPECTOR GEN., U.S. DEP'T OF JUSTICE, REVIEW OF THE FEDERAL BUREAU OF INVESTIGATION LABORATORY'S FORENSIC DNA CASE BACKLOG 6 (2010), available at <http://goo.gl/7Zk9Bk>.

³²¹ *Id.* at 2.

³²² See NAS REPORT, *supra* note 1, at 31.

³²³ Paul C. Giannelli, *Independent Crime Laboratories: The Problem of Motivational and Cognitive Bias*, 2 UTAH L. REV. 247, 250 (2010).

³²⁴ See Giannelli, *supra* note 186, at 75–76.

³²⁵ See *id.*

to expert defense witnesses in *Ake v. Oklahoma*,³²⁶ they often do not have reciprocal rights of access or the means to afford private defense experts.³²⁷

5. *Developing Education Programs*

The NAS Report criticized forensic sciences for the absence of doctoral programs in forensic science and the dearth in quality and funding of forensic science education programs generally.³²⁸ While each university will have to specifically address how forensic science fits into its curriculum, a collaborative effort with crime labs to promote Bachelor of Science degrees (as opposed to a Bachelor of Arts in Forensic Science found at some schools) will improve forensic science education. These degrees may supplant the “apprenticeship” system found in some forensic disciplines, but the training component can be fine-tuned and bolstered in the confines of a formal university program. These education programs could serve to benefit not only the practitioners themselves, but also lawyers and judges.³²⁹

V. BUILDING ON EXISTING MODELS AND FRAMEWORKS TO IMPROVE QUALITY AND COST

The NAS Report’s cardinal recommendation was the creation of a single forensic science entity to promote an “aggressive, long-term agenda to help strengthen the forensic science disciplines.”³³⁰ The NAS Report envisioned a national entity that would be responsible for overseeing research and determining standards.³³¹ This broad undertaking was immediately met with skepticism and resistance.³³² I would like to keep the NAS’s “aggressive long-term agenda[,]” but replace the goal of creating a single, national entity with that of creating a number of 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 reform has drawbacks, and the research partnership is not immune to downsides. Nonetheless, the past

³²⁶ See 470 U.S. 68, 83–84 (1985).

³²⁷ See Giannelli, *supra* note 186, at 75–76.

³²⁸ See NAS REPORT, *supra* note 1, at 223–24. Currently, there is no doctoral program specifically in forensic science. See *id.*

³²⁹ See NAS Report, *supra* note 1, at 234.

³³⁰ *Id.* at 16.

³³¹ See *id.* at 189–90.

³³² See *supra* text accompanying notes 259–63. It seems much of the backlash concerned the NAS Report’s recommendation that the national entity would be divorced from law enforcement. See, e.g., Joseph Polski, *Forensic Science: A Critical Concern for Police Chiefs*, 9 POLICE CHIEF 24–25 (2009).

five years of debate have shown that everyone has an opinion. Even though we have struggled to execute those opinions, we can look to some of the current frameworks that are attempting to embrace forensic reform for guidance.

A. INCUBATING FORENSIC SCIENCE REFORM: IDEAS AT HOME AND ABROAD

U.S. forensic science represents a patchwork quilt of standards and policies. Because thousands of jurisdictions have their own operating procedures, consistency and predictability are elusive. It seems that a logical starting point would be to consider pooling and sharing forensic resources across state and even international borders.³³³ Indeed, 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.”³³⁴ Moreover, the United Kingdom—which has been on the forefront of forensic development for decades—has made significant inroads in forensic reform by using a grassroots approach rather than a top-down legislative thrust upon reluctant labs.

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

This Part begins by outlining two U.S. examples of reform, both of which are in early stages. Next, it describes forensic reform progress in the United Kingdom and the European Union to draw lessons that can enhance a U.S. research partnership model.

³³³ See Pawel Rybicki, *Standardization in the Area of Scientific Evidence in European Union*, in *POLICING IN EUROPE*, 16 J. POLICE STUD. 91, 92–94 (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. *See id.* at 93.

³³⁴ RICHARD GILL, FORENSIC SCI. SERV., STUDY ON OBSTACLES TO COOPERATION AND INFORMATION-SHARING AMONG FORENSIC SCIENCE LABORATORIES AND OTHER RELEVANT BODIES OF DIFFERENT MEMBER STATES AND BETWEEN THESE AND COUNTERPARTS IN THIRD COUNTRIES 6 (2008), available at <http://goo.gl/t45ui6>.

