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Remapping the Path Forward: Toward a Systemic View of Forensic Science Reform and Oversight

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Abstract

The 2009 report of the National Academy of Sciences on the state of forensic science in the American criminal justice system has fundamentally altered the landscape for scientific evidence in the criminal process, and is now setting the terms for the future of forensic science reform and practice. But the accomplishments of the Report must not obscure the vast terrain that remains untouched by the path of reform that it charts. This Article aims to illuminate a critical and currently neglected feature of that territory, namely, the manner in which police and prosecutors, as upstream users of forensic science, select priorities, initiate investigations, collect and submit evidence, choose investigative techniques, and charge and plead cases in ways that have critical and systematic, though poorly understood, influences on the accuracy of forensic analysis and the integrity of its application in criminal cases. By broadening our understanding of how forensic science is created and used in criminal cases---by adopting a systemic perspective---the Article points to a raft of yet unaddressed issues concerning the meaning of scientific integrity and reliability in the context of investigative decisions that are by in large committed to the discretion of decidedly unscientific actors. Critically, the Article demonstrates that systemic dynamics affecting upstream use of forensic science might well undermine the reliability-enhancing goals of the reforms advocated by the National Academy Report. As the NAS Report begins to set the agenda for active conversations around legislative and executive action to reform forensic science, it is critical to consider these questions. Moreover, the Article suggests that the embrace of science as a unique evidentiary contributor within the criminal justice system problematizes some of the bedrock assumptions of American criminal procedure that have, to date, prevented more robust doctrinal intervention in the investigative stages and decisions that the Article explores.

Introduction

Over the course of the last half century, science has moved from the periphery to a place of prominence in the investigation and prosecution of crime. Analysis of physical evidence, particularly with recent scientific and technological advances in the arena of DNA, has been embraced as advancing the fundamental epistemic goals of the criminal justice system: enhancing the ability of investigators and prosecutors to connect the guilty with their misdeeds

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and even more powerfully enabling accurate *exculpation* of the innocent. Indeed, as more traditional investigative tools such as eyewitness identifications and confessions have been exposed as questionably reliable and, slowly, subject to greater legal oversight, the comparative advantages of forensic science from the standpoint of both accuracy and law enforcement efficiency are increasingly hailed.[1] Yet at the same time, news headlines continually reveal laboratory- or analyst-level forensic science breakdowns, and the steady stream of exonerations since the advent of forensic DNA has exposed that much of what passed at one point for credible scientific opinion was in fact mistaken or even fraudulent.[2] Less dramatically, but no less importantly, commentators have also exposed structural deficits in the criminal justice system's vetting of forensic evidence—among them, government control of forensic science production and its foundational research, under-resourcing of forensic laboratories that must compete with other branches of law enforcement for budgetary attention, deficiencies in defense access to experts, and deficits in courts' oversight through admissibility decisions.[3]

Thus, forensic evidence is both special and mundane. It is special in its potential---in some forms, under optimal circumstances---to identify and exclude with a degree of reliability that sets it apart from more traditional forms of proof in criminal investigations---eyewitness identification, confessions, informants, and the like. But at the same time, forensic science is, like all evidence produced by humans in the crucible of the criminal justice system, susceptible to error, bias, manipulation, rationing, and other dynamics that compromise its reliability---both in theory and in practice.

For at least three decades, academic observers and a handful of figures within the forensic science community were alone in grappling with this vexing duality. From the legal

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[1] See, e.g., Williams v. Illinois, 132 S. Ct. 2221, 2227 (2012); Davis v. Mississippi, 394 U.S. 721, 727–28 (1969); Kenworthy Bilz, Self-Incrimination Doctrine Is Dead; Long Live Self-Incrimination Doctrine: Confessions, Scientific Evidence, and the Anxieties of the Liberal State, 30 Cardozo L. Rev. 807, 834 (2008); President George W. Bush, State of the Union Address (Feb. 2, 2005), available at http://www.msnbc.msn.com/id/6902913/ns/politics-state_of_the_union/t/full-text-state-union-speech.

[2] See Brandon L. Garrett, Convicting the Innocent 89-90 (2011) (reporting that sixty-three percent of trials in DNA exonerations featured flawed forensic evidence); Michael J. Saks & Jonathan J. Koehler, The Coming Paradigm Shift in Forensic Identification Science, 309 Sci. 892, 892-95 (2005); Jonathan Saltzman & Mac Daniel, Man Freed in 1997 Shooting of Officer, Boston Globe, Jan. 24, 2004, 2004 WLNR 3621085 (reporting case of fingerprint "match" disproved through DNA exoneration).

[3] See, e.g., Erica Beecher-Monas, Evaluating Scientific Evidence: An Interdisciplinary Framework for Intellectual Due Process (2006); David Kaye, The Double Helix and the Law of Evidence (2010) (describing how adversary system distorted science of DNA); Paul C. Giannelli, The Abuse of Scientific Evidence in Criminal Cases: The Need for Independent Crime Laboratories, 4 Va. J. Soc. Pol'y & L. 439 (1997) [hereinafter Giannelli, Independent Crime Laboratories]; Randolph N. Jonakait, Forensic Science: The Need for Regulation, 4 Harv. J.L. & Tech. 109, 191 (1991); Jennifer Mnookin et al., The Need for a Research Culture, 58 UCLA L. Rev. 725, 744-60 (2010) (summarizing critiques); Michael J. Saks & David L. Faigman, Failed Forensics: How Forensic Science Lost Its Way and How it Might Yet Find It, 4 Annu. Rev. Law. & Soc. Sci. 149, 150—60 (2008) [hereinafter Saks & Faigman, Failed Forensics] (describing scientific and technological failures of "nonscience forensic sciences," the role of courts in propping up flawed disciplines, and proposals to make "these nonscientific forensic sciences . . . scientific").

academy, it was largely evidence scholars, bemoaning courts' inability or unwillingness to act as "gatekeepers" for scientific evidence in criminal cases (even after claiming that function in the midst of the "*Daubert* revolution," or being assigned it by rules of evidence[4]), who advocated doctrinal and even structural reform to achieve more rigorous scrutiny by courts.[5] But attention soon turned upstream from the courts to the laboratories, as forensic practitioners began to sound public alarms and scandals exposed resource and oversight deficiencies, and the burgeoning field of forensic DNA analysis highlighted, somewhat ironically, the gap between scientifically validated forensic techniques and those premised, at best, on anecdotal or field-tested claims to validity.[6] Thus emerged a vibrant literature examining forensic science as an input to court proceedings, criticizing the laboratory organization and regulation, the incentives of analysts, and the research foundations of forensic science, and other facets shaping the (largely maligned) output of forensic science laboratories.[7]

Once relegated to the pages of law reviews and social science journals, these views now have achieved the status of the policy mainstream with the release of the 2009 Report of the National Academy of Sciences, *Strengthening Forensic Science in the United States: A Path Forward* ("the NAS Report"). In three-hundred pages the Report criticized the absence of validation for virtually every forensic methodology;[8] pointed to widespread deficiencies in funding, training, and standard-setting in forensic science;[9] and laid further blame at the feet of courts for "continu[ing] to rely on forensic evidence without fully understanding and addressing

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[4] Michael J. Saks & David L. Faigman, Expert Evidence After *Daubert*, 1 Ann. Rev. L. & Soc. Sci. 105, 110 (2005); see Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, __ (1993); Fed. R. Evid. 702; Saks & Faigman, supra, at 109 (describing state law following lead of Supreme Court in *Daubert*).

[5] See, e.g., Erica Beecher-Monas, Evaluating Scientific Evidence: An Interdisciplinary Framework for Intellectual Due Process (2006); Keith A. Findley, Innocents at Risk: Adversary Imbalance, Forensic Science, and the Search for Truth, 38 Seton Hall L. Rev. 893, 895-96 (2008); Peter J. Neufeld & Neville Colman, When Science Takes the Witness Stand, 262 Sci. Am. 46, 49, 52-53 (1990).

[6] See Jay D. Aronson, Genetic Witness: Science, Law, and Controversy in the Making of DNA 15 (2007) (describing this as one of the primary consequences of DNA analysis in the criminal justice system); Saks & Faigman, Failed Forensics, supra note __, at 150-60 (discussing deficiencies exposed by DNA).

[7] David Kaye, The Double Helix and the Law of Evidence (2010) (describing how adversary system distorted science of DNA); Giannelli, Independent Crime Laboratories, supra note 3; Randolph N. Jonakait, Forensic Science: The Need for Regulation, 4 Harv. J.L. & Tech. 109, 191 (1991); Michael J. Saks & David L. Faigman, Failed Forensics: How Forensic Science Lost Its Way and How it Might Yet Find It, 4 Annu. Rev. Law. & Soc. Sci. 149, 150—60 (2008) (describing scientific and technological failures of "nonscience forensic sciences," the role of courts in propping up flawed disciplines, and proposals to make "these nonscientific forensic sciences . . . scientific"); see generally Jennifer L. Mnookin et al., The Need for a Research Culture in the Forensic Sciences, 58 UCLA L. Rev. 725, 730 (2011) (summarizing literature).

[8] Committee on Identifying the Needs of the Forensic Science Community, National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward 127—82 (2009) [hereinafter NAS Report].

[9] Id. at 183—239.

the limitations of different forensic science disciplines."[10] Importantly, however, the thrust of the NAS Report was not ultimately pessimistic but rather, as the title implies, forward looking: Its prestegious authors clearly viewed the future of criminal justice as bound up with the future of forensic science.[11] Toward that end, the NAS Report proffered thirteen recommendations for comprehensive reform of the forensic science field, which, in sum, call for broader training and standardization of laboratory work, an ambitious program for expanding research and education directed at improving forensic science, and, most controversially, institutional independence of laboratories from law enforcement institutions and the formation of a new federal agency, the National Institute of Forensic Science ("NIFS"), charged with, funding and agenda-setting in the forensic sciences.[12]

The NAS Report has been widely heralded as a watershed, and its analysis and recommendations look for the foreseeable future to be setting the terms of academic and policy debates concerning forensic science.[13] But academic and policy agendas tethered to the NAS Report will be deficient in a critical respect. Like the overwhelming majority of the scholarship and criticism that so heavily influenced it, the light shone by the Report is focused nearly exclusively on the primary site of forensic science *production*, the *laboratory*, as the relevant site of reform. But this ignores a critical set of dynamics affecting forensic science: namely, the manner in which upstream *users* of forensic science---police and prosecutors to be precise----will select priorities, initiate investigations, collect and submit evidence, choose investigative techniques, and charge and plead cases in ways that have critical and systematic, though poorly understood, influences on the accuracy of forensic analysis and the integrity of its application in criminal cases. These are dynamics have featured, albeit typically just below the surface, in many known even more unknown cases in which forensic science has failed to live up to, or even frustrated, the truth-facilitating function it is deployed to serve in criminal cases. Consider, for example, the fact that both cases that the Supreme Court has taken on the question of post-conviction access to (putatively exonerative) DNA testing have featured not allegations of shoddy science at the original criminal trial, but rather *incomplete* science: Both William Osborne and Hank Skinner have argued that prosecutors and police in their original

[10] Id. at 85—110.

[11] See id. at 19—33 for all thirteen of the NAS Report's recommendations.

[12] See id. at 19-33 (summarizing all thirteen recommendations).

[13] See, e.g., Mnookin, et al., supra note __, at 730 (outlining consensus among scholars and practitioners embracing essence of NAS Report recommendations). Two bills have been introduced in Congress o implement the Report's recommendations. An early bill introduced by Senator Leahy of Vermont has recently been joined by legislation directing $500 million to forensic science research and standards development. See Forensic Science Standards Act of 2012, available at http://democrats.science.house.gov/sites/democrats.science.house.gov/files/documents/H.R.%206106%20-%20Forensic%20Science%20and%20Standards%20Act%20of%202012.pdf; Criminal Justice and Sentencing Reform Act of 2011, available at http://www.opencongress.org/bill/112-s132/show. Action is also afoot at the executive level. National Science and Technology Council Subcommittee of Forensic Science, http://www.forensicscience.gov (last visited June 1, 2011) (explaining goal of subcommittee as to assess the practical challenges of implementing recommendations in the [NAS Report], and to advise the White House on how best to achieve the goals outlined in that report." See also infra Part III.

investigations opted not to test available and potentially exculpatory evidence, and relied in convicting them on less than the best available scientific evidence.[14] Consider, similarly, the fact that in a recent study of the first 250 DNA exonerations in the United States, analysis of investigative documents and trial transcripts revealed that at least thirty-four were initially tried for their crimes despite the known contemporaneous existence of arguably exculpatory forensic evidence.[15] The reform agenda of the NAS Report has little to say about the critical questions raised by these cases, which center not on laboratory-based practices but rather the exercise of upstream discretion by other law enforcement actors. More critically, the sort of systemic perspective proposed herein reveals a more complicated portrait of the dynamics of reform. Changes at the level of laboratory output and governance of the sort championed by the NAS Report will not inexorably cause more forensic science to be put to use for better outcomes in the criminal justice system, as the NAS Report assumes.

The structure of the Article is as follows. Part I describes the NAS Report and identifies two premises that gird its view of forensic science and contribution to the field: (1) that more good science as early as possible in the life cycle of criminal investigations will further that goal; and (2) that greater monetary resources and more independence for laboratories are necessary and sufficient conditions to achieve premise (1). Part I further aims to situate the NAS Report's adoption of these (implicit) premises in a particular historical, intellectual, and political context, and thereby suggest that while there is much value in the enormity of the task taken on by the Report, the path forward that it charted, and in particular its relative disregard of law enforcement and other non-laboratory-based factors in the forensic science landscape, was far from inevitable (and hence, perhaps incomplete).

Part II problematizes the premises identified in Part I by illuminating upstream dynamics driven not by laboratory-based actors, but rather by police and prosecutors.[16] Focusing on evidence gathering, the decision to obtain forensic testing, and the investigative response to forensic analysis, the discussion aims to demonstrate that, currently, decisions committed almost entirely to the discretion of police and prosecutors can lead both to underutilization---surprisingly little physical evidence being collected, surprisingly little forensic analysis being sought, and surprisingly little use being made of available forensic analysis---as well as qualitatively suboptimal utilization---late submission and testing, less than thorough follow-up

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[14] See Brief for Appellant 31-33, Skinner v. State of Texas, No. AP-76,675 (Feb. 2, 2012), 2012 WL 591289 (discussing facts); Brief for Respondent at 9 & n.3, District Attorney's Office for the Third Judicial District v. Osborne, 129 S. Ct. 2308 (2009).; see also Skinner v. Switzer, 131 S. Ct. 1289 (2011); Osborne, 129 S. Ct. 2308.

[15] This is based on a conservative count of the publicly available data from Professor Brandon Garrett's study. See Brandon L. Garrett, Appendix to Chapter Four of Convicting the Innocent: When Criminal Prosecutions Go Wrong, available at http://www.law.virginia.edu/pdf/faculty/garrett/convicting_the_innocent/garrett_forensics_appendix.pdf [hereinafter Garrett, Appendix to Convicting the Innocent]; see also Brandon L. Garrett, Convicting the Innocent: When Criminal Prosecutions Go Wrong (2011) [hereinafter Garrett, Convicting the Innocent]. Interestingly, in only three of those cases were the exculpatory results *not* disclosed to defense counsel. See Garrett, Appendix to Convicting the Innocent, supra.

[16] For reasons explained below, the analysis is confined to state and local, non-federal actors, although it will be generalizable to a certain extent. See infra Part II.

investigation in response, and, perhaps most importantly, systematic discounting of exculpatory science. Of course, these pathologies do not infect every case, and even where they do the impact varies tremendously. But to the extent there are systemic explanations for them---and Part II argues that there are---we should be concerned that the laboratory-centric reform vision of the NAS Report will not inexorably lead to the sought-after enhancement of the quality of forensic science in the criminal justice system. Moreover, as Part II argues in conclusion, there are dynamics of usage that might frustrate or be frustrated by some of the NAS Report's recommendations, in particular, some potential variations on its call for laboratory independence.

While the primary goal of this Article is diagnostic, Part III provisionally outlines some proposals for ways in which the NAS Report's path forward might be widened, and a more systemic vision for forensic science pursued. In part, the aim is to capitalize on the current momentum for reform based upon the NAS Report blueprint, which appears to be building within Congress, executive agencies, and among states.[17] Thus, Part III offers on the one hand a series of series of possible amendments to the existing reform agenda outlined by the NAS Report: The Report's research and standard-setting agenda should encompass police and prosecution practices such as evidence gathering, testing decisions, and disclosure regimes; policymakers should prioritize enhancing state-level oversight as a complement, or alternative, to national oversight of the field through the proposed NIFS; and the Report's "independence" recommendation should be reflected upon in light of the concerns raised in Part II. An additional part of the forward-looking agenda is to address a pervasive inattention to forensic science within criminal justice scholarship, which recently has featured innovative work emphasizing the complex interactions among criminal justice actors, the institutions in which they operate, and the legal strictures that guide them, prompting something of an upstream turn in the literature[18]---all dynamics at work and well worth assessing in regard to forensic science, particularly as a new regulatory structure is being contemplated. Thus, Part III concludes with the fairly bold suggestion that the goals of enhancing forensic science integrity challenges some of the foundations of criminal procedure doctrine ways not previously considered, in particular, by problematizing the enormous degree of discretion granted to police and prosecutors in pursuing investigations and building cases.

I. The NAS Report's View

A. A Brief (Political) History of *A Path Forward*

The NAS Report was the fruit of an unprecedented congressional charge to the National Academy of Sciences to conduct a comprehensive examination of the entire field of forensic science, across all disciplines, and including questions of both fundamental scientific validity and

[17] See supra note 13.

[18] Work exemplifying this trend includes Darryl K. Brown, The Decline of Defense Counsel and the Rise of Accuracy *i*n Criminal Adjudication, 93 Cal. L. Rev. 1585 (2005), Gerard E. Lynch, Our Administrative System of Criminal Justice, 66 Fordham L. Rev. 2117, 2149 (1998), Daniel Richman, Prosecutors and Their Agents, Agents and Their Prosecutors, 103 Colum. L. Rev. 749 (2003), and William J. Stuntz, . The Uneasy Relationship Between Criminal Procedure and Criminal Justice, 107 Yale L.J. 1 (1997).

organizational and logistical optimality.[19] The call ended decades of relative governmental neglect with regard to both oversight of and resources for the forensic sciences, despite the steadily increasing centrality of scientific evidence to the criminal justice system.[20] President Johnson's Commission on Law Enforcement and Administration of Justice made the development of scientific and technological capacity in the criminal justice system a federal priority, and hence the 1970's saw the first federal grant money to develop scientific capacity for state and local law enforcement agencies.[21] But this had the somewhat perverse effect of expanding the production of and demand for scientific evidence without an institutionalized financial commitment from jurisdictions, or accompanying standardization and regulation.[22] Oversight eventually developed, but essentially from within the forensic science field only, primarily via the wholly voluntary accreditation program developed by the American Society of Crime Lab Directors-Laboratory Accreditation Board ("ASCLD/LAB").[23] From the standpoint of standards of practice, forensic science methodologies were an incredible grab-bag, with some such as blood analysis possessing a set of theories and techniques rooted in scientific theory and practice, others such as fingerprint comparison (and to a lesser extent other comparative methods such as hair microscopy) having developed an experientially generated set of protocols in which analysts were trained, and many others characterized by few standardized techniques among

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[19] See Science, State, Justice, Commerce, and Related Agencies Appropriations Act of 2006, P.L. No. 109-108, 119 Stat. 2290 (2005) (charging the National Academy to conduct a study "as described in the Senate Report"); S. Rep. No. 109-88, at 46 (2005) (listing eight charges).

[20] See, e.g., Richard Saferstein, Criminalistics: An Introduction to Forensic Science 6-8 (7th ed. 2001) (reviewing history and recounting factors); Edward J. Imwinkelried, A New Era in the Evolution of Scientific Evidence: A Primer on Evaluating the Weight of Scientific Evidence, 23 Wm. & Mary L. Rev. 261, 261-62 (1981) (reviewing the history); Joseph L. Peterson & Anna S. Leggett, The Evolution of Forensic Science: Progress Amid the Pitfalls, 36 Stetson L. Rev. 621, 623-40 (2007) (reviewing the history).

[21] See President's Commission on Law Enforcement and Administration of Justice, The Challenge of Crime in a Free Society (1967) (recommending greater research and capacity building in forensic science).

[22] See, e.g., Nat'l Advisory Comm'n on Criminal Justice Standards and Goals, Report on Police 304-05 (1974) (observing that "[t]oo many police crime laboratories have been set up on budgets that preclude the recruitment of qualified professional personnel," and that "[t]oo often the laboratory is not considered a primary budget item and is one of the first units to suffer when budgets are trimmed"); Peterson & Leggett, supra note __, at 623-25.

[23] See American Society of Crime Lab Directors Laboratory Accreditation Board, About ASCLD/LAB, http://www.ascld-lab.org/about_us/aboutoverview.html ("ASCLD/LAB has been accrediting crime laboratories since 1982 and currently accredits most of the federal, state and local crime laboratories in the United States plus forensic laboratories in six countries outside of the United States.") (last visited Mar. 22, 2012). Even today only nine states require that crime laboratories be accredited, although approximately eighty-three percent of publicly funded laboratories have pursued accreditation nonetheless. See National Conference of State Legislatures, DNA Laws Database, Table 6 (2010), available at http://www.ncsl.org/portals/1/Documents/cj/Table6AccredLaboratories.pdf (last visited June 10, 2011); Andrea M. Burch et al., Census of Publicly Funded Forensic Crime Laboratories, 2009, at 7 (Aug. 2, 2012), available at http://www.bjs.gov/content/pub/pdf/cpffcl09.pdf. While ASCLD-LAB has filled a much-needed oversight gap and occasionally placed itself on the forefront of investigating scientific fraud, it has nevertheless been widely criticized as far too insular and uncritical of the forensic science field to perform meaningful oversight. See Ryan M. Goldstein, Note, Improving Forensic Science Through State Oversight, 90 Tex. L. Rev. 225, 238-39 & n.114 (2011) (reviewing some of the criticisms).

practitioners.[24] Practitioners of individual forensic methodologies took some steps by developing Scientific Working Groups ("SWGs") to develop standards of practice for individual techniques.[25] But these were themselves rooted at best in the accumulated wisdom of practitioners; even to the extent that the promulgated standards were of objective quality they were non-binding on practitioners and rarely institutionalized as policies within laboratories.[26]

Development of forensic DNA applications in the 1980's was in many respects a watershed---not simply from the standpoint of what the technology itself offered, but more systemically from the standpoint of forensic practice and oversight.[27] It is well beyond the scope of this Article (and a feat already accomplished by others) to offer a detailed account of the path from DNA's vanguard appearance in American courtrooms in the mid 1980's, to the development of an extensive framework of legal regulation in connection with the CODIS system of databases and the unprecedented volume of federal grant money to a forensic science discipline, along a trail marked by a series of pitched legal, scientific, and political battles that have come to be known as "the DNA wars."[28] Three relevant snapshots from the history are worth posting here, however.

First, in contrast to all forensic science techniques that preceded DNA analysis---what Erin Murphy helpfully categorizes as "first generation" forensic science---DNA came to the criminal justice system as a tool developed and used in non-forensic applications by a broad and

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[24] See, e.g., Donald Kennedy, Forensic Science: Oxymoron?, 302 Science 1625 (Dec. 5, 2003).

[25] See Mnookin et al., supra note __, at 771-72; see also About Scientific Work Groups, SWGFAST, http://www.swgfast.org/AboutSWGs.htm (last visited June 1, 2012) ("Since the early 1990s, American and International forensic science laboratories and practitioners have collaborated in Scientific Working Groups ... to improve discipline practices and build consensus standards." (emphasis added)).

[26] See, e.g., Garrett, Convicting the Innocent, supra note __, at 105—06 (describing scientifically invalid recommendation of Scientific Working Group on Shoeprint and Tire Tread Evidence that method allows "definite conclusion of identity"); Harry T. Edwards, The National Academy of Sciences Report on the Forensic Sciences: What It Means for the Bench and Bar, 51 Jurimetrics 1, 11 (2010) (asserting that SWGs were of "questionable value" due, among other reasons, to lack of enforcement, lack of empirical measurement of effectiveness, and excessive vagueness); Mnookin, et al., supra note __, at 771—72 (describing how SWGs "despite the scientific label in the name . . . have a rather tenuous relationship with research science," and concluding that while "practitioner-led SWGs may often reach appropriate, thoughtful, and perhaps even research-based conclusions, . . . they also risk being guided by and influenced by populist practitioner pressures"); see also State v. Dominguez, slip op. at 7—8 (Tex. Ct. App. Jul. 28, 2011) (recounting testimony in capital case of founding director of Scientific Working Group on Dog Scent and Orthagonal Detector Guidelines, who identified departures from dog scent lineup best practices but contended that procedure in case was still reliable).

[27] See, e.g., Erin Murphy, DNA Exceptionalism, 9 Law Probability & Risk 7, 9—15 (2010) [hereinafter Murphy, DNA Exceptionalism], (summarizing history and contrasting scrutiny of DNA to inattention vis-à-vis other forensic sciences).

[28] See, e.g., Jay D. Aronson, Genetic Witness: Science, Law, and Controversy in the Making of DNA Profiling 146-72 (2007); David Lazar, The Technology of Justice: DNA and the Criminal Justice System (2004).

deep community of scientific professionals.[29] Second, and relatedly, the reception of forensic DNA into the criminal justice system was accompanied by far greater standardization among practitioners, as well as regulation by courts and the political branches, than what had characterized the field of first generation forensic science.[30] The DNA Identification Act of 1994 establishing, among other things, a national system of DNA databases and a national DNA Advisory Board, as well as regular Congressional funding of the field, are only two of many examples of the exceptional regulatory attention DNA has received. [31]

But these features prompted a third dynamic that presages a theme that would resurface in the 2009 NAS Report: that the hotly contested process of erecting a legal infrastructure for oversight of forensic DNA was closely bound up with questions of the proper demarcation of the law/science divide in the field. While a community of researchers and some aligned with the defense aimed to situate forensic DNA and oversight of it squarely within the province of the "pure" scientific field that gave birth to it, another powerful bloc led in particular by the FBI contended that forensic DNA was a unique field amenable to regulation only from within.[32] A tug and pull between these perspectives shaped the earliest congressional foray into DNA oversight---the establishment of the national system of DNA databases as well as a DNA Advisory Board comprised in part of independent scientists but appointed with the approval of the FBI director. It also shaped the National Academy's role in issuing two reports (via its National Research Council ("NRC"), the same body responsible for the 2009 NAS Report) on standards for DNA typing and, in particular, calculation of population genetics for purposes of determining the significance of a "match" between DNA profiles. An initial report issued in 1992 was hotly criticized for endorsing what some viewed as too conservative a method for calculating those percentages, and relatedly for accounting for matters (including analyst proficiency, laboratory standards, and related operational matters) that the FBI and others considered to be beyond the narrow technical expertise of the NRC. The outcry from these groups prompted a second, narrower, and less conservative report in 1996.[33] The point for present purposes is not a scientific one but a political one: Congress and the NAS itself have long been sensitive to territorial questions in the arena of forensic science. Indeed, efforts to launch the sort of broad-based review eventually undertaken by the NAS in 2009 was stymied

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[29] Erin Murphy, The New Forensics: Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence, 95 Calif. L. Rev. 721, 726-31 (2006) [hereinafter Murphy, New Forensics].

[30] See, e.g., Murphy, DNA Exceptionalism, supra note 27, at 9-11.

[31] See DNA Identification Act of 1994, Pub. L. No. 103-322, 108 Stat. 2065 (1994); see also DNA Backlog Elimination Act, Pub. L. No. 106-546, 1114 Stat. 2726 (2000); Crime Information Technology Act of 1996, Pub. L. 105-251, 112 Stat. 1870 (1998) The federal Coverdell grant program is a rare example of a more broadly available funding source for forensic science. Science, State, Justice, Commerce, and Related Appropriations Act of 2006, P.L. No. 109-108, Stat. 2290 (2005) (allocating funds for Paul Coverdell Forensic Science Improvements Grants).

[32] See, e.g., Aronson, supra note 28, at 147.

[33] See id. at 146-72; Richard Lempert, After the DNA Wars: Skirmishing With NRC II, 37 Jurimetrics 439, 451-53, at 465-66 & nn. 63-64 (1997); William C. Thompson, Accepting Lower Standards: The National Research Council's Second Report on Forensic DNA Evidence, 37 Jurimetrics 405, 406 (1997).

for years by infighting among law enforcement and defense leaders, forensic practitioners, and policymakers about whether a Congressionally authorized assessment of the field should be undertaken by the NIJ---an arm of the Department of Justice---or a scientific authority like the National Academy. [34]

In any event, governmental interest in, and funding and regulation of, DNA did not spill over to other forensic science techniques, despite the fact that these non-DNA applications dominated (as they continue to do) the caseloads of crime laboratories.[35] Indeed, the greatest impact of forensic DNA from the standpoint of oversight was undoubtedly to highlight the *absence* thereof with regard to most other forensic techniques, as well as the enormous and increasingly glaring gap between the promise of scientific reliability and the increasingly exposed reality of forensic practice.[36] Reports of laboratory breakdowns from Houston to North Carolina to Detroit pointed to a litany of similar structural roots: a history of competition with other police divisions for limited resources; failure to hire, train, and retain qualified analysts; caseload pressures that exacerbated other organizational deficiencies to further cause slipshod work and enhance analysts' vulnerability to pressure from police and prosecutors.[37] Indeed, these were circumstances that were compromising the integrity of results even in the new "gold standard" of DNA analysis.[38]

The theme of scientific and law enforcement entanglement was, again, prominent in a central (though hotly contested) criticism of the field---one advanced by prominent academics whose perspectives would emerge prominently in the NAS Report. An overriding structural concern was the lack of institutional independence enjoyed by the overwhelming majority of crime laboratories that were, to one extent or another, under the administrative control of (and often shared physical space with) police and prosecutorial agencies.[39] The entanglement was more foundational as well. The attention and funds of the federal government that had been

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[34] See Murphy, DNA Exceptionalism, supra note 27, at 13—14 & n.50 (discussing history).

[35] See Burch et al., supra note 23, at Table 5 (reporting that in 2009 sixty-six percent of requests for analysis to laboratories were for non-biological evidence); NAS Report, supra note 8, at 41 (stating that DNA analysis comprises only ten percent of laboratory caseloads).

[36] See Aronson, supra note 28, at 3; Michael J. Saks & Jonathan J. Koehler, What DNA "Fingerprinting" Can Teach the Law About the Rest of Forensic Science, 13 Cardozo L. Rev. 361, 372 (1991).

[37] See generally Michael Bromwich, Final Report of the Independent Investigator for the Houston Police Department Crime Lab and Property Room (Jun. 13, 2007), available at http://www.hpdlabinvestigation.org/reports/070613report.pdf (describing Houston Crime Lab failures in DNA, serology, and other disciplines); Ben Schmitt & Joe Swickard, Troubled Detroit Police Crime Lab Shuttered: State Police Audit Results 'Appalling,' Wayne County Prosecutor Declares, Detroit Free Press (Sept. 26, 2008) (discussing ballistics analysis errors and widespread lab failures); Mandy Locke et al., Scathing SBI Audit Says 230 Cases Tainted by Shoddy Investigations (Aug. 27, 2010), available at http://www.newsobserver.com/2010/08/19/635632/scathing-sbi-audit-says-230-cases.html (describing widespread failures at North Carolina state crime lab).

[38] See, e.g., Bromwich, supra, at 116-50.

[39] See, e.g., Burch et al., supra note 23; Giannelli, Independent Crime Laboratories, supra note 3, at 469-76.

brought to bear on forensic science, DNA and non-DNA methodologies alike, emanated largely from the priorities and professional infrastructure of law enforcement, and (putting aside DNA testing and toxicology analysis) were divorced from both the theoretical underpinnings and the professional culture of the sciences---a feature that critics bemoaned as suppressing scientific rigor or, worse, infecting science-based claims in the field with intolerable bias.[40] Overwhelmingly, the empirical bases for the expert claims made by practitioners in forensic discipline – assertions, for example, of "matches" between fingerprints, or between bullets and weapons, or between shed hairs – lay in the accumulated observation of examiners, rather than in a scientific theory developed and tested in a neutral laboratory setting.[41] To the extent that data does underlie the scientific claims made by forensic experts, government agencies in possession of that data have been reluctant to open it to scrutiny, complicating meaningful efforts at verification, and undermining scientific hallmarks of collaboration and replicability.[42] And to the extent that the federal government sponsors independent research in forensic science, priorities are generally set and funds disseminated by the Department of Justice's research arm, the National Institute of Justice, whose grant administration has been heavily criticized for its lack of independence from the DOJ's own law enforcement agenda.[43] The SWGs that had taken the lead at developing what standards of practice did exist for non-DNA methodologies are funded by the Department of Justice and administered under the auspices of the FBI, NIJ, and Drug Enforcement Agency.[44]

But if similar themes were emerging from the accelerating reports of scandal and mismanagement, the particular institutional contexts from which these themes were distilled varied enormously. "Forensic science" encompasses a wide array of disciplines, varying in the type of training and skills typically required (e.g., physical and biological science background required for DNA or toxicology analysis, versus more practical, law-enforcement-based training that typifies fingerprint or blood spatter examination), practiced in a variety of institutional settings (e.g., traditional laboratories in which DNA or drug analysis is performed, versus

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[40] See Paul C. Giannelli, *Daubert* and Forensic Science: The Pitfalls of Law Enforcement Control of Scientific Research, 2011 Ill. L. Rev. 53, 89—90 (2011) (reviewing charges) [hereinafter Giannelli, *Daubert* and Forensic Science]; Jennifer L. Mnookin, et al., The Need for a Research Culture in the Forensic Sciences, 58 UCLA L. Rev. 725, 730, 765—67 (2011) (describing how situating the forensic laboratory within law enforcement agencies created a "divide between research values and forensic practice").

[41] See, e.g., Mnookin et al., supra note __, at 774-59.

[42] See Michael J. Saks & David L. Faigman, Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It, 4 Annu. Rev. of Law & Soc. Sci. 149, 151, (2008); Roger Koppl, How to Improve Forensic Science, __, 257 (2005) (discussing "eight features of the organization of forensic science that needlessly reduce the quality of work performed by forensic scientists" and listing several features hampering pursuit of open and redundant testing of conclusions).

[43] See, e.g., Craig M. Cooley, Increasing Forensic Evidence's Reliability and Minimizing Wrongful Convictions, 43 Tulsa L. Rev. 285, 375 (2007) (describing allegations of NIJ ineffectiveness in grant oversight); Giannelli, *Daubert* and Forensic Science, supra note 40, at 88 (detailing reports of NIJ bias).