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

Two U.S. labs have committed to forensic science research while also performing casework. Both labs—one a local initiative and the other a product of the Department of Defense (DoD)—solve problems the NAS Report addressed. The labs' structures and operational frameworks provide a network of oversight, maximize efficiency and analytical quality, and focus on collaboration and uniformity to establish forensic standards in both research and 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 Sciences³³⁵ (DFS) opened for business.³³⁶ The lab houses a public health lab, the medical examiner's office, and a hybrid of the police forensics lab and the new DFS crime lab.³³⁷ Eventually, the police crime-scene unit will be phased out, and the all-civilian DFS crime lab, along with the health lab, will be under DFS's jurisdiction.³³⁸

The primary motivation for creating DFS and building the crime lab was the NAS Report.³³⁹ 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 was the recent front-page news coverage highlighting forensic labs' substandard practices and the lack of effective oversight.³⁴⁰ With DFS, the District aimed to achieve independence—not only from conducting forensic analysis in borrowed space or contracting analyses with labs outside the

³³⁵ Establishment of the Department of Forensic Sciences, D.C. CODE § 5-1501.02 (2011).

³³⁶ Andrea Noble, *Forensics Laboratory Opens in D.C.*, WASH. TIMES, Oct. 2, 2012, at A15; Zoe Tillman, *D.C. Crime Lab Chief Outlines Strategy for Preventing Scandals*, BLOG OF LEGAL TIMES (Oct. 30, 2012, 12:52 PM), <http://goo.gl/zXXMfP>.

³³⁷ See Sam Pearson, *District Moves Away from Police Control of Forensic Functions*, HOMICIDE WATCH D.C. (Jan. 2, 2013 9:00 AM), <http://goo.gl/IwzMox>.

³³⁸ See *id.*; see also Tillman, *supra* note 336.

³³⁹ See Pearson, *supra* note 337; cf. Tillman, *supra* note 336; Zoe Tillman, *In Q&A, D.C. Forensic Sciences Chief Says Lab Moving Toward Accreditation*, BLOG OF LEGAL TIMES (Jan. 28, 2013, 12:40 PM), <http://goo.gl/I4eMOX>. Specifically, the District of Columbia endeavored to respond to how the Report identified crippling fragmentation as the most significant threat to forensic science quality and credibility. In particular, the District of Columbia aimed to resolve the documented lack of uniform standards, training, and accreditation, as well as effective oversight of forensic science practices. See Tillman, *supra* note 336.

³⁴⁰ See, e.g., Peters, *supra* note 129.

area,³⁴¹ but also independence from law enforcement and political pressure, as recommended by the NAS Report.³⁴² DFS hopes to accomplish this by both having its own building and phasing law enforcement personnel out of its operations.

Another goal for DFS is to encourage and maintain efficiency. Having a single department overseeing the efforts of several groups in the same physical area provides central oversight, uniform standards of operation, and a manageable system of checks and balances.³⁴³ By housing several interactive departments under one roof, DFS hopes to encourage communication and collaboration among units, thereby increasing its overall efficiency and preventing backlogs. With a single department at the administrative helm, and a common intent to promote and maintain high standards, those standards would more likely be followed, and procedural missteps would be discovered before things get out of hand.

b. The Department of Defense Forensic Enterprise Directive

DoD has also made operational quality at its forensic labs a priority. A recent DoD directive establishes policies for military forensic work and delegates responsibilities for different forensic tasks and areas among groups within DoD.³⁴⁴

The directive seeks to establish increased collaboration and communication among various DoD divisions in an effort to “develop and maintain an enduring, holistic, global forensic capability to support the full range of military operations.”³⁴⁵ The directive sets up a central committee to coordinate all forensic enterprise activities. Responsibilities for promulgating standards and monitoring implementation and practices are delegated to different groups within the DoD.³⁴⁶

³⁴¹ See Noble, *supra* note 336.

³⁴² See Pearson, *supra* note 337. DFS Director Max Houck admitted that understanding and maintaining his lab’s independence from law enforcement will be among its more difficult tasks. See Tillman, *supra* note 339. Yet, he is hopeful that its independence from both law enforcement and political pressure will allow DFS to focus more intently on grounding its results upon good science, highly trained (civilian) personnel, and continuing education for analysts. See *id.*; see also Tillman, *supra* note 336.

³⁴³ See Pearson, *supra* note 337; Tillman, *supra* note 339.