[44] See Fed. Bureau of Investigation, Scientific Working Groups, http://www.fbi.gov/about-us/lab/swgs (last visited Jun. 10, 2011); Jan S. Bashinski & Joseph L. Peterson, Forensic Sciences, *in* William A. Geller, Local Government Police Management 569, 580 (3d ed. 1991); Mnookin et al., supra note __, at 771-73.

settings where comparative analysis of fingerprints or ballistics are performed with specialized but non-laboratory equipment).[45] Crime laboratories themselves vary greatly in their institutional configuration: Although the vast majority are under the control of a law enforcement entity at some level of government, laboratories might serve an entire state, a particular region, a specific local jurisdiction---or, as in the case of the FBI Laboratory, might have a primary customer (federal law enforcement) and also perform casework on request from other jurisdictions.[46] Private laboratories and independent public laboratories also dot the landscape,[47] as do a significant number of forensic science units within law enforcement organizations that perform crime scene work and non-laboratory-based analyses---typically fingerprint and other comparative and interpretative analyses (e.g., blood spatter, photographic analysis, handwriting comparison).[48] This tremendous fragmentation in the field is both a cause and an explanation of the relative lack of field-wide attention or oversight, particularly external to the profession, and particularly at the federal level.[49]

In sum, Congress's call to the NAS in 2006 was an important and long-overdue measure to address a near-total failure within policy circles to address what the accompanying Senate Report described as an "absence of data" – or what might be more accurately described as a preliminary diagnosis of failure – with respect to the national infrastructure for the production of forensic science.[50] Moreover, it presented the NAS Report drafters with a task of immense factual complexity and political complexity. In ultimately committing the project to the National Academy of Sciences for the project – widely viewed as the government's preeminent scientific authority – Congress for its part appeared to call for a striking and deliberate turn toward recapturing the *scientific* bona fides of the field. But the history of DNA oversight was no doubt in the minds of many participants in the review process. And, notwithstanding a general consensus that the forensic sciences required, at least, greater funding and infrastructural improvement, by undertaking a broad-based review of forensic disciplines that had long been *wholly* the province of law enforcement the NAS's effort was likely to engender even more controversy.[51] In any event, Congress's precommitment that the NAS Report would be an

[45] See NAS Report, supra note 8, at 38-39.

[46] See NAS Report, supra note 8, at 57-64.

[47] Id.

[48] See generally Randall A. Childs et al., Survey of Forensic Service Providers, 1 For. Sci. Pol'y & Mgmt 49 (2009).

[49] See NAS Report, supra note 8, at 77 (discussing challenge of fragmentation).

[50] S. Rep. No. 109-88, at 45 (2005) ("The results of these studies are indicative of a larger problem within the forensic science and legal community: the absence of data. While a great deal of analysis exists of the requirements in the discipline of DNA, there exists little to no analysis of the remaining needs of the community outside of the area of DNA.").

[51] Cf. Murphy, DNA Exceptionalism, supra note __, at 16 (arguing that DNA created a previously absent political mandate for the 2009 NAS Report).

endeavor generated by the scientific and not the legal community did not relieve the Report's drafters of the heavy freight of criminal justice politics.[52]

B. The NAS Report's (More and Less Implicit) Premises

Armed with an important but challenging mandate, the NAS formed a blue ribbon Committee on Identifying the Needs of the Forensic Science Community ("the Committee") to conduct the study. Its Congressional charge specified that the Committee was to be "independent" and broadly representative of interests within the "forensics community"[53]: The sixteen-member Committee included leading research scientists, forensic scientists, a criminal defense attorney and a former federal prosecutor, legal academics, and a federal judge.[54] No non-forensic-practitioner police (or sitting prosecutors) were among its ranks, however, a fact not lost on those communities.[55] Over the course of two years the Committee heard hundreds of hours of testimony from stakeholders in the field – practicing forensic scientists, social scientists, academics, prosecutors and defense attorneys, and federal, state, and local law enforcement officials,[56] and "engaged in independent research."[57]

The factual findings of the Committee contained in its three-hundred page report largely confirm the most pessimistic accounts of the forensic sciences that had been circulating in academic and, to some extent, professional quarters[58] Underfunding, unvalidated methodologies, and untrained and unregulated analysts are described as, if not the norm, a disturbingly pervasive

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[52] See NAS Report, supra note 8, at 13—14 (noting "[p]olitical [r]ealities" entailed by fact that forensic science is "within the regulatory province of state and local law enforcement entities"); Gianelli, U. of Ill., at 88 & nn. 238—240 (describing evidence of political battles between the DOJ/NIJ and the National Academy of Sciences over authority to conduct forensic science research); Solomon Moore, Science Found Wanting in Nation's Crime Labs, N.Y. Times (Feb. 4, 2009) (describing "turf wars" between law enforcement and scientific communities in connection with NAS Report); see generally William J. Stuntz, The Pathological Politics of Criminal Law, 100 Mich. L. Rev. 505 (2001) (detailing institutional dynamics and political incentives that push toward a political alliance between prosecutors and legislatures).

[53] S. Rep. No. 109-88, at 46 (directing the formation of "an independent Forensic Science Committee," to include "members . . . representing operational crime laboratories, medical examiners, and coroners; legal experts; and other scientists as determined appropriate").

[54] NAS Report, supra note 8, at Appx. A (listing members and biographies).

[55] See id.; see also Testimony of Barry Matson, Senate Judiciary Committee Hearing, Strengthening Forensic Science (Sept. 9, 2009) (responding to NAS Report and noting that "absence of prosecutors on the National Academy of Sciences Committee on Forensic Sciences has not been lost on those of us serving every day in the trenches of America's courtrooms"); Meredith Mays, Forensic Science Reform Continues, The Police Chief (Nov. 2009), available at http://www.policechiefmagazine.org/magazine/index.cfm?fuseaction=display&article_id=1938&issue_id=112009 (noting objection of International Association of Chiefs of Police that "the report was developed without input from law enforcement practitioners and recommends their input be sought).

[56] NAS Report, supra note 8, at 2, Appx. B (describing witnesses and meeting agendas).

[57] NAS Report, supra note 8, at 2.

[58] See supra text accompanying notes ___.

reality among the nearly 400 public crime laboratories in the United States.[59] Techniques long relied on by law enforcement and accepted by courts – pattern identification analysis ranging from fingerprints to shoe prints to ballistics, hair and fiber analysis, and questioned document analysis, among other disciplines – were called out as never having been systematically and scientifically validated.[60] The Report's thirteen recommendations for reform were no less sweeping. It called for large scale reform of crime laboratory practices, from development of standardized protocols for conducting and documenting particular forensic tests, to development of a national code of ethics and greater proficiency oversight.[61] It outlined an ambitious agenda for expanding research and education directed at improving laboratory practice at its foundation—independent research into the "accuracy, reliability, and validity in the forensic science disciplines" as well as "observer bias" on the part of analysts,[62] development of graduate education programs in the forensic sciences.[63]; encourage continuing legal education in re forensic science for law students, practitioners, and judges[64]--and at enhancing two specific applications of forensic science: fingerprint and AFIS,[65] and homeland security.[66] Finally, two specific proposals were advanced as foundational to all of the above: establishing a new federal agency, the National Institute of Forensic Science ("NIFS"), charged with, funding and agenda-setting in the forensic sciences, including carrying out the Report's laboratory and research recommendations; and restructuring crime laboratories to make them "independent" from law enforcement organizations.[67]

While the recommendations themselves are detailed and the factual findings animating them clear, the path forward sketched by the Report is premised on several far more implicit assumptions concerning the relationship of forensic science to the criminal justice system more generally---none of which is inexorable, and all of which are crucial to the success of the Report's intervention. Two are key for present purposes: (1) that more good science will enhance the quality of criminal justice; and (2) that a better-resourced and more independent forensic community will achieve premise (1). Part II will turn to demonstrating that a fuller accounting for the use of forensic science in the criminal justice system complicates the coherence of these premises. First, however, it is worth reflecting on the presence and significance of these assumptions embedded within the NAS Report.

1. The Science-Justice Link

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[59] See Burch et al., supra note 23.

[60] NAS Report, supra note 8, at 39, 85—110, 127—82.

[61] NAS Report, supra note 8, at 22-24.

[62] NAS Report, supra note 8, at 24

[63] NAS Report, supra note 8, at 27—28.

[64] NAS Report, supra note 8, at 28.

[65] Id.

[66] Id.

[67] Id. at 22.

The NAS Report paints a discomforting picture of the current state of forensic science, to say the least.[68] Against this bleak backdrop, it is striking that the tenor and prescriptive thrust of the NAS Report is a commitment to promote the *expansion* of forensic science, and a belief that more forensic science, so long as it is *good*, will advance the ends of justice in the criminal law.[69] The view is of a field failing to live up to its potential, and the solution for this failure is to address the multiple facets of "underresourc[ing]" in forensic science, not to reconsider the primacy placed on scientific evidence in criminal investigations and prosecutions.[70] In this regard, the NAS Report echoes concerns expressed both by law enforcement and defense and innocence communities that "the investigative capabilities of forensic science are not being realized"[71]---inhibiting both detection and correction in criminal cases.

Highlighting the extent to which the NAS Report is premised on a view that maximizing science will in turn maximize the reliability of outcomes in the criminal justice system, and bearing down on the details of that view, permits reflection on three facets of that view that are essentially unexplored by the Report. First, while the notion that forensic science holds out the dual promise of convicting the guilty and freeing the innocent has become something of a requisite incantation in the literature, it is not without important critics. Scholars of science, including several who have been engaged in the forensic science debates, have problematized faith in science, particularly as tool of inclusion rather than exclusion in the criminal justice

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[68] See supra notes __ and accompanying text.

[69] NAS Report, supra note 8, at 20 ("The benefits that will flow from a strong, independent, strategic, coherent, and well-funded federal program to support and oversee the forensic science disciplines in this country are clear: The Nation will (1) bolster its ability to more accurately identify true perpetrators and exclude those who are falsely accused; (2) improve its ability to effectively respond to, attribute, and prosecute threats to homeland security; and (3) reduce the likelihood of convictions resting on inaccurate data.").

[70] Id. at 14—15 ("Being underresourced also means that the tools of forensic science—and the knowledge base that underpins the analysis and interpretation of evidence—are not as strong as they could be, thus hindering the ability of the forensic science disciplines to excel at informing investigations, providing strong evidence, and avoiding errors in important ways.")

[71] See, e.g., Kevin Strom et al., 2007 Survey of Law Enforcement Evidence Processing: Final Report 4-5 (Oct. 2009), available at https://www.ncjrs.gov/pdffiles1/nij/grants/228415.pdf ("[S]ome U.S. law enforcement agencies continue to have only a limited understanding of the full benefits of forensic evidence and a mindset that forensic evidence is beneficial mainly for prosecuting crimes, not for developing new leads in investigations."); Kevin J. Strom & Matthew J. Hickman, Unanalyzed Evidence in Law-Enforcement Agencies: A National Examination of Forensic Processing in Police Departments, 9 Criminology & Pub. Policy 381, 391—93 (2010); Emma Disley et al., Toward a Comparison of DNA Profiling and Databases in the United States and England 1 (RAND 2010), available at http://www.rand.org/content/dam/rand/pubs/technical_reports/2010/RAND_TR918.pdf (noting U.S. law enforcement community's envy of United Kingdom's broader and more accelerated use of forensic DNA in investigations); Nancy Petro, Early DNA Testing Could Prevent Nightmare of Wrongful Charges, Wrongful Conviction Blog, Aug. 20, 2012, http://wrongfulconvictionsblog.org/2012/08/20/early-dna-testing-could-prevent-nightmare-of-wrongful-charges/ (reporting story from Maryland); California Task Force on Forensic Services, Report 68 (2003), available at oag.ca.gov/sites/all/files/pdfs/publications/bfs_bookmarks.pdf (**"**With the advent of AFIS, CODIS, and NIBIN, the ability of the laboratory to link items of evidence to a previously unidentified suspect has grown tremendously. . . . Unfortunately, the rules by which investigators currently prioritize cases and evidence for examination by resource-constrained laboratories mitigate against the use of this capability for cases that are not the very most serious or highest profile.").

system. Sheila Jasanoff has cautioned that the always imperfect process of scientific production is bound to be systematically less reliable when wielded in the service of catching and convicting criminals (a goal that all motivational and cognitive biases already gird) rather than exonerating them.[72] Other scholars, have challenged the widely presumed objectivity and reliability of DNA and other "second generation" forensic technologies that are now trusted by law enforcement (and the NAS Report) to not only confirm but also develop suspects in the first instance.[73] Thus, even setting aside concerns about whether trade-offs in privacy and civil liberties are compensated by gains offered by expanded government collection and manipulation of identifying information,[74] the notion that more, good science leads fairly inexorably to more good criminal justice outcomes is not entirely obvious. Significantly, these more critical views reflect a markedly dynamic understanding of forensic science, contemplating as they do the consequences of other players in the criminal justice system contributing to the production of and making use of laboratory-generated evidence in ways that may be in tension with---or perhaps problematize---the objective claims of science. As we shall see, this dynamism is largely lacking from the NAS Report.

Second, the NAS Report's confidence in the future of forensic science is methodologically agnostic, and thereby rejects any notion that DNA and other "second generation forensics"[75] would largely supplant, or at least significantly marginalize, their more traditional cousins. Rather, traditional techniques must, but can, learn from DNA---and the government should support this aim through funding for validation research and laboratory resources.[76] While conceding that the "scientific foundation" of these disciplines "is currently limited" and that some might have limited prospects for validation to support claims of individualization that are currently made in courtrooms, such analysis "might have the capacity (or the potential) to provide probative information to advance a criminal investigation."[77] The view that some forensic methods might not offer sufficiently reliable or discrete information for a jury's assessment, but can be reliably wielded by law enforcement to generate or exclude suspects is plausible but far from intuitively correct.[78] More to the point, it effectively commits

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[72] See Sheila Jasanoff, Just Evidence: The Limits of Science in the Legal Process, 34 J. L. Med. & Ethics 328, 337 (2006).

[73] See Murphy, New Forensics, supra note 29, at 267-74; Simon A. Cole & Michael Lynch, The Social and Legal Construction of Suspects, 2 Ann. Rev. L. & Soc. Sci. 39 (2006).

[74] See, e.g., Sledon Krimsky & Tania Simoncelli, Genetic Justice: DNA Data Banks, Criminal Investigations, and Civil Liberties 225-320 (2011) (exploring privacy, civil liberties, and civil rights concerns from expanded exploitation of DNA).

[75] See Murphy, New Forensics, supra note 29, at 744.

[76] See NAS Report, supra note 8, at 133.

[77] NAS Report, supra note 8, at 127.

[78] Cf. Emily Meazel, Super Deference, The Science Obsession, and Judicial Review as Translation of Agency Science, 109 Mich. L. Rev. 733, 733-35, 753-54 (2011) (evaluating deference versus judicial scrutiny of agency science).

significant discretion to investigators and prosecutors to select among scientific tools to aid in investigations.

A third and final point to be made concerning the NAS Report's presumed tie between science and reliable criminal justice outcomes is that it is almost entirely, and expressly, focused on a single producer-user relationship---namely, from the laboratory to the courtroom. To be sure, the Report understands that police (and to some extent prosecutors) will utilize the results of forensic analysis to make decisions in the course of criminal cases long before arrest, much less trial. Nevertheless, the overriding emphasis of the Report's recommendations concerning both research and standard-setting---recommendations that form the heart of its reliability-enhancing project---are proposed with an eye to trial-oriented decisions such as the admissibility of evidence and the form and integrity of testimony presented to judges and juries.[79] Indeed, it is against the backdrop of a view that "the courts have been utterly ineffective in addressing" the problem of invalid or unverified science"[80] that the Report concludes that the forensic science profession itself must shore up its inputs to adjudication.

Of course, the overwhelming majority of charged criminal cases never see the inside of a courtroom, since some ninety-five percent terminate in a guilty plea.[81] More to the point, the overwhelming majority of physical evidence available in a case never sees the fluorescent light of a laboratory, and much of what a laboratory *could* produce is never actually generated for use in criminal cases. The reasons for this aspect of the "underutilization" question are complex, and to be sure are at least partly related to laboratory-centered circumstances---in particular, as the NAS Report noted, work backlogs that might discourage utilization.[82] But, as the next Part discusses in detail, an array of decisions made outside a laboratory by police and prosecutors deciding what evidence to collect, what evidence to submit for testing, and how (if at all) to act upon analysis that a laboratory can or does perform are undoubtedly factors to be considered in the equation. The fact that for all of these reasons police and prosecutors are themselves playing critical, frequently dispositive, roles in "adjudicating" the significance of scientific evidence in a particular case[83] is a reality that the NAS Report does not grapple with.

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[79] NAS Report, supra note 8, at 127.

[80] NAS Report, supra note 8, at 53 (adding that "judicial review, *by itself*, is not the answer" (emphasis added)).

[81] See U.S. Dep't of Justice, Bureau of Justice Statistics, Sourcebook of Criminal Justice Statistics Online, at tbl 5.46.2002 (2002), available at http://www.albany.edu/sourcebook/pdf/t5462002.pdf. Plea rates are lower, though still quite high, for rapes, murders, and other violent crimes. Id.

[82] See, e.g., NAS Report, supra note 8, at 37 (reporting that "backlogs discourage law enforcement personnel and organizations from submitting evidence").

[83] See Rachel E. Barkow, Institutional Design and the Policing of Prosecutors: Lessons from Administrative Law, 61 Stan. L. Rev. 869, 871 (2009) (discussing adjudicative role that prosecutors play in light of plea rates); Gerard E. Lynch, Our Administrative System of Criminal Justice, 66 Fordham L. Rev. 2117, 2149 (1998) ("[P]rosecutors, in their discretionary charging and plea bargaining decisions, are acting largely as administrative, quasi-judicial decision-makers.").

2. Funds and Firewalls

If the NAS Report viewed the wagon of criminal justice as hitched to the star of forensic science, it understood resource constraints and professional infrastructure as the primary, and interconnected, barriers on the path forward. As the previous section discussed, the Committee identified at the outset that the greatest concern raised by its investigation was "underresourcing" in the forensic sciences: inadequate resources devoted to foundational research to validate forensic methodologies; and inadequate laboratory resources to support consistent, reliable, and expeditious work.[84] At the same time, the Committee concluded that a necessary condition for harnessing the justice-advancing potential of the forensic science field is the severance of its administrative and, critically, its professional ties to the law enforcement institutions that utilize its product[85]---a conclusion reflected in many of the Report's recommendations, but perhaps most clearly in the controversial proposals to remove public forensic laboratories "from the administrative control of law enforcement," and to establish a national oversight body housed *outside* the Department of Justice.[86] The goal for the field should be *professionalization*: "[f]ull adoption of [the] scientific culture," which is viewed as entailing commitments that are distinct from the law (and criminal law in particular), and which in turn give scientific evidence a special claim to validity within legal culture.[87] The NAS Report calls for NIFS to superintend the development of all the hallmarks of professional solidification:[88] educational pathways,[89] technical standards of practice,[90] ethical norms,[91] and centralized certification and accreditation of practitioners.[92] Research and educational programs are to reflect greater connectivity with "the broader scientific community," and the Committee repeatedly drew on examples from other technical and scientific professions as models for a professional infrastructure for forensic science.[93]

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[84] NAS Report, supra note 8, at 77.

[85] NAS Report, supra note 8, at 23, __ ("The best science is conducted in a scientific setting as opposed to a law enforcement setting.").

[86] NAS Report, supra note 8, at 24, 80—81; id. at 18 (""In sum, the committee concluded that advancing *science* in the forensic science enterprise is not likely to be achieved within the confines of the DOJ.").

[87] NAS Report, supra note 8, at 111, 125; see also id. at 111 (quoting Sir Isaac Newton's description of the scientific method).

[88] See, e.g., Richard H. Hall, Professionalization and Bureaucratization, 33 Am. Sociological Rev. 92, 93 (1968); Mills & Vollmer, Professionalization (1966).

[89] NAS Report, supra note 8, at __.

[90] NAS Report, supra note 8, at 194 ("Standards and best practices create a professional environment that allows organizations and professions to create quality systems, policies, and procedures and maintain autonomy from vested interest groups.").

[91] NAS Report, supra note 8, at __.

[92] NAS Report, supra note 8, at 25.

[93] NAS Report, supra note --, at 194, 195, 208, 212 (referring to examples from "technical professions" including clinical laboratory research, medicine, and engineering0.

But critically, in the view of the NAS Report a direct relationship existed among the three aims of enhancing the quality of criminal justice, addressing underutilization, and achieving forensic science independence and professionalization. Professionalization would contribute directly to reliability of outcomes by addressing issues of bias, both motivational and cognitive, in forensic analysis. Motivationally, the Committee credited the concerns from academia and the defense community (substantiated at least anecdotally by the forensic science scandals of the last decade) that forensic analysts view themselves as aligned with the interests of law enforcement, and that "[b]ecause forensic scientists often are driven in their work by a need to answer a particular question related to the issues of a particular case, they sometimes face pressure to sacrifice appropriate methodology for the sake of expediency."[94] Cognitively, the Committee was moved by the burgeoning social science literature, as well as the spectacular failure of fingerprint analysis in the FBI's investigation of Brandon Mayfield in connection with the 2005 Madrid subway bombing, demonstrating that information often made available to forensic analysts by the law enforcement officials with whom they work---about the identities of suspects, or about the general strength of the state's case, for example---can *unconsciously* and *unintentionally* lead to false conclusions systematically skewed in the state's favor.[95]

Also, however, professionalization is viewed as making a more indirect contribution to reliability by addressing the problem of "underresourcing." In a world of limited budgets, the Committee concluded that crime laboratory administrators were systematically disadvantaged in competing against other priorities in a police organization to obtain the budgetary capacity necessary to generate reliable analysis.[96] More broadly, resources devoted to the field and funneled through law enforcement institutions like the DOJ (and the NIJ) would not be devoted to the pursuit of scientific truth (wherever it may lie), but to self-serving confirmation of the already developed infrastructure for forensic evidence.

In all events, administrative segregation is viewed as a key feature of professionalism and the synergy with resourcing and general reliability concerns,[97] and there is no suggestion that any tension exists among those three facets of the Report's view of the field. Unsurprisingly, these features of the NAS Report's reform agenda garnered the most negative response: While forensic science practitioners, police, and prosecutors largely welcomed calls for better resourcing and expanded research in the field, they have opposed calls for outside regulation as

[94] NAS Report, supra note 8, at 24.

[95] NAS Report, supra note 8, at 123-24 (citing work by, among others, Itiel Dror, and discussing the Mayfield case).

[96] NAS Report, supra note 8, at __; cf. Bashinski & Peterson, supra note __, at 581 (arguing that laboratories located within law enforcement agencies should be situated "as high in the [police] organization as possible] because of "the special budgetary requirements of a laboratory and the need for it to maintain scientific independence," and cautioning that "placing the laboratory in a part of the organization . . . that may not recognize the ssignificance of forensic science in the criminal investigation process may condemn the laboratory to a reduced level of budgetary support and may keep it from developing effective and necessary communications and rapport with investigative units").

[97] NAS Report, supra note 8, at 23.

well as the institutional independence of laboratories.[98] Also perhaps unsurprising, given the academic consensus prior to the Report, none of the opposition to independence or national oversight emanating from the forensic science and law enforcement communities has enjoyed a serious defense from outside law enforcement circles.[99] But politics and self-interest aside, there may well be a more complicated relationship among the three aims of professionalism, resourcing, and reliability than what the NAS Report presumes, or so the next Part will contend.

II. What's Missing

This Section tells a different sort of story about forensic science, one that does not take place primarily in the laboratory, or even in the courtroom, but rather at crime scenes, in squad rooms, and in prosecutors' offices in the course of criminal investigations. It aims to sketch the numerous ways in which law enforcement actors exercise discretion in regard to the production and use of forensic science that is (like much of criminal investigation and pretrial prosecutorial work) largely unexamined and unregulated. The picture that emerges problematizes both premises of the NAS Report, to the extent that its reform recommendations essentially ignore critical facets of police and prosecutorial action that affect both the quantity and quality of forensic science and its impact on the criminal justice system.

A caveat is necessary at the outset. By necessity, the account in Part II traffics significantly in generalization. To do otherwise would be an undertaking both enormous---accounting as it must for the massive and diverse set of actors, organizations, and practices

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[98] See Joseph P. Bono, Forensic Science Reform in the 21st Century: A Major Conference, A Blockbuster Report and Reasons to be Pessimistic, 58 UCLA L. Rev. 781, 788 (2010) (president of the American Academy of Forensic Sciences, criticizing NAS Report as biased and unrepresentative); National District Attorneys Association, Written Statement for the Record, U.S. Sen. Cmte. on Commerce, Sci. & Trans., Turning the Investigation on the Science of Forensics (Dec. 7, 2011), available at http://www.theiai.org/current_affairs/20111207_TurningInvestigationOnScienceOfForensics.pdf (last visited Apr. 1, 2012); International Association of Chiefs of Police, Reponse, available at http://www.policechiefmagazine.org/magazine/index.cfm?fuseaction=display_arch&article_id=1887&issue_id=92009; National District Attorneys Association, Resolution in Support of Efforts to Strengthen Forensic Science in the United States, available at http://www.ndaa.org/pdf/NDAA_strengthen_forensic_science_resolution_4_10.pdf.; Meredith Mays, Forensic Science Reform Continues, The Police Chief (Nov. 2009) , available at http://www.policechiefmagazine.org/magazine/index.cfm?fuseaction=display&article_id=1938&issue_id=112009 (describing objections of International Association of Chiefs of Police to NAS Report); ASCLD/LAB Newsletter, The ASCLD/LAB Board Reacts to the NAS Study (Mar. 26, 2009), available at http://www.ascld-lab.org/communications/newsletters/2009_march_newsletter.pdf (reporting view of Association of Crime Lab Directors largely embracing Report recommendations but rejecting independence and NIFS proposals).

[99] See, e.g., Michael Risinger, Pitfalls, 2010 Utah L. Rev. 225, 225—26, 236-39 (arguing that "the [NAS] Report has now made it untenable to treat criticisms as simply the cavils of uninformed academics with nothing better to do" though calling the NIFS and independence proposals politically infeasible); Jonathan J. Koehler, Forensic Science Reform in the 21st Century: A Major Conference, a Blockbuster Report and Reasons to be Pessimistic, 9 L. Probability & Risk 1, 2 (2010) (asserting that NAS Report adopted the views of non-practitioner observers of forensic science); Mnookin et al., supra note __, at __. But see D. Michael Risinger, The NAS Report on Forensic Science: A Glass Nine-Tenths Full (This is About the Other Tenth), 50 Jurimetrics 21 (2009) (criticizing the Report for not going far enough in prescribing standards of laboratory practice to curb analyst bias, and instead merely calling for further research on the subject).

represented by the country's more than 15,000 law enforcement agencies and 2300 prosecutors' offices[100]---and ultimately impossible---stymied as it is by a relative paucity of empirical data about the practices that are most relevant to the account.[101] The Article responds to this challenge with something of a dance between the general and the particular, the theoretical and the anecdotal, the speculative and the data-driven. I make one significant qualifying cut, confining the analysis (broad brush though it is) to non-federal criminal law; the role of the FBI crime laboratory, the unique structure and role of U.S. Attorney's Offices vis-à-vis federal (as well as state) investigators, and the distinctive (and, when compared to the states on aggregate, far smaller) caseload on the federal side (including perhaps most significantly a relative dearth of the violent crimes and property crimes) render the story on the federal side sufficiently distinctive to be laid to the side. The account that follows attempts to marshal what empirical evidence is available with respect to the criminal justice system and forensic science usage to offer a plausible account of what might be happening "on the ground"; and indeed, one independent aim here is to highlight the social science literature in this area, which is limited but also dramatically under-utilized in legal academic accounts of the field. To be sure, this is an approach that runs the grave risk of saying both too much (in over-generality) and too little (in the selectivity of its focus). Nevertheless, it is a starting point for questioning the completeness of the NAS Report's agenda, and for beginning to forge ahead down an admittedly more complex, but hopefully more fruitful, path forward.

A. Upstream Discretion

1. Evidence Collection

It is perhaps too obvious to state that the quality and reliability of forensic science is entirely dependent upon the quality and reliability of the processes by which the analyzed evidence is collected.[102] By "collection," I refer to a range of activities that occur in relation to

[100] Brian A. Reaves, Bureau of Justice Statistics, Census of State and Local Law Enforcement Agencies, 2004, at 1 (Carolyn C. Williams ed.) (2007) (reporting 12,766 local police departments and 3,067 sheriffs' offices), available at http:// www.ojp.usdoj.gov/bjs/abstract/csllea04.htm.2005; [cite for federal agencies]; Duren Banks & Steven W. Perry, Prosecutors in State Courts, 2007 – Statistical Tables, at 2 (Dec. 2011), available at http://bjs.ojp.usdoj.gov/content/pub/pdf/psc07st.pdf.

[101] Brian Forst, Improving Police Effectiveness and Transparency: National Information Needs on Law Enforcement (Prepared for presentation at the Bureau of Justice Statistics Data User's Workshop, Feb. 12, 2008), at 2, 6 ("In today's world of information and the ready availability of statistical tools to anlyze it, one can only marvel at how little we know about what the police could do to raise the rate at which victimizations end in conviction from well below 10% to perhaps 20% or more." (and encouraging BJS and NIJ to do more, and specifically suggesting more data collection in regard to patrol versus investigation, effect of police practices on conversion from arrest to conviction, police management, and "use of technology")).

[102] See Vernon J. Geberth, Practical Homicide Investigation: Tactics, Procedures, and Forensic Techniques 167 (1996); Henry C. Lee et al., Henry Lee's Crime Scene Handbook 1 (2001). Mike Redmayne, Expert Evidence and Criminal Justice 23 (2001) (noting that "most fundamental" issue affecting use of forensic science is that "[t]race evidence cannot be used unless the police are aware of its existence and usefulness, and know how to collect and preserve it"); Bashinski & Peterson, supra note __, at 568 ("The effectiveness of a forensic operation rests on the ability of the police department's evidence recovery system to recognize, preserve, document, and retrieve relevant physical evidence."); John K. Roman et al., The DNA Field Experiment: Cost-Effectiveness Analysis of the Use of

spatial or physical locations---primarily, a geographic location where a crime occurred, the body of a victim (as when as sexual assault kit is collected) or the body of a suspect (as when reference samples are collected for comparison to evidence found on a victim or at a crime scene). In addition to evidence gathering, other activities such as transportation (typically first to a police storage facility to await possible transmittal to a laboratory) and documentation also must occur in this stage.[103] The stakes are high. If evidence is not identified and gathered, or if it is collected, transported, and stored in a deficient manner,[104] items that could have established an element of a crime, or implicated a perpetrator, or exculpate a suspect, could be destroyed or lost---or worse, could generate inaccurate forensic testing outcomes.[105] Somewhat less obviously and far less glamorously, if the steps of evidence collection are not documented to show what, how, and when physical evidence was collected, exploitation of that evidence could be compromised (by, for example, precluding admissibility under chain of custody rules), and the ability for downstream actors to evaluate the integrity of the evidence and the investigation that uncovered it will be compromised.[106]

Evidence collection practices and priorities have been identified by criminal justice researchers as systematically suppressing forensic analysis in at least some cases in which it might be thought to aid in detection or arrest, such as in the property crimes and sexual assault examples described above. The consequences of deficiencies in evidence collection are at least sometimes borne by identified, and putatively innocent, suspects as well. O.J. Simpson's highly publicized criminal trial popularized such concerns, when his attorneys successfully neutralized evidence of a DNA match between Simpson's blood and that found at the scene of his wife's (and her companion's) murder by arguing that police and laboratory sloppiness and corruption rather than Simpson's presence at the crime scene explained the inculpatory evidence.[107] In New York's notorious Central Park Jogger case, failure to properly handle evidence likely led to the identification of hairs that were transferred at the police station and not the crime scene.[108] One of the Supreme Court's recent forays into actual innocence claims concerned plausible

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DNA in the Investigation of High-Volume Crimes 11-12 (2008) ("Biological specimens must be properly collected, stored, and submitted to the crime lab to get a sample that can be analyzed.").

[103] See, e.g., Technical Working Group on Crime Scene Investigation, Crime Scene Investigation: A Guide for Law Enforcement 17-32 (2000) (directing officers to document each stage of crime scene response and evidence collection).

[104] Typically, though not always, physical evidence is gathered from a crime scene, and transported to a non-laboratory police storage facility to await a decision concerning submission for testing. SOURCE ___.

[105] See Bashinski & Peterson, supra note __, at 572 ("For example, evidence that could exclude a suspect may be overlooked at the scene if the crime scene examiner has prematurely focused on a particular theory of reconstruction. Or physical evidence capable of answering a critical investigative question may never be analyzed if an investigator is unaware of its potential value.").

[106] See, e.g., Bashinski & Peterson, supra note __, at 568.

[107] See, e.g., Aronson, supra note __, at __ (describing defense strategy of arguing that contamination occurred in crime scene processing).

[108] NYS Bar Association Report 42 (2009), available at ___.

allegations of flawed blood spatter analysis as a result of poor evidence handling and transport.[109] And a recent exoneration in a Texas murder case featured a near-miss in this regard: A bandana initially overlooked by investigators because it was located beyond the confines of what they adjudged the crime scene was recovered by an enterprising relative of the victim and became critical in exonerating the wrongful convicted defendant and identifying the actual murderer.[110] There is fair reason to think that Morton's near-miss is not an isolated occurrance.[111]

The NAS Report itself recognized the critical status of evidence collection for the integrity of forensic analysis, but opted (expressly) not to take up that precursor stage of forensic analysis.[112] This is likely because, as a general matter, evidence collection only occasionally, and at most partly, is a laboratory function. Only about half of the nation's crime laboratories even engage in crime scene response, and fewer than half of state laboratories do so (with a greater percentage of municipal and county laboratories offering such services).[113] This makes

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[109] See House v. Bell, 547 U.S. 518, 543-46 (2006) (describing allegation of shoddy evidence storage and transport undermining blood spatter evidence, in capital case in which exculpatory DNA testing was later conducted). These risks at the collection stage are only exacerbated in the DNA era---not simply because of the potential enormity of a missed opportunity to subject evidence to DNA testing, but also because, ironically, the sensitivity of the most current techniques of DNA analysis increases the potential for contaminated evidence to yield profiles of individuals who are not legitimate suspects in a crime. See Murphy, New Forensics, supra note 29, at 721; see also District Attorney's Office for the Third Judicial District v. Osborne, 557 U.S. 52, 80 (2009) (Alito, J., concurring) (noting that DNA testing is unique both in its promise of certainty and in its sensitivity to contamination).