³⁴⁴ See U.S. DEP’T OF DEFENSE, DIR. No. 5205.15E, DOD FORENSIC ENTERPRISE § 1(a) (Apr. 26, 2011) [hereinafter 5205.15E].

³⁴⁵ See *id.*

³⁴⁶ See *id.* For instance, the act places certain forensic disciplines like DNA, trace, and latent prints in the hands of the Secretary of the Army, while other forensic disciplines—image and video analysis, for example—are housed under the Secretary of the Air Force. See *id.* 5205.15E § 1(d)-(e).

The goals outlined in the directive seem to mirror those DFS sought 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 collaboration among the groups. The DoD directive sets up a uniform system of standards and procedures to guide forensic activity.³⁴⁷

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 the central committee.³⁴⁸ Much like DFS, the purpose here is likely to maximize efficiency and analysis quality while minimizing error. And as with DFS, the difficulty likely will be to strike a balance between providing both local oversight and forensic practice monitoring and global oversight of the collaboration and communication among a number of interdependent groups.

2. Across the Pond: Lessons from the United Kingdom

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

a. First Steps: The Forensic Science Service

FSS was once a dominant forensic force in the United Kingdom.³⁴⁹ At one time, FSS operated a monopoly of the United Kingdom's forensic science workload.³⁵⁰ In 1991, however, FSS became an executive agency, which ran more like a business and, for the first time, charged for its services.³⁵¹ As a government-owned company, FSS sold its services to police forces and in December 2010, held 60% of the forensic science market share.³⁵² In 1995, FSS created the first DNA database.³⁵³ Each

³⁴⁷ See *id.* 5205.15E, Enclosure 3, § 1.

³⁴⁸ See *id.* 5205.15E, Enclosure 3.

³⁴⁹ See SCI. & TECH. COMM., FORENSIC SCI. SERV., HOUSE OF COMMONS, SEVENTH REPORT OF SESSION 2010–12, at 9 (2011) [hereinafter SEVENTH REPORT], available at <http://goo.gl/69IYWU>.

³⁵⁰ See *id.*

³⁵¹ See *id.* at 10.

³⁵² See *id.* at 3.

year, FSS works on more than 120,000 cases, employing over 1,000 scientists.³⁵⁴

Still, the United Kingdom is not without its stories of wrongful conviction. In 1974, a pub bombing left 21 people dead and 160 injured.³⁵⁵ On the night of the bombings, six Irishmen were arrested, and in 1975, the men were convicted based on confessions, evidence linking the men to the Irish Republican Army, and forensics suggesting the men handled explosives.³⁵⁶ 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.³⁵⁷ 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.³⁵⁸

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 support from the director of public prosecutions, who decided he would not fight for the convictions to stand.³⁵⁹ The court determined that the two issues addressed—the voluntariness of the confessions and sufficiency of forensic evidence—both signaled that the convictions were unsupportable.³⁶⁰ The forensic tests were originally held to confirm that two of the six men handled explosives; however, scientists later admitted that “a range of innocent products” could produce the same positive results.³⁶¹ This “miscarriage of justice” came to an end in 1991, when the six men were finally freed sixteen years after their convictions.³⁶² Their release proved to be a watershed moment for U.K. forensic science.

The day after the “Birmingham Six” were released, the government called for a royal commission to report on forensic science issues.³⁶³ Amidst sweeping calls for changes, there were virtually no major

³⁵³ See PARLIAMENTARY OFFICE OF SCI. & TECH., POSTNOTE: THE NATIONAL DNA DATABASE 1 (2006), available at <http://goo.gl/Kxj3SE>.

³⁵⁴ See SEVENTH REPORT, *supra* note 349, at 9.

³⁵⁵ See Kent Roach & Gary Trotter, *Miscarriages of Justice in the War Against Terror*, 109 PENN ST. L. REV. 967, 975 (2005).

³⁵⁶ See *id.*; see also Gary Edmond, *Whigs in Court: Historiographical Problems with Expert Evidence*, 14 YALE J.L. & HUMAN. 123, 145 (2002).

³⁵⁷ See Roach & Trotter, *supra* note 355, at 975–77.

³⁵⁸ See *id.*

³⁵⁹ See *id.* at 977.

³⁶⁰ See *id.*

³⁶¹ See Clare Lissaman, *Birmingham Six Release Remembered*, BBC (Mar. 14, 2011, 12:06 AM), <http://goo.gl/LZpOZt>.