[110] See, e.g., Editorial Board, Duty the Best Choice to Lead District Attorney's Office, Austin American Statesman (May 19, 2012) (reporting that Williamson County DA fought DNA testing on bandana because it had not been recovered at what police determined was crime scene). Other anecdotal examples abound.

[111] See Ex Parte Miles, 359 S.W.3d 647, 651-52 & n.4 (Tex. Crim. App. 2012) (discussing, in context of innocence claim, that copious amounts of evidence were collected, however the detective officer in charge of the canvass did not search an area in the bushes where an eyewitness---ultimately the state's primary witness against the defendant---identified the shooter as hiding); Kaye, supra note __, at 258 ("Of course, the laboratory is not going to come back with a report that states that suspect 1 is the driver if its STR testing plainly excludes the suspect as the source of material swabbed from the driver's airbag, but what might additional swabs from both airbags show?"); Johathan Schuppe & William Kleinknecht, Evidence of a Crisis, The Star Ledger (Jan. 30, 2006) (describing beleaguered Essex County Crime Scene Unit and Newark homicide investigation in which no physical evidence was recovered); Robert B. Bates, Curing Investigative Tunnel Vision, The Police Chief, at 41 (Jan. 1987) (discussing investigative impact of overly selective collection of fingerprint evidence). But of course, where documentation practices are weak, it is more difficult to identify the extent of the problem. Critically, documentation is likely to be the weakest in the cases that will naturally receive the least scrutiny: relatively minor offenses carrying relatively low sentences that are likely to lead to early negotiated guilty pleas.

[112] See NAS Report, supra note 8, at 57, 183.

[113] See Burch et al., supra note 23, at 3, 5, 9; Frank Horvath et al., A National Survey of Police Policies and Practices Regarding the Criminal Investigation Process: Twenty-Five Years After RAND 76 (November 2001) ("[I]n most agencies evidence-related duties are not assigned predominantly to any one type of individual or position. Rather, they are more likely to be shared among patrol officers . . . investigators . . . and evidence technicians."); Roman et al., supra note __, at 349—50 (describing range of evidence collection responsibilities among five studied jurisdictions, including committing task to crime scene investigators, to patrol, and to teams made up of technicians,

sense, as evidence collection must frequently occur in a short time frame on little notice---conditions that in the mine run of cases do not lend themselves to response from an organizational entity that might be separated by many hundreds of miles from the crime scene.

Indeed, it is most often the case that, across jurisdictions and crime categories, patrol officers---typically the most junior personnel with the greatest minute-to-minute demands on their time [114] ---will engage in initial, critical evidence-collection activities, and may be responsible for the entirety of these tasks.[115] At minimum, patrol are typically first responders to a reported crime, and will perform critical foundational tasks such as establishing a crime scene, the spatial parameters of which will guide the search for evidence, and securing that scene to prevent human and environmental contamination. [116] In small departments that lack the personnel to differentiate between patrol and investigative functions, or in most departments where a reported crime is less serious (as a matter of formal or informal policy), this same first responder will likely personally perform or at least coordinate the full task of evidence collection.[117] Where a department's size permits role differentiation and the reported crime is more serious---homicides, sexual assaults, and serious assaults or violent property crimes---a trained investigator such as a detective will typically direct or personally conduct evidence collection after the patrol officer's initial preliminary crime scene response.[118] And additionally,

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patrol, and detectives); Barry A.J. Fisher et al., Introduction to Criminalistics 5 (2009); see also Keith Inman & Norah Rudin, Principles and Practice of Criminalistics: The Profession of Forensic Science 62 (2001) ("The individual making decisions about what evidence to collect and the person given the responsibility to collect it vary widely between jurisdictions, so it is difficult to generalize."); Technical Working Group on Crime Scene Investigation, Crime Scene Investigation: A Guide for Law Enforcement (2000) (reporting wide variation).

[114] See William H. Bieck et al., The Patrol Function, *in* Local Government Police Management 59-60 (3d ed. 1991). With regard to training, requirements vary by state and department. See generally Brian A. Reaves, State and Local Law Enforcement Training Academies, 2006 (Feb. 2009); see also Nancy Marion, Police academy training: are we teaching recruits what they need to know?, 21 Policing: An International Journal of Police Strategies & Management 54, 56-57 (1998) (summarizing). In Texas for example, a course in crime scene investigation is required only for "intermediate peace officer certification." Texas CLEOSE, at http://www.tcleose.state.tx.us/publications/publications_gen/rules_handbook.pdf. Basic certification requires a forty-four hour course in "investigation," which includes one unit in "Protection of and Crime Scene Search." See Texas CLEOSE, at http://www.tcleose.state.tx.us/publications/publications_gen/history_of_the_bpoc_course.pdf (March 2008).

[115] Technical Working Group on CSI at 14-16; Horvath et al., supra note __, at 6; Fred E. Inbau et al., Scientific Police Investigation 36 (1972); Paul L. Kirk & Lowell W. Bradford, The Crime Laboratory: Organization and Operation 105 (Paul L. Kird ed., Thomas Books 1965).

[116] Vernon J. Geberth, Practical Homicide Investigation: Tactics, Procedures, and Forensic Techniques 43 (1996) ("In almost all instances, the first officer to arrive at any homicide crime scene is the uniformed patrol officer.").

[117] Id.

[118] See Eck, supra note _ at 144 ("Patrol officers are typically the first investigators at a crime scene. . . . The more evidence they collect, the greater the likelihood that further investigation will be productive. . . . For some very complex crimes . . . a specialist, usually a detective, has to be sent to the crime scene at the beginning of the investigation."); Horvath et al., supra note __, at 6, 34-35, 41 (reporting that most preliminary investigation, particularly during the initial response and preliminary investigation stages, are conducted by patrol officers, and that patrol is critical to evidence collection); Frank Horvath & Robert Messig, The Criminal Investigative Process

some law enforcement organizations have specially trained evidence technicians or crime scene responders that are institutionally located within patrol or other units; in the smallest departments, they will likely simply be police officers who primarily perform other functions (either patrol or investigative) but have some additional training or, more likely, experience in evidence collection.[119] In the most serious crimes, particularly homicides, there may be policies in place whereby one or more evidence technicians respond to the scene and assist in evidence collection---though more likely, this is a decision largely within the discretion of an investigator or even a patrol officer.[120] In less serious offenses, and particularly in smaller jurisdictions, a trained evidence technician might but often will not be available as needed to collect evidence such as latent prints or items containing biological material.[121]

Having a picture in mind of *who* is doing this work is important for assessing the factors affecting the quantity and quality of evidence gathering as a precursor to laboratory analysis. Importantly, the degree of selectivity that is occurring at this early stage is more dramatic than might commonly be appreciated. The best, albeit limited, empirical data that exists indicates that, across the board, significantly less physical evidence is collected in most cases than is available, that the rates of collection vary widely across categories of crime, and that this has gap between collection potential and actuality has not meaningfully diminished even as forensic science has become a more central feature of criminal cases. A recent study sponsored by the National Institute of Justice revealed that (across four urban jurisdictions) some physical evidence was collected in nearly all homicide investigations initiated during the study period, but in only thirty percent of assault investigations and only twenty percent of burglary investigations.[122] Even rape cases, which to most minds probably stand apart as consistently offering physical evidence that is likely to be of probative value, only sixty-four percent featured

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and the Role of Forensic Evidence: A Review of Empirical Findings, 41 J. Forensic Sci. 963, 977 (1996) ("In most criminal investigations, it is the patrol officer who initially responds to and collects the majority of the physical evidence ... Thus, in most instances, what the patrol officer does during this preliminary investigation has a significant impact on whether the case will survive the case screen process, and be assigned for follow-up investigation. Therefore, if in this initial response, there is a failure to recognize or to collect potentially valuable evidence, particularly from a suspect, the case outcome is likely to be adversely affected.").

[119] See Childs et al., supra note __; Roman et al., supra note __, at 70; Horvath, supra note __, at 76. Strikingly, in Horvath et al.'s survey of law enforcement organizations, twelve percent of responding agencies indicated that evidence technicians were *not* required to have any specialized training. Id.

[120] Joseph A. Peterson et al., The Role and Impact of Forensic Evidence in the Criminal Justice System 22 (Sept. 2010), available at https://www.ncjrs.gov/pdffiles1/nij/grants/231977.pdf [hereinafter Peterson et al., Role and Impact of Forensic Evidence].

[121] Jan M. Chaiken, The Criminal Investigation Process Volume II: Survey of Municipal and County Police Departments 25 (1975) (reporting more than 80% of departments having evidence technicians); Horvath et al., supra note __, at 75-76 (reporting only 45% of agencies employ evidence technicians); Saferstein, supra note __, at 16 (noting that in most police forces "a patrol officer or detective is charged with the responsibility of collecting the evidence," and that their effectiveness "will be dependent on the extent of . . . training and working relationship with the laboratory").

[122] Peterson et al., Role and Impact of Forensic Evidence, at 46, 63, 78.

crime scene evidence collection.[123] To some extent these percentages reflect variation among crimes in terms of manner and area of commission that will affect the existence of physical evidence: Biological evidence is less likely to be left behind in a non-violent property crime than a sexual assault, while fingerprints are at least as if not more likely to be left in the former than the latter.[124] But "natural" variation is not the whole story, as shown by a number of innovative studies that have actually *checked* the evidence collection work of crime scene responders,[125] or have compared evidence collection rates in a given jurisdiction with and without the intervention of training or standardized collection procedures.[126] Human selectivity and error is undoubtedly a major driver.

What factors animate selectivity? Institutional and individual resource constraints are clearly the overarching driver: Not all crimes can possibly be met with a full investigative response along any dimension, forensic evidence gathering and analysis being only one. As with other investigative resource-allocation decisions in police departments, evidence collection activities are largely determined by the seriousness of a reported offense.[127] Across the board, departments will devote the greatest resources of personnel, equipment, and time to homicides, sexual assault, and other violent crimes against persons---less so to property crimes, and even less so to run-of-the-mill drug crimes, despite their significantly greater numerical share of caseloads.[128] Initial response to the least serious offenses will be the most standardized and least elaborate: Collection of obviously relevant objects, perhaps fingerprint processing in property cases, but likely no search for and collection of, say, less apparent biological material for DNA

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[123] See Peterson et al., Role and Impact of Forensic Evidence, supra note __, at 95. In fact, biological evidence, quintessentially associated with sexual assault investigations, was collected in only fifty-three percent of the investigations studied in Peterson's research. Id.

[124] See, e.g., id. at 21.

[125] See Brian Parker & Joseph Peterson, Physical Evidence Utilization in the Administration of Criminal Justice (1972).

[126] John Roman et al., Post-Conviction DNA Testing and Wrongful Conviction 4 (2012) ("[C]onvictions for crimes involving any sexual assault were more likely to yield determinate results when compared to convictions for nonsexual assault homicide, simply because of the presence of a victim or suspect physical evidence recovery kit (PERK), which often yielded a DNA profile."); see also Rebecca Campbell et al., The Effectiveness of Sexual Assault Nurse Examiner (SANE) Programs, 6 Trauma, Abuse & Violence 313, 315 (2005) (discussing effect of SANE programs on rates of evidence recovery in sexual assault cases); Donald Johnson et al., Use of Forensic Science in Investigating Crimes of Sexual Violence: Contrasting Its Theoretical Potential With Empirical Realities, 18 Violence Against Women 193, 194 (2012) (same). Cf. HMIC, Under the Microscope Refocused 2-3, 8 (2002), available at http://www.hmic.gov.uk/media/under-the-microscope-20020601.pdf (reporting that increase in crime scene personnel in United Kingdom yielded substantial increase in DNA and fingerprint recovery).

[127] Peterson et al., Scientific Evidence and the Police, supra note __, at 97—98.

[128] See Bureau of Justice Statistics, Sourcebook of Criminal Justice Statistics Table 4.6.2010, available at http://www.albany.edu/sourcebook/pdf/t462010.pdf.

analysis (despite technological advances permitting analysis of invisible, trace quantities of DNA in such cases).[129]

Moreover, the primary engines of evidence collection in these lower priority cases---typically patrol officers---are also the most junior, least trained, and most over-tasked personnel in the police hierarchy. Crime scene response is typically competing with calls for other crimes, ticket quotas, routine patrol responsibilities, and any number of other tasks that make up a patrol officer's diverse portfolio of daily responsibilities.[130] With limited time, patrol officers are undoubtedly triaging their work on any given call; there is good reason to suspect that meticulous performance of tasks associated with evidence collection will be less attractive and receive short-shrift to "real" police work such as interviewing witnesses.[131] Even the limited regime of evidence collection in the run of the mill case is likely to be performed quickly, and perhaps shoddily.

In more serious cases, where more time and human capital are devoted to evidence collection, selectivity is driven by more deliberate exercises of discretion. Evidence collection is shaped by and contributes to a process of case construction, as officials, particularly police, make judgments in selecting and prioritizing the collection of some subset of available material. Processing a crime scene, for example, requires attention not only to the technical requirements of evidence collection, but also to far more subjective judgments about what areas are likely to yield evidence of a crime.[132] In one case, a researcher observed a homicide detective issue "specific directions" to crime scene unit personnel to fingerprint "everything possible in the bedroom where the victim was found," "no fingerprint examination in the second bedroom or of the deceased's car," and take prints in kitchen and lounge only "near where blood marks are

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[129] Bashinski & Peterson, supra note __, at 569; Roman et al., supra note __, at 148; Investigators Using "Touch" DNA to Solve Property Crimes, Houston Chronicle, Mar. 12, 2012, available at http://www.chron.com/news/houston-texas/article/DNA-is-solving-property-crimes-3397341.php (discussing controversy concerning resources).

[130] Roman et al., supra note __, at 106, 148 (describing pressure that patrol experienced to quickly process crime scenes and become available for incoming calls).

[131] See, e.g., Joseph L. Peterson, Steven Mihajlovic & Michael Gillialand, Forensic Evidence and the Police: The Effects of Scientific Evidence on Criminal Investigations 46 (National Institute of Justice 1984) [hereinafter Peterson et al., Forensic Evidence and the Police] (observing that "patrol officers seldom rope off a crime scene or ban other police personnel from the scene except in the most extraordinary of situations ... [m]ost officers are rather blasé about taking such steps and are more interested in interviewing witnesses and completing their preliminary report so that they may resume patrol activities").

[132] See, e.g., Martin Innes, Investigating Murder: Detective Work and the Police Response to Criminal Homicide 157 (2003) ("Identifying and collecting contact trace materials from the crime scene was based around a methodical and ordered set of actions, combined with a degree of 'improvised practice' to account for the particular circumstances of the incident concerned. The crime scene examiners would first seek to identify the obvious 'contact points' where physical materials relating to the crime were evident and collect these. Then, on the basis of the distribution of this material, read in conjunction with the detectives' early understandings of what sort of crime it is and the likely actions and interactions that have occurred, the examiners would seek to identify whereabouts further evidence is likely to be and direct their searches accordingly."); Snyder & LaMoyne at __ (encouraging "rigid" practices mediated by flexibility to permit learning from a crime scene);.

found or where objects that are likely to have been handled by the offender are located."[133] Professor David Kaye has shared a similar account from the perspective of a crime scene specialist called to an automobile crash: "Detective Thompson requested that I swab and impound both airbags in vehicle 1. . . . I noted red stains . . . on both the driver and the front passenger airbags. . . . I swabbed a representative spot of the bloodstains on the driver's airbag. . . . I cut and collected the driver's airbag. . . . I then swabbed a representative spot on the front passenger airbag. . . . At the direction of Detective Thompson no further action was taken."[134] Of course, particularly where these judgment calls are made by personnel who will remain involved in an investigation---a circumstance more typical in serious cases where a detective typically responds to a crime scene---they are likely to determine not only the available physical evidence, but also to shape investigators' understanding of the relevance of that evidence (and, perhaps, the irrelevance of evidence not selected in the initial canvass) to the case.[135] Such assessments will be better or worse depending on the crime and the personnel involved, of course, which only reinforces the importance of documenting the choices made early on.

There are also more formal constraints on law enforcement discretion in regard to the collection of physical evidence. From the standpoint of legal doctrine, these are important but relatively limited. In the main, police need not collect or save any quantum of evidence with any particular degree of competence, so long as they work in good faith.[136] The most significant direct constraints flow from the Fourth Amendment: There is no general "crime scene" exception to the Fourth Amendment's requirement of "reasonable" searches and seizures, and thus police are may not enter a premises and gathering evidence absent an imminent threat to public safety, or consent to entry, or the obtaining of a warrant.[137] But where the space at issue is the site where a crime has occurred---the moment of initial crime scene response---none of those requirements presents a formidable or time consuming barrier. A warrant is readily obtainable where an officer has received a report (and thus has probable cause to believe) that a crime has occurred at a given location;[138] even better, consent to search can often be gotten;[139]

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[133] Innes, supra note __, at 209.

[134] David Kaye, The Double Helix and the Law of Evidence 258 (2010).

[135] See Lee et al., supra note __, at 3-4 (characterizing crime scene investigation as first stage in crime "reconstruction").

[136] See Arizona v. Youngblood, 488 U.S. 51 (1988) (rejecting contention that due process was violated by loss of potentially favorable evidence, in favor of standard requiring showing of official bad faith to make out constitutional destruction of evidence claim); California v. Trombetta, 467 U.S. 479 (1984) (rejecting argument that failure to preserve breath test samples for later analysis violated due process unless exculpatory value was apparent and comparable evidence is unavailable to defendant).

[137] See Flippo v West Virginia, 528 U.S. 11, 14 (1999).

[138] See Yale Kamisar, Does (Did) (Should) the Exclusionary Rule Rest on a "Principled Basis" Rather than an "Empirical Proposition"?, 16 Creighton L. Rev. 565, 569-70 (1983) (calling warrants "notoriously easy" to obtain).

and in all events, the current trend in Fourth Amendment doctrine is to lower the remedial risk to police who proceed without a warrant, at least in arguably close cases.[140]

Of course, these rules only directly constrain the initial decision to gather evidence, and say little about the particular manner in which that evidence will be gathered. But undoubtedly there are trickle-down effects. If a warrant must be obtained to search a location or a person, that increases the likelihood that more senior law enforcement personnel, or perhaps even a district attorney, will be involved, which might in turn enhance the expertise and care that is brought to the task. The warrant application process also permits a moment of reflection (and documentation) concerning the value, known or hypothesized, of evidence to an investigation, an event that might serve some disciplining function---particularly later in an investigation as theories of a case start, for better or for worse, to coalesce.[141] On the other hand, the prospect of delay might compromise evidence (although exigency doctrines permit warrantless searches and seizures to prevent imminent destruction[142]), or it might present just enough hassle to disincentivize the request to collect it in the first place[143]---particularly in less serious cases, or where police are not otherwise convinced of the value of the effort.

With regard to the scope and manner of evidence collection, regulation comes largely from departmental policies, which are minimal and varied, particularly in smaller jurisdictions. Evidentiary chain of custody as a prerequisite to admissibility of course plays some role in spurring policies (or at least standardized practices) governing the collection, packaging,

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[139] See Mark Hutchins, Crime Scene Searches, 33 Prosecutor 25, 26 (Nov./Dec. 1999) (observing that "[w]arrants are seldom necessary for making the initial entry" to a crime scene because of consent and exigent circumstances doctrines).

[140] See Jennifer E. Laurin, *Messerschmidt* and Convergence in Action: A Reply to Comments on *Trawling for* Herring, 112 Colum. L. Rev. Sidebar 119 (2012).

[141] Cf. Chip Heath et al., Cognitive Repairs: How Organizational Practices Can Compensate for Individual Shortcomings, 20 Res. Organizational Behav. 1 (1998)

[142] See Kentucky v. King, 131 S. Ct. 1849, 1858 (2011); see also Schmerber v. California, 384 U.S. 757, 770(1966) (permitting warrantless collection of blood for purposes of toxicology analysis because "the delay necessary to obtain a warrant, under the circumstances, threatened the destruction of evidence"); Kaliku v. United States, 994 A.2d 765 (D.C. 2010) (holding warrantless collection of penile swab from assault suspect justified under exigent circumstances exception); State v. Dupree, 319 S.C. 454, 460 (1995) (permitting warrantless search of suspect's mouth given risk that drugs were inside and would be swallowed).

[143] See Richard Van Duizend, L. Paul Sutton & Charlotte A. Carter, The Search Warrant Process 19 (1984) (quoting a detective saying: "'Actually, there are a lot of warrants that are not sought because of the hassle.... I don't think you can forgo a case because of the hassle of a search warrant, but you can... work some other method. If I can get consent [to search], I'm gonna do it.'"); David A. Sklansky, Quasi-Affirmative Rights in Constitutional Criminal Procedure, 88 Va. L. Rev. 1229, 1250-51 (2002) (observing that despite some automation trends, "getting a warrant still takes hours or days," and "formal procedures for seeking a telephonic warrant are often cumbersome" and that as a result police simply forego them); William J. Stuntz, Warrants and Fourth Amendment Remedies, 77 Va. L. Rev. 881, 891-92 (1991) (observing that warrant requirement certainly deters some searches).

documentation, and transfer of evidence.[144] Nevertheless, observers of the field have remarked that such policies are often lacking, and that evidence collection, documentation, and storage are widely viewed as low-priority matters within departments.[145] Significantly, much of the work in promulgating and encouraging good practices among police responsible for evidence collection appears to fall to crime laboratories, in part because, thanks to CODIS regulations, they face their own legal requirements for documenting and certifying the integrity of evidence received by them.[146] But despite the fact that the vast majority of laboratories are under the control of law enforcement, relationships between crime laboratories and their police "customers" vary in terms of closeness and functionality. Indeed, notwithstanding the NAS Report's overriding concern about coziness in these relations, the dominant theme sounding from criminal justice researchers as well as practitioners is one of a need for greater *coordination* than what current exists between laboratory-based personnel and law enforcement---particularly with regard to evidence collection tasks.[147]

2. Obtaining and Using Forensic Analysis

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[144] Commission on Accreditation for Law Enforcement Agencies, Collection and Preservation of Evidence, *in* Accreditation Standards (4th ed. 1999) (calling for departments to prepare written guidelines governing when crime scene search officers are to be summoned and the comprehensiveness of the search required); Technical Working Group on Crime Scene Investigation, Crime Scene Investigation: A Guide for Law Enforcement (2000).

[145] Eck & Williams, Criminal Investigations, *in* Local Government Police Management __, 144 ("Despite the emphasis that investigative management texts place on collecting and processing physical evidence, many police departments do not have written policies governing this area."); Vernon J. Geberth, Practical Homicide Investigation: Tactics, Procedures, and Forensic Techniques 805(1996) ("Often agencies do not put enough emphasis on [the crime scene investigative] phase of the investigation, opting, instead, for something less time-consuming, e.g., a confession."); Peterson et al., Forensic Evidence and the Police, supra note __, at 46, 53 ("Patrol officers seldom rope off a crime scene or ban other police personnel from the scene except in the most extraordinary situations. Most officers are rather blasé about taking such steps and are more interested in interviewing witnesses and completing their preliminary report so that they may resume patrol activities."); Joseph T. Latta & William P. Kiley, Property and Evidence Control: The Hidden (and Ticking) Time Bomb, CALEA Update Magazine (Jun. 2007), available at http://www.calea.org/calea-update-magazine/issue-94/property-and-evidence-control-hidden-and-ticking-time-bomb (discussing widespread problem that "property room or property component has been a low priority in terms of operations, staffing, and resource allocation"); see also Martin Innes, Investigating Murder: Detective Work and the Police Response to Criminal Homicide 208 (2003) ("The early stages of an investigation are frequently chaotic and confused, and . . . problems were often experienced in exerting control over the scene in the earliest stages. It was frequently the case that the continuity of records . . . was not maintained.").

[146] Elizabeth Davies et al., Collecting DNA From Arrestees: Implementation Lessons, NIJ Journal no. 270 (Jun. 15, 2012), available at www.nij.gov/journals/270/arrestee-dna.htm#note13 ("Most state laws do not address responsibility for overseeing collection activities in their DNA laws. As a result, oversight functions like training and coordination often fall to laboratory staff. . . . However, it is important to note that although laboratories almost always assume responsibility for oversight of arrestee DNA policies and the costs associated with devoting staff time to administrative tasks, they rarely have the legal authority to compel an agency to comply with rules.").

[147] Bashinski & Peterson, supra note __, at 570 ("Regardless of the organizational placement of [crime scene investigators] its functions should be well coordinated with related units in the department."); Horvath et al., supra note __, at 76; Roman et al., supra note __, at 51, 73, 148 (describing how collaboration is "critical" and describing break down in evidence collection in some studied jurisdictions because of poor coordination);Saferstein, supra note __, at 16 (advising coordination but noting lack thereof in many agencies).

In the last four terms the Supreme Court has decided two cases concerning constitutional rights of access to DNA testing to make their way to the Supreme Court, *District Attorney's Office for Third Judicial District v. Osborne*[148] and *Skinner v. Switzer*.[149] Both cases raised most directly the question of whether a defendant could challenge the state's opposition to providing post-conviction access to physical evidence for the purpose of DNA testing. But less prominently, both illustrated the consequences of decisions made by police and prosecutors that affected the availability and significance of forensic evidence in the cases. In Osborne's case, DNA analysis on semen recovered from the rape victim included Osborne in a relatively large group of potential donors, but only after a putative accomplice fingered Osborne and the victim gave an equivocal identification; the state opted not to pursue more discriminating DNA analysis.[150] In Skinner's, a significant amount of evidence recovered from the crime scene, including blood-stained clothing, was never analyzed, despite the fact that fingerprints found on the murder weapon did not match Skinner.[151] In both cases, the scientific evidence that *was* offered was ambiguous---inculpatory but far from definitive[152]---making other forms of evidence crucial (in particular eyewitness accounts obtained by police before the forensic evidence was available), and raising the question of whether further analysis might not have yielded more probative, and perhaps exculpatory, results. In other words, police and prosecutorial roles in the production and usage of forensic evidence funnel may well have been material to the reliability of the scientific evidence offered at trial.

As it turns out, these cases are far from aberrational. Once gathered, evidence typically makes its way to a storage location (often though not always within a police department) to await further decisions about its fate: Will it be submitted to a crime laboratory for analysis; if so what will that analysis entail; and if that analysis is obtained, what will be the investigative response? Each of these decisions is far less automatic, far more variable, and far more subject to the discretion of upstream, non-laboratory actors than is commonly understood.[153]

To begin with, forensic evidence is funneled through the criminal justice system in a manner that results in surprisingly stark drop-offs from rates of collection to rates of submission to analysts, and rates of analysis actually performed. Recent attention to rape kit "backlogs" has exposed one manifestation of this phenomenon: Evidence collected from the bodies of sexual

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[148] 557 U.S. 52 (2009).

[149] 131 S. Ct. 1289 (2011).

[150] See Osborne v. State, 110 P.3d 986, 989-90 (Alaska App. 2005) (describing evidence and testing decision).

[151] Skinner v. State, 956 S.W.2d 532, 536 (Tex. Ct. Crim. App. 1997) (describing evidence collected, tested, and left untested).

[152] See Brief for Appellant 31-33, Skinner v. State of Texas, No. AP-76,675 (Feb. 2, 2012), 2012 WL 591289 (discussing facts).

[153] See Peterson et al., Role and Impact of Forensic Evidence, supra note __, at 122 ("[I]t is clear that criminal justice officials external to the laboratory screen much of the forensic evidence and have a major influence on evidence examination priorities and practices.").

assault victims, sometimes in cases yet unsolved, has been found in a number of jurisdictions to be filling the storage lockers of police departments, never having been submitted for laboratory analysis.[154] What limited empirical data exists suggests that the phenomenon of collected but unexploited potential forensic evidence is the rule rather than the exception. In an NIJ-sponsored study of crime laboratories in Indiana and Los Angeles, Joseph Peterson found significant drop-offs between evidence collection and evidence analysis across (though variable among) crimes. Thus, evidence was collected in thirty percent of assault investigations, but submitted in only twelve percent and analyzed in only nine.[155] Even in homicide investigations, which nearly always entailed the collection of physical evidence, only eighty-eight percent of cases saw that evidence submitted to laboratories, and only eighty-one percent of cases had the submitted evidence analyzed.[156] Sexual assaults featured even more dramatic funneling, with evidence collected in sixty-four percent of cases, submitted in only thirty-two percent, and analyzed in only half the cases in which it was submitted.[157] Peterson's results were consistent with the forensic evidence funnel revealed in other similar studies.[158] Variation exists among types of forensic analysis as well. Some types of forensic testing are practically essential to establishing the elements of certain criminal offenses---think, for example, drug offenses where the chemical composition of a substance must be determined; evidence will invariably be submitted for forensic toxicological analysis (though whether it is analyzed before the case is disposed is another story, as discussed below). Across a wider variety of offenses, fingerprints are the most consistently submitted and analyzed type of evidence for identification purposes---more commonly, and more consistently, than biological evidence susceptible to DNA analysis, which even when collected is frequently never submitted.[159]

Moreover, once evidence is submitted to a laboratory, a series of decisions must be made about the type and timing of testing that will occur. To some extent these are decisions that are typically and properly the subject of laboratory protocols. Biological evidence, for example, will

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[154] See Sarah Tofte, Human Rights Watch Report 3 (2009) (discussing Los Angeles County); [news accounts].

[155] Peterson et al., Role and Impact of Forensic Evidence, supra note __, at 56.

[156] Id. at 77-78.

[157] See Johnson et al., supra note __, at 206.

[158] See Kevin Strom et al., The 2007 Survey of Law Enforcement Forensic Evidence Processing xi (2009) (reporting that in a 2007 survey of national law enforcement organizations, among unsolved homicide, rape, and property crime cases, 14%, 18%, and 23%, respectively and on average, featured unsubmitted forensic evidence); Travis C. Pratt et al., This Isn't *CSI*: Estimating the National Backlog of Forensic DNA Cases and the Barriers Associated With Case Processing, 17 Crim. Justice Policy Rev. 32, 36—37 (2006); Ritter, supra note __ (reporting that among 2,000 law enforcement agencies responding to survey, eighteen percent of unsolved alleged sexual assaults had unsubmitted, unanalyzed evidence).

[159] See Peterson et al., Role and Impact of Forensic Evidence, supra note __, at 46, 63; Johnson et al., supra note __, at 206; Pratt et al., supra, at 36—37; Kevin J. Strom & Matthew J. Hickman, Unanalyzed Evidence in Law-Enforcement Agencies: A National Examination of forensic Processing in Police Departments, 9 Criminology & Pub. Policy 381, 391—93 (2010).

typically be "screened" to determine whether it contains substances that might be susceptible to further testing, and laboratories typically do this testing first and automatically after a request for testing is made. Some evidence might be susceptible to multiple types of analysis (for example, an item that potentially bears both blood and latent fingerprints), and scientific protocols will dictate the order of testing in order to preserve the various samples. But typically there are also choices to be made that fall within the investigative wheelhouse. Of course, for some (perhaps many) cases police will approach evidence submission decisions in a fairly routine fashion: In the mine run of drug cases, for example, evidence suspected of being or containing illicit substances will undoubtedly be submitted for toxicology analysis.[160] In more complex cases, there are likely to be multiple items of evidence, some or all of which could be subjected to a variety of different tests. A shoe, for example, might be examined for trace evidence (such as hairs), and for the presence of biological material (such as blood), and for comparison to a shoe print left at a crime scene. If initial testing identified a stain on the shoe as blood, there might be a variety of different types of analysis available to try to associate that blood to an individual---for example, a small or degraded piece of evidence might be susceptible to DNA testing with certain techniques---say, for example, mini-STR analysis (permitting the testing of much smaller samples but with less discriminating results than the now-standard method of STR analysis), and mtDNA analysis (more widely available for small samples than mini-STR but far less discriminating); but the choice will often entail trade-offs with respect to how narrow a field of inclusion will be drawn.[161]

There is a further issue of timing. Notwithstanding significant popular and academic attention to the recent ability of police to use DNA and (to a lesser extent) fingerprint databases to generate suspects through "cold hits" early in criminal cases,[162] it remains the case that the vast majority of forensic evidence is generated and used not early but quite late in a case. Available empirical evidence demonstrates that in the overwhelming majority of cases physical evidence might well be submitted for analysis prior to arrest, but across case type and forensic methodology, testing typically is not performed until after a suspect is in custody;[163] indeed, it is

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[160] See Peterson et al., Forensic Evidence and the Police, supra note __.

[161] See, e.g., Erin Murphy, The Art in the Science of DNA: A Layperson's Guide to the Subjectivity Inherent in DNA Typing, 58 Emory L.J. 489, 493-94 (discussing variety of available DNA analysis techniques); DNA Diagnostics Center, Mini-STR Testing, available at http://www.forensicdnacenter.com/dna-ministr.html (last visited Aug. 1, 2012); see also District Attorney's Office for the Third Judicial District v. Osborne, 129 S. Ct. 2308 (2009).

[162] See, e.g., Simon A. Cole & Michael Lynch, The Social and Legal Construction of Suspects, 2 Ann. Rev. L. & Soc. Sci. 39, 45 (2006) ("Not until the end of the twentieth century was it possible for criminal justice organizations easily to conduct large-scale searches on databases indexed according to biometric information (fingerprints and DNA profiles). The development of such automatically searchable databases generated a significant but little-noticed change in the relationship between criminal investigation and suspect evidence. . . . Trace evidence recovered from crime scenes could be routinely searched against criminal identification databases as a first, rather than last, resort.").

[163] See Johnson et al.. supra note __, at 210 (reporting that physical evidence was a predictor of arrest, however was analyzed prior to arrest in only 1.6 % of cases that had crime scene evidence collected and ended in arrest); Peterson

quite common forensic analysis not to be performed until after well after charges are filed, and frequently not until shortly before a trial occurs in a case. This is in large part a reality of the press of caseloads on most crime laboratories, particularly in high-volume drug analysis requests,[164] but also in lower-demand areas as well, and particularly in DNA.[165] Significant wait times typically accompany requests for analysis in the ordinary course---often exceeding thirty days in these higher volume request categories.[166] For reasons of tactics or legal constraint (discussed in further detail below), decisions to arrest, and frequently even to charge, simply cannot await the completion of testing, at least in cases in which the low threshold of probable cause can be met with other evidence. Of course, not every case *is* handled in the ordinary course. Laboratories might have formal testing priority policies based on, say, some combination of court deadlines and offense type, giving priority to cases set for trial or other hearings, for example.[167] In many laboratories, however, the approach is more improvisational: Evidence is accepted (as submitted at the discretion of law enforcement), and testing and timing decisions are made on the basis of some combination of informal practice and negotiation between analysts and case investigators or prosecutors.[168] There is likely to be at least some degree of communication, and perhaps even collaboration, among laboratory personnel and law enforcement "customers" in navigating these resource considerations; indeed, as with evidence collection, practitioners and criminal justice researchers view the facilitation of ongoing communication as a need and a goal for the field.[169] Often, it's a matter of the squeaky wheel getting the grease, meaning, again, that the ball is often in the court of police and prosecutors.[170]

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et al., Role and Impact of Forensic Evidence, supra note __, at 123 (reporting that collection of forensic evidence predicted arrest, but that evidence was rarely analyzed before arrest occurred).