³⁶² See *id.*

³⁶³ See Stewart Field & Philip A. Thomas, *Justice and Efficiency? The Royal Commission on Criminal Justice*, 21 J.L. & SOC'Y. 1, 1, 5 (1994).

recommendations in the 1993 report, aside from suggesting an advisory council to oversee the use of forensics.³⁶⁴ A few years later, FSS put its own group together to address quality standards.³⁶⁵ 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.³⁶⁶

b. Learning to Walk: The International Organization for Standardization

The International Organization for Standardization (ISO) offers an international standard for lab quality.³⁶⁷ ISO 17025 applies to testing and calibration labs, and ISO suggests that accreditation organizations use its standards to measure quality through both managerial and technical requirements.³⁶⁸ The management requirements focus on policy-oriented changes within labs to ensure quality, including policies, standards, and procedures.³⁶⁹ The technical requirements emphasize scientist competence, environmental conditions, methodology, reporting requirements, and equipment management.³⁷⁰

In an effort to increase quality, the government in 1999 focused on registering practitioners with a voluntary program for assessing forensic science competence.³⁷¹ The standards required an assessment of competence and reassessment every four years.³⁷² While the voluntary program began as a government-funded enterprise, the ultimate goal was to reach 10,000 registered practitioners and become self-financing, but by 2004, it had only 1,800 members.³⁷³ With less-than-successful enrollment, a prominent police association withdrew its support, and government

³⁶⁴ See *id.* at 2–5.

³⁶⁵ See *Written Evidence Submitted by the Forensic Science Regulator*, FORENSIC SCI. SERV. (2011), available at <http://goo.gl/CAfxjB>.

³⁶⁶ See *id.*; see also INT’L ORG. FOR STANDARDIZATION, INTERNATIONAL STANDARD ISO/IEC 17025: GENERAL REQUIREMENTS FOR THE COMPETENCE OF TESTING AND CALIBRATION LABORATORIES (2005) [hereinafter ISO 17025], available at <http://goo.gl/Oox8EW>. ISO sets forth voluntary international standards, with its ISO 17025 creating requirements for competency in testing and calibration. *Id.* at 1.

³⁶⁷ See ALAN G. ROWLEY, UNITED NATIONS INDUS. DEV. ORG., COMPLYING WITH ISO 17025: A PRACTICAL GUIDEBOOK FOR MEETING THE REQUIREMENTS OF LABORATORY ACCREDITATION SCHEMES BASED ON ISO 17025:2005 OR EQUIVALENT NATIONAL STANDARDS 1 (2009), available at <http://goo.gl/tQBRzz>.

³⁶⁸ See ISO 17025, *supra* note 366, at vi.

³⁶⁹ See *id.* at 2–3.

³⁷⁰ See *id.* at 10–23.

³⁷¹ See Brian Rankin, *Forensic Practice*, in CRIME SCENE TO COURT: THE ESSENTIALS OF FORENSIC SCIENCE 1, 18–19 (Peter White ed., 3d ed. 2010).

³⁷² See *id.*

³⁷³ See SEVENTH REPORT, *supra* note 349, at Ev 75.

funding was transferred to the National Policing Improvement Agency.³⁷⁴ Realizing that focusing on individual practitioners failed to regulate quality at the organizational level, the National Policing Improvement Agency decided to remove all aid.³⁷⁵

Over time, FSS experienced severe financial troubles, which some attributed to the large number of forensic services it provided, as opposed to private labs that provided only the most lucrative services.³⁷⁶ In an attempt to rectify the situation, FSS was granted trading fund status in 1999 to increase the organization's financial flexibility.³⁷⁷ Six years later, FSS was established as a govco, a "[g]overnment-owned, contractor-operated" organization.³⁷⁸ The government intended to create a kind of public sector–private market partnership that would provide the efficiency of the 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.³⁷⁹ After reportedly losing about two million pounds a month, the government decided to shut down FSS in favor of an entirely private market.³⁸⁰ As the organization that employed 1,600 prepared to close, the decision caused public backlash, with some accusing the government of allowing cost to determine justice.³⁸¹

c. Running Forward: Privatization and Regulation

As the private market increased its activities, and concerns that the government was favoring cost over quality endured, the government stepped in and created the forensic science regulator, a publicly funded position not directly controlled by the government.³⁸² The regulator explained what he called the "most obvious risk" in closing FSS: going from very stringent accreditation requirements to a nonaccredited environment.³⁸³ A condition required to close FSS alleviated this concern: only ISO 17025-accredited labs could receive FSS work.³⁸⁴ Additionally,

³⁷⁴ See *id.*

³⁷⁵ See *id.*

³⁷⁶ See *id.* at 13.

³⁷⁷ See *id.* at 5 (citation omitted).

³⁷⁸ *Id.* at 5, 9.

³⁷⁹ See SEVENTH REPORT, *supra* note 349, at 23 (citation omitted).

³⁸⁰ See *Forensic Science Service to Be Wound Up*, BBC (Dec. 14, 2010, 10:07 AM), <http://goo.gl/99St9M>.

³⁸¹ See *id.*

³⁸² See GOULKA ET AL., *supra* note 319, at 4–5; *Forensic Science Regulator*, GOV.UK, <http://goo.gl/iqXd1T> (last visited Apr. 14, 2014).

³⁸³ See SEVENTH REPORT, *supra* note 349, at 37 (citation omitted).

³⁸⁴ See *id.* at 35 (citation omitted).

all DNA labs reporting to the police had to comply with ISO 17025 standards, and all fingerprint labs had to comply by 2015.³⁸⁵

In March 2012, “the government closed the FSS from taking on more material”³⁸⁶ and achieved its goals of increasing both efficiency and quality through regulation and privatization.³⁸⁷ DNA profiles are reported within a few days of when the lab receives the materials.³⁸⁸ 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 for profiling purposes.³⁸⁹ Although the United Kingdom has significantly fewer cases, lower crime, and a lower population than the United States, the comparison between the two countries’ DNA systems is staggering.³⁹⁰ While it is possible the United Kingdom’s lack of backlog and quick turnaround stem from its demographic differences, the more likely answer is that the United Kingdom has succeeded at effectively managing its DNA system. Within two years of setting up its DNA database, the United Kingdom saw backlogs rise into the six-figures.³⁹¹ But, just two decades later, the United Kingdom has no backlog for its DNA analysis—a foreign concept in the United States.³⁹²

In addition to requiring accreditation to address quality issues, the United Kingdom mandated standards for processing crime scenes, transporting samples to labs, and now requires different labs to analyze samples from the accused and the victims.³⁹³ Additionally, all data is

³⁸⁵ See *id.* at 36–37 (citation omitted).

³⁸⁶ Angus Crawford, *Closure of Forensic Archive a ‘Shambles’, Experts Warn*, BBC (July 18, 2012, 12:23 AM), <http://goo.gl/Odpgw4>.

³⁸⁷ See GOULKA ET AL., *supra* note 319, at 2 (noting that the United States could apply the English system to reduce cost and improve outcomes).

³⁸⁸ See *id.* at 7.

³⁸⁹ See *id.* at 5. Although I have deep reservations about such a rule, the U.S. Supreme Court recently determined that DNA can be taken from an individual upon arrest for a felony. See *Maryland v. King*, 133 S. Ct. 1958, 1980 (2013).

³⁹⁰ As of 2012, the United Kingdom had forty-three police forces with 134,101 officers. See *Police Officer Numbers at Nine-Year Low*, BBC (July 26, 2012, 9:43 AM), <http://goo.gl/jYSSOO>. Additionally, in the twelve-month period ending March 31, 2011, there were only about four million arrests in the United Kingdom. See HOME OFFICE, STATISTICS: POLICE POWERS AND PROCEDURES ENGLAND AND WALES 2010 TO 2011: SECOND EDITION (2012), available at <http://goo.gl/p3eD3K>.

³⁹¹ See Richard Pinchin, *Eliminating DNA Backlog*, FORENSIC MAG., Aug.–Sept. 2007, at 32, 33.

³⁹² See *id.* at 33–34.

³⁹³ See MIRANDA JOLICOEUR, NAT’L INST. OF JUSTICE, U.S. DEP’T OF JUSTICE, INTERNATIONAL PERSPECTIVES ON WRONGFUL CONVICTIONS 20 (2010), available at <http://goo.gl/d3IwA2>.

submitted to an accreditation service to ensure standards are met, and the regulator may, at any time, enter a lab to check compliance.³⁹⁴

3. *Wishful Thinking: The European Union*

It is useful to contrast the United Kingdom's "deregulation" of forensic science with the attempt at centralization in continental Europe. The European Network of Forensic Science Institutes (ENFSI) aims to be recognized as Europe's leading authority on forensic science.³⁹⁵ ENFSI endeavors to maintain the quality of forensic science and develop forensic services delivery throughout the European Union. ENFSI itself is a network of forensic institutes and labs geographically spread across Europe, including those from E.U. member states and most E.U. candidate countries. As of 2012, ENFSI membership consisted of sixty-four institutes spread across thirty-six countries.³⁹⁶