[164] Although relatively few requests for DNA analysis are made, each case is extremely time- and resource-intensive, and is competing against an ever-increasing stream of work flowing from state and federal laws requiring the routine collection and analysis of DNA from individuals who enter the criminal justice system. See Burch et al., supra note 23, at 4; Michelle Villarreal, Department of Public Safety Crime Labs Limits DNA, Drug Testing, Corpus Christi Caller (Sept. 1, 2012), available at http://www.caller.com/news/2012/sep/01/department-of-public-safety-crime-labs-limits; Group Reports, Texas Forensic Science Roundtable (Jun. 6, 2012) (on file with author).

[165] See Burch et al., supra note 23, at 4; Villarreal, supra note __; Group Reports, Texas Forensic Science Roundtable (Jun. 6, 2012) (on file with author).

[166] See Burch et al., supra note 23, at 3.

[167] Molly E. Griswold & Gerard L. Murphy, It's More Complex than You Think: A Chief's Guide to DNA 16-20 (2010), available at http://policeforum.org/library/dna-forensics/DNA-Book10.10.pdf (describing prioritization approaches); Peterson et al., Forensic Evidence and the Police, supra note __, at 69, 76—77 (describing formal laboratory policies dictating submission and analysis).

[168] NAS Report, supra note 8, at 61.

[169] See, e.g., Griswold & Murphy, supra note __, at 23-25 (describing laboratory policy requiring prosecutor sign-off on police request for expedited analysis).

[170] See, e.g., NAS Report, supra note 8, at 61 (quoting account from witness before NAS committee); Justin Fenton, Criminals' DNA Ignored, Baltimore Sun (Sept. 27, 2008), at 1A (reporting that police told crime lab technicians not

Finally, there is the question of investigative and prosecutorial response to scientific evidence that is obtained. Of course, forensic evidence will not by its own force solve a crime; the thing never speaks for itself.[171] Many forensic science techniques can only, at the top of their games, prove the nature of an object or instrumentality of crime---chemical drug analysis establishing a powder as cocaine, or firearms examination linking a spent bullet cartridge to a weapon. And even those forensic methodologies that purport to identify linkages between physical evidence and human sources---DNA analysis, fingerprint comparison, hair microscopy, for example---are only one piece of an investigative puzzle. Thus, DNA shed at a crime scene only points to a suspect if there is no lawful explanation for its presence. And, as in Osborne's and Skinner's cases, even forensic evidence putatively capable of "identifying" its source might do so to a degree of discrimination that requires further linking evidence to convince a factfinder (meaning, prior to trial, an investigator, a magistrate, or a prosecutor) that an identified suspect is probably guilty. But importantly, to the extent that forensic evidence is typically available only *after* an arrest in a case, this is frequently the province of the prosecutor, who will frequently have a number of options other than the one that typically receives the most focus---take the case to trial. Rather, she will be faced with questions such as whether to charge a suspect or instead wait for forensic analysis or pursue additional lines of testing, as well as whether the availability (or not) of forensic evidence will affect negotiations to resolve the case by plea.

Perhaps even more so than was the case with evidence collection, police enjoy enormous discretion in connection with evidence submission and requests for testing. Police, for their part, are operating under relatively few formal constraints. Most commonly, accepted practice or (rarely) formal policies will simply delegate to a lead investigator the decision of whether, when, and with what direction to submit evidence for forensic testing.[172] She is most likely to be highly resource constrained, and (at least, critically, in all but the most serious or specialized instances) carrying far more cases than she could ever investigate thoroughly.[173] So the name of the game

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to follow up on DNA found at crime scenes in at least six open homicide and sexual assault cases and three closed burglary cases).

[171] Cole & Lunch, supra note __, at 55 ("[T]he evidence must have a material relation to the crime that renders it suspicious – that is, it should not match the prints of persons who had legitimate access to the scene, it should be found on an apparent entry point such as a window or at the surface of the safe or jewelry box from which items were pilfered. In other words, the suspect character of the material evidence depends on how it fits into the story of the crime and of the circumstances of that crime.").

[172] See Griswold & Murphy, supra note __, at 18. Indeed, the exceptions prove the rule. One of the most widely remarked and controversial consequences of the above-described revelations of unsubmitted, untested sexual assault kits has been the adoption in some police departments and crime laboratories of mandatory testing policies for all evidence collected in rape investigations. Compare Megan Twohey, Chi. Trib. (Jul. 6, 2010) (describing Illinois legislation requiring testing of all rape kits, backed by victims' groups), with Joseph Peterson et al., Sexual Assault Kit Backlog Study, at v (Mar. 5, 2012), available at https://www.ncjrs.gov/pdffiles1/nij/grants/238500.pdf (reporting that law enforcement was generally skeptical of mandatory testing).

[173] See, e.g., Villarreal, supra note __ (contrasting evidence submission practices by law enforcement in small jurisdictions, one submitting only "about three pieces of evidence within a three to six month period," with those in large jurisdictions processing more narcotics and violent crime cases).

is typically doing the minimum required to close a case by arrest.[174] To be sure, there are legal constraints to the extent that the substantive penal law forms the backdrop to any investigation: To effect an arrest, probable cause is required, which in turn requires reference to the substantive law underlying a given offense.[175] Some forensic analysis is effectively required in order to establish an element of an offense: drug analysis in narcotics offenses; or testing for the presence of semen in many sexual assault cases (particularly if a victim is unavailable to testify).[176] But in many cases scientific evidence is just one form of possible proof, and even if forensic evidence would be desirable or even necessary for discharging the state's burden at trial, the low threshold of probable cause to arrest or charge can typically be met without it.[177]

In the context of forensic science, these pressures against the marginal utility of additional investigative effort are only reinforced, at least as a general matter, by the prevailing culture of policing. Students of the field continue to depict it as a highly bureaucratic enterprise, generally resistant to innovation both at the management level and at the level of individual police actors. Challenges to policing from "outsiders" is typically viewed with the greatest skepticism; the contributions of those who are not "team players" are unlikely to be embraced, at least where they do not conform to existing police priorities.[178] And so, researchers have noted that to the extent forensic science has been embraced, it is in service of police-defined objectives (determined in traditionally police-led ways), not as generative of lines of inquiry or tactics for pursuing them in a given case.[179] Ironically, these dynamics are likely to be particularly

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[174] See, e.g., United States v. Jacobsen, 466 U.S. 109, 122-23 (1984); United States v. Place, 462 U.S. 696 (1983).

[175] U.S. Const. Amend. 4.

[176] See Peterson et al., Role and Impact of Forensic Evidence, supra note __, at 22-23 (2010).

[177] For example, in drug cases police will typically have a variety of "field tests" at their disposal, permitting them to make presumptive drug identifications that are sufficient as a legal matter to establish probable cause to arrest and charge—albeit perhaps not admissible in court to prove the chemical composition of a drug. See, e.g., Harris v. State, 71 So.3d 756 (Fla. 2011) (holding that alert by dog trained in narcotics detection was insufficient evidence to establish probable cause to search a car, owing to reliability concerns), cert. granted, Florida v. Harris, 132 S.Ct. 1796 (2012); People v. Swamp, 84 N.Y.2d 725 (1995); Villarreal, supra note __; see also Marc G. Kurzman & Dwight Fullerton, "Drug Identification," *in Scientific & Expert Evidence* 523--54 (Edward J. Imwinkelreid ed., 2d ed. 1981) (noting that "presumed identification" by police officers, health professionals, or street users is often incorrect, with the potential error rate for visual identification as high as 60 percent).

[178] Jerome H. Skolnick & David H. Bayley, Community Policing: Issues and Practices Around the World 50, 205-08 (1988)

[179] See Cole & Lynch, supra note __, at 50 ("Data trawling requires a profound change in a police culture that prefers conventional methods of constructing suspect pools. A recent study suggests that a surprising number of U.S. law enforcement agencies still do not conceive of DNA testing as an investigatory tool and are reluctaint to submit DNA evidence for testing in 'suspectless' cases."); Horvath & Messig, supra note __, at 966—67; David A. Schroeder & Michael D. White, Exploring the Use of DNA Evidence in Homicide Investigations: Implications for Detective Work and Case Clearance, 12 Police Quarterly 319, 337 (2009) ("[D]etectives consistently indicated that they would use DNA evidence when needed; they just did not need it that often."); cf. Edward R. Maguire, Structural Change in Large Municipal Police Organizations During the Community Policing Era, 14 Justice Q. 547, 569—70, 572(1997) (finding "no significant differences in structural change between departments which claim that

pronounced with respect to the types of forensic methodologies that we (and the NAS Report drafters) might most want police to embrace: those with the strongest footing in science rather than policing---DNA, for example, rather than fingerprint analysis and other techniques rooted in police training and culture.[180] That this remains a prevailing attitude is suggested by studies demonstrating that DNA analysis tends to be requested by police far more in cases with very low clearance rates; it is a tool of last, rather than first, resort.[181] It is also entirely consistent with the notable enthusiasm in the law enforcement community for expanded use of early DNA analysis, to permit exploitation of the CODIS suspect databases, in property crimes investigations. These are categories of cases that currently have extremely low clearance rates, in which frequently there are typically no witnesses, and little other evidence available for police to pursue along traditional lines: clearing property crimes is difficult, and many reported incidents never even pass the initial department screen of being worth the bother of opening a file.[182] At the same time, though, there is concern that the type of investigative follow-up that should occur after obtaining a "hit" in such cases is frequently absent: no gathering of elimination samples to establish that a recovered DNA profile was not the result of lawful access, much less investigation to provide evidence confirming the plausibility of the database-generated suspect.[183]

Of course, there is at least one institutional check on police discretion in all criminal cases, and that is the prosecutor, who has the authority to accept or decline a case for prosecution, and must (as a matter of both legal and ethical constraint) assess anew whether probable cause supports charging the case. Prosecutors' offices can, and sometimes do, undertake efforts to make police more or less sensitive to post-arrest dynamics, with the aim of improving the quality of cases submitted, decreasing declination rates and plea bargaining, and freeing up prosecutorial resources.[184] But there is good reason to suspect that, where such procedures do not exist as a matter of office policy or culture, prosecutors have limited power or

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they have not implemented, are planning to implement, or have implemented community policing" and hypothesizing that this may be because of inconsistency between community policing and existing institutional environments); James J. Willis et al., COMPSTAT and Bureaucracy: A Case Study of Challenges and Opportunities for Change, 21 Just. Q. 463, 485 (2004) (recounting limited use that commanders made of data generated after implementing COMPSTAT, analyzing information primarily to fulfill "traditional 'crime control' function" rather than "to identify underlying causes of problems, to tailor specific responses to these problems, or to assess the effectiveness of these responses," as COMPSTAT promised).

[180] Joseph L. Peterson et al., The Uses and Effects of Forensic Science in the Adjudication of Felony Cases, 32 J. For. Sci. 1730, 1734 (1987) [hereinafter Peterson et al., Uses and Effects of Forensic Science].

[181] David A. Schroeder & Michael D. White, Exploring the Use of DNA Evidence in Homicide Investigations: Implications for Detective Work and Case Clearance, 12 Police Quarterly 319, 337 (2009).

[182] See, e.g., Roman et al., supra note __; William K. Rashbaum & Joseph Goldstein, DNA Match Tying Protest to 2004 Killing Is Doubted, N.Y. Times (Jul. 11, 2012).

[183] See, e.g., id.; Grits for Breakfast, Texas Crime Labs Ill-Equipped to Handle Coming Volume of Touch-DNA Cases (Jul. 15, 2012), available at http://gritsforbreakfast.blogspot.com/2012/07/texas-crime-labs-ill-equipped-to-handle.html.

[184] See, e.g., Marc Miller & Ronald Wright, The Black Box, 94 Iowa L. Rev. 125, 148-53 (2008); Marc Miller & Ronald Wright, The Screening/Bargaining Tradeoff, 55 Stan. L. Rev. 29, 30-36 (2002).

inclination to prompt greater police effort. Despite the vaunted duty to "see that justice is done,"[185] the overriding reality of most prosecutors' work is to see that dockets are managed. Prosecutors have their own press of caseloads, only a small number of which will go to trial---at which time forensic evidence might well be viewed as critical whenever it is available, if only to deliver on juror expectations.[186] Scrutiny of a police case file is typically light as a general matter, perhaps even more so in regard to scientific evidence.[187] The limited available studies of the effect of forensic evidence on charging decisions show that prosecutors screen, if at all, simply for the possibility of forensic analysis, not for its existence or content.[188] And so, again, the incentive in most cases will be to pursue scientific evidence late if at all, and as a corroborator only; otherwise, forensics are far more a hassle than they're worth.[189]

Consider what is likely to be lost when forensic analysis occurs late in an investigation---post-arrest or post-charge, as is the prevailing circumstance. To the extent that scientific evidence that is susceptible to databasing (chiefly DNA, fingerprint, and firearms), delayed analysis means a missed opportunity to identify suspects or links to other crimes, or save investigative resources in generating those leads. To the extent that scientific evidence has substantial *dis*confirming ability---i.e., to exclude suspects identified through other means---delay in analysis risks a prolonged investigation into an innocent individual.[190] Late analysis also compromises the ability of both prosecutors and defense attorneys to fully vet the strength

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[185] Berger v. United States, 295 U.S. 78, 88 (1935).

[186] See, e.g., Donald E. Shelton, Juror Expectations for Scientific Evidence in Criminal Cases: Perceptions and Reality About the "*CSI* Effect" Myth, 27 Thomas M. Cooley L. Rev. 1, 23-24 (2010) (finding based on juror surveys that jurors expect forensic evidence but do not reflect undue skepticism of it); Tom R. Tyler, Viewing CSI and the Threshold of Guilt: Managing Truth and Justice in Reality and Fiction, 115 Yale L.J. 1050, 1083 (2006) (asserting that "the *CSI* effect has become an accepted reality by virtue of its repeated invocation by the media" which, while "consistent with empirical findings in other areas of legal psychology" is not established by empirical research).

[187] See, e.g., Daniel J. Givelber, Lost Innocence: Speculation and Data About the Acquitted," 42 Am. Crim. L. Rev. 1167 ("Unless the police report on its face reveals an inconsistency or barrier to conviction, the prosecutor accepts the general conclusion of the police without making an independent investigation or evaluation of the evidence." (quoting Lloyd L. Weinreb, Denial of Justice: Criminal Process in the United States 58 (1977)).

[188] Peterson et al., Uses and Effects of Forensic Science, supra note __, at 1752-52.

[189] See, e.g., Joshua K. Marquis & Velva M. Walter, CSI Effect --Does It Really Exist?, National District Attorney's Association, http://communities.justicetalking.org/blogs/day17/archive/2007/10/16/csi-effect-does-it-really-exist.aspx ("[B]ecause of these forensic crime shows there now exists a much higher bar for police and prosecutors to reach in proving the guilt of defendants. Expensive tests are run on evidence such as fingerprints, DNA, etc.--even when the defendant was 'caught in the act' of committing the crime for which he/she is being tried by police and eye-witnesses.").

[190] See, e.g., Brief of Amicus Curiae New York County District Attorney's Office et al. in Support of Respondent 10, 132 S. Ct. 2221, 2227 (2012) (reporting that "over a recent twelve-month period, nearly one in ten suspect profiles tested by the OCME for the Manhattan DA's Office resulted in an exoneration.").

of the overall case and of the scientific evidence in particular, potentially distorting charging decisions, plea negotiations, and of course trial preparations.[191]

But there are also more subtle, and perhaps more pervasive (though admittedly not fully understood) concerns, stemming from the risk that systematic skews in how police and prosecutors process information and make decisions could thwart or even pervert the objective value of scientific evidence. A "warehouse" of research in behavioral psychology suggests that once individuals form particular beliefs, they pursue and process information in a manner that aims to verify that belief. Trained professionals---police and prosecutors among them---are hardly immune to such cognitive biases; indeed, the dynamic of "tunnel vision" in criminal investigations has long been acknowledged.[192] Most relevant, perhaps, is the category of "confirmation bias" that leads individuals systematically to both credit and pursue information that is consistent with prior belief, and to discredit and ignore information that is inconsistent. Critically, the later scientific evidence is available in a criminal investigation, the more strongly police, as well as prosecutors, are likely to be intellectually committed to a particular understanding of the case; indeed, where scientific analysis of evidence is not done until after charges are filed, the commitment is strongly to a particular suspect.[193]

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[192] See, e.g., Karl Ask et al., The "Elasticity" of Criminal Evidence: A Moderator of Investigator Bias, 22 Applied Cognitive Psych. 1245, 1246 (2008); K. Ask & P.A. Granhag, Motivational Bias in Criminal Investigators' Judgments of Witness Reliability, 37 J. of Applied Soc. Psych. 561 (2007) (finding disconfirmation bias regarding witness statements in study group of Swedish investgiators); Barbara O'Brien, Prime Suspect: An Examination of Factors That Aggravate and Counteract Confirmation Bias in Criminal Investigations, 15 Psychol. Pub. & Pol'y L. 315, (2009) (demonstrating that in study group – of college students - the act of naming a suspect produced confirmation bias effects, including believing or valuing available evidence to the extent that it confirmed suspect guilt); Barbara O'Brien, A Recipe for Bias: An Empirical Look at the Interplay Between Institutional Incentives and Bounded Rationality in Prosecutorial Decision Making, 74 Mo. L. Rev. 999, 1033 (2009); Robert B. Bates, Curing Investigative Tunnel Vision, The Police Chief, at 41 (Jan. 1987); D. Kim Rossmo, Failures in Criminal Investigation, The Police Chief (Oct. 2009). Indeed, studies have demonstrated that professionals with specialized expertise in a relevant area can exhibit *exacerbated* cognitive limitations---as when police trained in interrogation demonstrated *inferior* capacity to judge truth and deception in suspects as compared to untrained college student subjects. See, e.g., Karl Ask and Par Anders Granhag, Motivational Bias in Criminal Investigators' Judgments of Witness Reliability, 37 J. of App. Social Psych 561 (2007) (identifying confirmation bias in controlled study of trained investigators); Saul M. Kassin et al., "He's guilty!": Investigator Bias in Judgments of Truth and Deception. 26 Law and Human Behavior 469 (2002) (finding that trained investigators were more likely than lay people to incorrectly "detect" deception in suspects and to be confident in their judments); Saul M. Kassin and Fong, "I'm Innocent!": Effects of Training on Judgments of Truth and Deception in the Interrogation Room, 23 L. and Human Behav. 499 (1999) (finding that trained investigators were more likely than lay people to incorrectly "detect" deception in suspects); Rassin, Blindness to Alternative Scenarios in Evidence Evaluation, 7 J. Investig. Psych. Offender Profil. 153 (2010) (finding that lay people appeared more open to alternative suspects than trained investigators).