ENFSI recognizes that the lack of common standards is a barrier to cooperation between forensic science labs. Further, the benefits of common standards in the fight against crime have been a priority for ENFSI for some time.³⁹⁷ In its policy statement on accreditation, ENFSI makes the call to harmonize forensic standards and procedures.³⁹⁸ It states that "ENFSI wishes to promote consistent and reliable scientific evidence through the whole forensic process from the scene of [the] crime to court."³⁹⁹

It is obvious—at least from the European Union's point of view—that common standards are essential to effectively investigating crimes that involve forensic information that spans across national borders. For example, the Prüm Treaty (legislation before the European Union) relies on member states to make forensic information (DNA and fingerprints) contained in national databases available for searching.⁴⁰⁰ To facilitate this process, the data must be in a standard format so that such searches are technically feasible.

Yet, with all of its centralization, the European Union itself lacks the standards in forensic science that it wants. There is no institutional control,

³⁹⁴ *Id.*

³⁹⁵ See EUR. NETWORK OF FORENSIC SCI. INSTS., ANNUAL REPORT 2011, at 3 (2011), available at <http://goo.gl/9epLJk>.

³⁹⁶ See *About ENFSI: Members*, ENFSI, <http://goo.gl/IyTNRJ> (last visited Apr. 14, 2014).

³⁹⁷ See generally Ekrem Malkoc & Wim Neuteboom, *The Current Status of Forensic Science Laboratory Accreditation in Europe*, 167 FORENSIC SCI. INT'L. 121, 124–25 (2007).

³⁹⁸ See STANDING COMM. FOR QUALITY & COMPETENCE, ENFSI, POLICY ON STANDARDS FOR ACCREDITATION 1 (2010).

³⁹⁹ *Id.*

⁴⁰⁰ Press Release, European Comm'n, The Integration of the "Prüm Treaty" into EU-Legislation (June 12, 2007), available at <http://goo.gl/QUaf86>.

and thus “no institution which develops forensic science standards, or enforces and supervises their implementation.”⁴⁰¹ 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.

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

B. ACKNOWLEDGING THAT PROBABLY NOTHING IS PERFECT

While creating research partnerships is likely a far cry from a massive federal level entity, a bottom-up approach will bridge the chasm between forensic research and practice, while developing the infrastructure needed for industrywide reform.

The drawback to a grassroots effort is, of course, its inherent ad hoc nature that, without any additional controls, will simply be a redundancy of the current system. As the NAS Report noted: “[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.”⁴⁰² In the research partnership model, this question of interaction will be an issue. Research partnership agencies and subagencies might not have adequate means of communication. A method for communicating efforts to improve standardization with other researchers and crime labs would be needed. The risk is that, with so many different organizations all attempting to reform forensic science, there is bound to be overlap and inefficiency. To this end, establishing an advisory committee,⁴⁰³ where membership represents a balanced cross-section of the different disciplines and research labs, would go a long way toward communicating concerns and implementing uniform standards among the research partnerships.

⁴⁰¹ Rybicki, *supra* note 333, at 91, 99.

⁴⁰² See NAS REPORT, *supra* note 1, at 78.

⁴⁰³ The proposed Forensic Science and Standards Act of 2013 provided for the creation of a forensic science advisory committee, and a similar committee would diminish any inefficiencies created by the inherent disconnect among the many research partnerships. See H.R. 3064, 113th Cong. § 8 (2013).

Nonetheless, the work will have to proceed in conversation with the broader criminal justice system. Reforming forensic science in a vacuum—even with the cooperation of crime labs—leaves out the end users of the forensic product. Thus, research must be performed with attention to courtroom admissibility and the realities of the criminal justice system. Such an effort requires transparency in both evidence analysis and use (the encompassing crime-to-conviction model), achieved only by clearly documenting *what* information is observed and *how* it has been interpreted. After observing the evidence, for example, it must then be translated into value for a particular purpose (“suitability”). Defining what is suitable evidence is a policy decision that may be static or plastic. Based on the evidence observations, the analysis should articulate *why*, for example, a print is or is not suitable for a specific purpose. Clearly defining “suitability” should be considered not only for ensuring consistency between examiners but also for identifying complex comparisons, which may require additional measures of quality assurance to mitigate risks of error. Forensic reform must also keep in mind the judges and juries who will analyze and assess the information.

As Jane Moriarty posits, even when science is clearly inadequate, judges have been unwilling to rigorously examine it because they are set in their ways and “cannot seem to imagine” excluding evidence that commonly comes in.⁴⁰⁴ In one case where defense counsel challenged his client’s conviction based on the NAS Report’s condemnation of the science’s validity, the judge reasoned that the NAS Report “merely presents a general picture of the current processes and pitfalls of toolmark identification and identifies possible methods of improvement.”⁴⁰⁵ Other judges have likewise noted that the NAS Report’s recommendations are important but still refuse to consider them.⁴⁰⁶

Any forensic science reform needs also to accept that courts are particularly resistant to change. Because *Daubert* requires judges to act as gatekeepers, admitting “good science” into their courtrooms and turning

⁴⁰⁴ Jane Campbell Moriarty, *Will History Be Servitude?: The NAS Report on Forensic Science and the Role of the Judiciary*, 2010 UTAH L. REV. 299, 310 (2010); see also *People v. Eleby*, 2012 WL 1548192 (Cal. Ct. App. May 3, 2012) (unpublished opinion) (finding that “some scholarly criticism” is not enough to warrant exclusion of the evidence); *State v. McGuire*, 16 A.3d 411, 436 (N.J. Super. Ct. App. Div. 2011) (finding that the purpose of the NAS Report is to highlight deficiencies in a forensic field and to propose improvements to existing protocols, not to recommend against admission of evidence).

⁴⁰⁵ *In re Trapp*, 165 Wash. App. 1003 (Wash. Ct. App. 2011) (unpublished opinion).

⁴⁰⁶ See *Commonwealth v. Gambora*, 933 N.E.2d 50, 60 (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).

away everything else,⁴⁰⁷ forensic reform should encourage the dissemination of forensic research in terms non-scientists can understand.⁴⁰⁸ Without an understanding of the faulty validity of many of the forensic sciences, judges will continue to admit such evidence 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.⁴⁰⁹ Alongside the lack of training and funding, the lack of unification among the various systems results in fragmentation. If accreditation and standardization criteria exist, they differ markedly from jurisdiction to jurisdiction.⁴¹⁰ In fact, most U.S. jurisdictions require no formal certification for their forensic science practitioners.⁴¹¹ The structure of the American government, with 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 infringing on authorities typically reserved to the states.⁴¹² Instead, collaboration would be necessary. With a system so divided, however, the idea of universally overhauling forensic science is

⁴⁰⁷ See *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 589 (1993) (“[U]nder 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.”).

⁴⁰⁸ In *Frye v. United States*, 293 F. 1013 (D.C. 1923), the court set forth a standard for admitting expert testimony in which “the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.” *Id.* at 1014. Under *Frye*, admitting evidence requires generally accepting (1) the theory supporting the scientific conclusion, and (2) the techniques and experiments leading to the conclusion. See Alice B. Lustre, Annotation, *Post-Daubert Standards for Admissibility of Scientific and Other Expert Evidence in State Courts*, 90 A.L.R.5th 453 (2001). For states using *Frye*’s general acceptance test, problems arise in determining what is generally accepted, defining the “scientific community” in question, and determining how much agreement is needed for “general acceptance.” Thus, the uniform standards achieved by research partnerships will assist courts in applying the *Frye* standard to forensic evidence testimony by clarifying any ambiguities inherent in *Frye*’s admissibility requirements.

⁴⁰⁹ See NAS REPORT, *supra* note 1, at 6.

⁴¹⁰ See *id.*

⁴¹¹ See *id.*

⁴¹² See *id.* at 13. The United States boasts a system of limited federal government. As stated in the Tenth Amendment, “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.” U.S. CONST. amend. X. The Tenth Amendment is the primary vehicle for arguments that the federal government is overstepping its authority and encroaching on states’ rights. See Charles Cooper, *Reserved Powers of the States*, in THE HERITAGE GUIDE TO THE CONSTITUTION (Edwin Meese III et al. eds., 2005), available at <http://goo.gl/yTN88m>.

enough to send any politician running. And if the workload does not do it, the funding woes certainly would.

While news stories have extensively detailed faulty forensics leading to innocent persons spending time in prison, their focus is on bad science rather than ineffectual standards that fail to regulate a science that works when it is conducted properly.⁴¹³ Unless the public 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.

C. SETTING A STAGE FOR REFORM

Even with these obstacles, the United States could still achieve a program comparable to that in the United Kingdom 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. Although many fought back, arguing that closing FSS favored saving money at the expense of quality,⁴¹⁴ data suggests that is not the case. It is doubtful that research partnerships might ultimately privatize the U.S. system of forensic science (or at least decouple crime labs from law enforcement agencies). After all, the United Kingdom is far smaller, with fewer jurisdictions and less crime. Moreover, similar privatization in the U.S. prison system⁴¹⁵ has been widely criticized.⁴¹⁶ Finally, the U.K. system could be characterized as capitalism all dressed up: it requires much

⁴¹³ See, e.g., *Wrongly Convicted Man Now Free Thanks to DNA Evidence*, WSB-TV ATLANTA (Nov. 12, 2007, 5:30 PM), <http://goo.gl/YG6KA9>.

⁴¹⁴ See SCIENCE & TECH. COMMITTEE, WRITTEN EVIDENCE SUBMITTED BY DR. FIONA PERRY, 2010-11, H.C., ¶ 1iv-vii (U.K.), available at <http://goo.gl/XWvScj>; see also *Forensic Science Service to Be Wound Up*, *supra* note 380.

⁴¹⁵ In the 1980s, the federal and state governments began contracting with private companies for incarceration services to reduce costs. See Nicole B. Casarez, *Furthering the Accountability Principle in Privatized Federal Corrections: The Need for Access to Private Prison Records*, 28 U. MICH. J.L. REFORM 249, 255-57 (1995). Over the past three decades, the federal government expanded the privatization. By 2009, 15% of federal prisoners were incarcerated in privately operated correctional facilities. See David C. Fathi, *The Challenge of Prison Oversight*, 47 AM. CRIM. L. REV. 1453, 1461 (2010) (citation omitted).

⁴¹⁶ As one study demonstrated, California state-run prisons spend about \$162 per inmate per day, compared with only \$72 in privately run prisons. See *Private Prisons Save Money, Report Says*, CORRECTIONAL NEWS (July 28, 2011), <http://goo.gl/2dNIGX>. 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 prison privatization is that to turn a profit, more prisoners are needed. See *Private Prisons*, AM. CIVIL LIBERTIES UNION, <http://goo.gl/qyxGZi> (last visited Apr. 14, 2014).

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 available for labs to analyze. Taking steps toward establishing a privatized (and thus, competitive) forensics industry—coupled with quality regulation and government funding—would promote the use of cost-efficient procedures that produce valid, reliable, and accurate results. In this respect, decoupling crime labs from law enforcement agencies would add additional layers of protection. As one former FBI assistant director explained, investigations showed that labs controlled by law enforcement often reported results biased in favor of the prosecution.⁴¹⁷ Whether intentional or not, the bias undermines the system's credibility, 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 back in 2009. While forensic science is not prepared for its own version of an FDA, the use of something less drastic than a federal watchdog is a good incentive to induce action. While the specter of wrongful convictions should be (although I acknowledge it is not) 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, we could finally begin to set baseline requirements for standards and quality while simultaneously increasing efficiency and decreasing costs.

CONCLUSION

Evidence admissibility is largely dependent on implementing and enforcing comparable standards, which should be achieved for the entire forensic process, from crime scene to courtroom. Yet, consistency and predictability across the forensic nervous system are few and far between. Ultimately, we can do better. Establishing a federal entity to oversee reforms in forensic science attempts to accomplish too much in a sector that remains fragmented and impervious to change. Research partnerships between crime labs and universities, on the other hand, will improve lab efficiency, foster communication between labs, and unify oversight. Improving crime labs would directly correlate to keeping innocent defendants out of jail, and in some cases, alive. Research partnerships should prioritize the NAS Report recommendations to streamline, simplify,

⁴¹⁷ See Marie Cusick, *Scandals Call into Question Crime Labs' Oversight*, NPR (Nov. 20, 2012, 6:14 PM), <http://goo.gl/gLXUE8>.

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 their 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. “There are only two mistakes one can make on the road to truth: not going all the way, and not starting.”⁴¹⁸ This is our opportunity to set forensic science right before it gets the result wrong and it stays that way.

⁴¹⁸ Michael Morton & Barry Scheck, *Morton, Scheck: Changes Are Long Overdue for Texas’ Clemency Process*, HOUSTON CHRON. (Oct. 16, 2013, 7:26 PM), <http://goo.gl/JUmnjW>.