[193] Alafair S. Burke, Improving Prosecutorial Decision Making: Some Lessons of Cognitive Science, 47 Wm. & Mary L. Rev. 1587, 1605-06 (2006) ("[M]any commentators believe that the ethical prosecutor brings charges only when she is sufficiently certain in her own mind of the accused's guilt. Accordingly, if charges are brought, the prosecutor has presumably made a personal determination about the defendant's guilt. If additional evidence arises, selective information processing comes into play."); Eck, supra note __, at __ ("When a prime suspect is identified,

Cognitive bias of this sort is likely to have particularly perverse effects with respect to precisely the types of forensic evidence that from a reliability-enhancing perspective we should be most concerned about: exculpatory science, and science that is *less* than the "gold standard." On the former count, confirmation bias and tunnel vision has been widely accepted as a cause of erroneous disregard, rejection, or recharacterization of exculpatory evidence by both police and prosecutors, and the anecdotal evidence is that the force of science does not render forensic evidence immune to this pressure. Far from it, as the cases of thirty-four DNA exonerees convicted in spite of the presence of known exculpatory evidence demonstrate.[194] In Jeffrey Deskovic's case, DNA evidence obtained post-charge, which established, he was not the source of semen found in the classmate he was accused of raping and murdering, was disregarded in the face of a (now known to be) false confession.[195] In Neal Miller's case, pre-DNA blood-group testing that was not completed until the eve of trial actually excluded him as a source of semen on the bed sheet of the victim he was on trial for raping on the strength of the victim's identification; police and prosecutors argued that the source must have been a boyfriend, who was never tested as a possible source and who indeed (we now know) was not.[196] In James Edwards' murder trial, jurors were told that blood evidence collected at the crime scene that was inconsistent with the victim and Edwards was left by a store employee, but, again, no testing was ever conducted to verify that theory---which turned out to be false.[197] The list goes on.[198]

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then the focus and nature of the lines of inquiry ybeing conducted by police alters, they shift from information-based inquiries to a more targeted style of intelligence-based inquiries. Investigative actions are directed towards trying to prove the involvement in the crime of the particular individual identified as a prime suspect."); Keith A. Findley & Michael S. Scott, The Multiple Dimensions of Tunnel Vision in Criminal Cases, 2006 Wis. L. Rev. 291, 308.

[194]See Garrett, Appendix to Convicting the Innocent, supra note __.

[195] See Report on the Conviction of Jeffrey Deskovic for the Westchester County District Attorney (2008).

[196] See, e.g., Brandon L. Garrett & Peter J. Neufeld, Invalid Forensic Science Testimony and Wrongful Convictions, 95 Va. L. Rev. 1, 81 (2009).

[197] Ruth Fuller & Dan Hinkel, Convict Cleared in '94 Waukegan Slaying, Chi. Trib. (May 30, 2012), available at http://articles.chicagotribune.com/2012-05-30/news/ct-met-edwards-charges-dropped-20120530_1_dna-evidence-murder-case-reckling-case ("Prosecutors knew at trial that blood evidence collected at the scene, Grand Appliance and TV in Waukegan, matched neither the victim nor the defendant, but they told jurors that didn't clear Edwards because the blood could have come from a store employee with a cut.").

[198] See Ex Parte Brandley, 781 S.W.2d 886, 890 (Tex. Crim. App. 1989) ("The murder investigation was so contrived that it created false testimony and that the investigation failed to follow any leads which did not comport with the preconceived, premature notion that applicant committed the murder. Styles admitted at the evidentiary hearing that before he arrived in Conroe and prior to interviewing any witnesses, applicant was his only suspect. Styles maintained this blind focus despite the fact that a Caucasian pubic hair, not belonging to the victim, was found near the victim's vagina. The State resisted all efforts to obtain hair samples for comparison from the three janitors who saw the victim moments before the assault."); Garrett & Neufeld, supra note __, at 81-83 (describing cases in which police and prosecutors failed to obtain elimination samples, thought characterizing these as analyst failure); N.Y. State Bar Ass'n Task Force on Wrongful Convictions, Final Report of the New York State Bar Association's Task Force on Wrongful Convictions 91 (Apr. 4, 2009), available at http:// www.nysba.org/Content/ContentFolders/TaskForceonWrongfulConvictions/FinalWrongfulConvictionsReport.pdf [hereinafter N.Y. Bar Ass'n Report] (describing multiple cases including those of Scott Fappiano, Anthony Faison,

Confirmation bias can also, perversely, lead investigators or prosecutors to embrace less probative or less reliable evidence than what objective scientific evaluation would counsel. Consider, for example, the Massachusetts case of Edmond Burke, in which despite DNA testing excluding him as the source of saliva found on the victim of a rape, Burke was arrested and prosecuted on the strength of forensic odontology examination that matched his teeth as the source of the bite mark that caused the saliva to be deposited.[199] The controversial use of canine scent lineups often reflects this dynamic as well, as dog scent experts have a curious habit of intervening late in cases in which other forensic evidence has proved unsuccessful in linking identified suspects to crimes.[200] The concern is obvious: That the heat of pursuit (of a suspect or a theory) blinds investigators or prosecutors to the inconvenient but more fair-minded conclusion that the best available science counsels a new investigative path.

None of this should be taken to suggest, though, that the introduction of scientific evidence into an investigation at an earlier stage necessarily obviates the kinds of concerns raised by cognitive biases interacting with other habits of investigation and prosecution. Consider the textbook "early science" circumstance: development of a suspect following collection of evidence from a crime scene, immediate laboratory submission, and testing that permits database searching for the source of the evidence---the owner of a resulting DNA profile, or a detected latent fingerprint. The Brandon Mayfield case illustrated in rather notorious fashion that such early science is far from infallible: There, multiple FBI fingerprint examiners erred in "matching" Mayfield's prints to those detected on evidence recovered from the scene of the 2005 Madrid subway bombing; Mayfield, an Oregon attorney who happened to be Muslim and somewhat active in the local Islamic community, was wrongly arrested for the crime. While the laboratory-based error garnered the most attention (and critical response), another feature of the investigation is relevant for present consideration: After obtaining the results of the fingerprint comparison, FBI agents obtained a warrant for Mayfield's arrest based in part on allegations that he was likely to flee given that he had previously traveled to Madrid illegally, given that he had no passport. In other words, what turned out to be an exculpatory fact---that government agencies had no record of Mayfield ever having *been* in Spain---was resolved against Mayfield on the strength of the fingerprint "match."[201]

Cases like this illustrate the risk that forensic science's "apparent credibility[] leav[es] the process of detection, evidence gathering and investigation hidden. The canopy of science

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Hector Gonzalez, Charles Shepard, and the Central Park jogger defendants, in which known inconsistencies between evidence and theory of guilt existed, and additional potentially exculpatory forensic testing was not conducted).

[199] See Burke v. Town of Walpole, 405 F.3d 66, 81-85 (1st Cir. 2005).

[200] See Winfrey v. State, 291 S.W.3d 68, 69-73 (Tex. App.-Eastland 2009) (describing how multiple laboratory-based methods of analysis failed to connect crime scene evidence and individuals who police had developed as suspects through informants, leading to multiple dog scent lineups, each following interviews with informants allegedly reporting inculpatory information)), *rev'd by* 323 S.W.3d 875 (Tex. Crim. App. 2010).

[201] See Office of the Inspector General, A Review of the FBI's Handling of the Brandon Mayfield Case 252 (Mar. 2006), available at http://www.justice.gov/oig/special/s0601/final.pdf.

obscures the primitive analytic tools that persist."[202] In Mayfield's case, and most other known instances of questionable investigative paths following early suspect development through databases, we might have expected the high profile and violent nature of the crimes at issue to trigger the greatest investment of investigative resources, as well as the most vigorous testing by defense counsel. The push to expand the tools of early suspect development through the tools of forensic science, including in property offenses and other high volume crime, would seem to intensify these risks.[203] Consider the recent exoneration of Dwayne Johnson in Las Vegas, convicted following a guilty plea to robbery, following an investigation in which the only evidence against him was a CODIS hit. Johnson was innocent, as police discovered years later when crime scene samples originally matched to Johnson yielded another CODIS hit to a different individual; the source of the error was a laboratory sample mix-up.[204] In a resource-restricted environment, scientific evidence may well cut short investigation that is still called for, and with far more appealing plea offers coming in these cases we should expect less than full adversarial testing of that work---as Dwayne Jackson's case tragically illustrates.[205]

3. Enter NAS

Leading law enforcement researchers have described the current state of affairs with respect to forensic science usage as being that "physical evidence is not collected in most cases investigated by police; when it is collected, much of it is not scientifically analyzed; and when it is analyzed, it is used not to promote investigative efficiency, but rather to bolster prosecutorial proceedings."[206] This may overstate the case somewhat, but the previous two Parts describe an array of conditions that certainly support that state of affairs, and risk its most concerning manifestations in at least some cases.

It should by now be clear that the NAS Report has little if anything to say, directly, about the concerns with which this Article is preoccupied. Simply creating the conditions for more and better quality science to be produced by laboratories will not address critical features of under-production, under-utilization, and qualitatively sub-optimal exploitation of forensic science in the criminal justice system. To be sure, there are systemic resource constraints that, if addressed at the laboratory level, are likely at least partly improve the state of affairs with respect to the

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[202] P.K. Manning, Technology's Ways: Information Technology, Crime Analysis, and the Rationalization of Policing, 1 Crim. J. 83, 84 (2001); see also See William C. Thompson, Tarnish on the "Gold Standard": Recent Problems in Forensic DNA Testing, Champion (Jan./Feb. 2006), at __ (discussing cold hit contamination-based errors); Cole & Lynch, supra note __, at 48-49 (same).

[203] See supra note __ and accompanying text.

[204] Jackie Valley, Metro Reviewing Cases After DNA Error Led to Wrongful Conviction, Las Vegas Sun (Jul. 7, 2011), available at http://www.lasvegassun.com/news/2011/jul/07/dna-lab-switch-led-wrongful-conviction-man-who-ser (discussing wrongful conviction of Dwayne Jackson after laboratory switched samples and wrongly matched him to crime scene evidence).

[205] See supra notes __ and accompanying text (describing problem with respect to DNA in property crimes).

[206] Horvath & Meesig, supra note __, at 965.

suppressed rates of evidence submission and analysis usage that are features of the status quo; undoubtedly, this behavior is at least in part a resigned response to laboratory backlogs.[207] But the causes are likely more endogenous, and more entrenched, as well.[208] Affirmative rather than trickle-down intervention appears to be called for.

But the concern is not just that the reform agenda of the NAS Report might neglect critical issues, but that it might in some instances unwittingly confound them. Two features of the NAS Report's proposals are illustrative. Consider first the NAS Report's commitment to putting more scientific evidence into the hands of investigators early in investigations, perhaps most directly reflected in its call for expanded inter-operability of Automated Fingerprint Identification Systems ("AFIS") and its conclusion that a range of identification-orientated forensic disciplines (such as hair microscopy, handwriting analysis, or forensic odontology) might be well-suited for investigative use although they may never be validated sufficiently to support the claims of individualization currently made in courtroom testimony.[209] These may well be right-headed proposals on balance. With regard to AFIS in particular, it is likely that the expanded ability to generate suspects based upon fingerprints recovered from crime scenes—a capacity currently limited by a surprising array of proprietary barriers to interoperability of multiple jurisdictions' computerized fingerprint databases---would permit police to pursue the investigation of cases, property crimes in particular, that are currently closed without resolution for lack of evidence. Moreover, it may well be that a range of forensic disciplines provide more reliable inclusions of suspects than other more traditional forms of evidence---think, especially, eyewitness evidence;[210] and it certainly may permit highly reliable *exclusion*.

But cases like that of Edmond Burke, and the conditions that systematically diminish the ability of investigators to fair-mindedly evaluate the reliability of competing scientific evidentiary conclusions in a case, raise concerns about whether, absent additional measures, this

[207] NAS Report, supra note 8, at 37 (reporting that "backlogs discourage law enforcement personnel and organizations from submitting evidence").

[208] For whatever self-reporting is worth in this context, it is instructive that recent surveys of forensic science "customers" reveal laboratory wait-times to be only one of many reasons cited for non-submission of evidence. See Pratt et al., supra note __, at 36-37. There is also good reason to doubt that laboratory backlogs are likely to substantially diminish, at least in the near future; indeed, despite significant dedicated federal funding prior to and since the NAS Report, they have not yet shrunk. See Mark Nelson, Making Sense of DNA Backlogs 2010: Myths vs. Reality 3 (NIJ 2011) (presenting graphs showing steady increase in productivity and steady increase in submissions leading to persistent increase in backlogs), available at https://www.ncjrs.gov/pdffiles1/nij/232197.pdf. Expanded collection of DNA from convicted and, increasingly, arrested individuals---a practice that may well dramatically increase if the Supreme Court ratifies the authority of police to collect DNA from arrestees in the case raising that issue this Term---has a major impact on laboratory resources in this regard. See __, supra note Burch et al., supra note 23, at 4 (reporting that seventy-five percent of DNA analysis requests were for arrestee and offender samples).

[209] NAS Report, supra note 8, at 127.

[210] So, for example, it may be that hair examiners can say with a higher degree of confidence that two hairs are consistent with being from the same source, than an eyewitness can say that a face seen in a lineup is in fact the face she saw at a crime scene; the latter would be more discriminating if true, but it might be highly likely to be false.

evidence will be put to the best possible use.[211] Moreover, we might well be concerned about the likely role that evidence that possesses a scientific imprimatur and the capacity simply to narrow a field of suspects will play in the course of an investigation. If it is true that investigators' tendency is to have a "restricted" view of the value of forensic evidence primarily as a tool of confirmation rather than investigation, and that resource pressures among other incentives dictate that the "best" investigative path is the shortest line to case closure, the push will be to utilize forensic evidence of this sort to enhance tried and true investigative methods---suspect interviews and interrogations among them.[212] This could well be an effective strategy from the standpoint of closing cases, as scientific evidence has been established as an important factor in obtaining confessions.[213] From the standpoint of reliability concerns, however, this should give us pause: Scientific evidence has the capacity to convince both the guilty and the innocent that confession is in their interests,[214] and confessions in turn diminish the capacity to independently scrutinize the reliability of the forensic evidence that prompts them.[215]

Consider also the NAS Report's much-debated call for laboratory independence. Critically, apart from the merits of the recommendation, its very meaning has been the subject of significant debate; while strong proponents of crime laboratories as operating wholly outside of law enforcement control have claimed the NAS Report adopted their viewpoint, others have argued that a more modest accommodation, "administrative independence" within, perhaps, a law enforcement organization, is consistent with the Report's aims.[216] Law enforcement and prosecution interests have been heard on this matter, though the attitude among supporters of the NAS Report's agenda has been largely dismissive, viewing these opponents of strong independence (somewhat understandably) as tainted by the very self-interest and power dynamics that motivated the recommendation in the first place. Politics aside, a systemic view of forensic science oversight suggests that there are very real concerns raised about the design of an "independent" laboratory system that should be considered in connection with reform, and

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[211] See supra notes __ and accompanying text.

[212] Horvath and Meesig, supra note __, at 966.

[213] See Richard A. Leo, Police Interrogation and American Justice 143, 190 (2008).

[214] Id. at 147; Steven A. Drizin & Rob Warden, True Stories of False Confessions (2009) (describing false confessions in Central Park jogger case).

[215] See, e.g., Garrett, Convicting the Innocent, supra note __, at 25; Dan Simon, The Limited Diagnosticity of Criminal Trials, 64 Vand. L. Rev. 143, 181 (2011).

[216] Paul C. Giannelli, Independent Crime Laboratories: The Problem of Motivational and Cognitive Bias, 2010 Utah L. Rev. 247 (supporting complete independence but proposing more limited alternatives that might achieve aims); Kenneth Melson, Embracing the Path Forward: The Journey to Justice Continues, 36 N.E. J. on Crim. & Civ. Confinement 197, 217-18 (2010) ("Advocacy groups critical of forensic science have latched on to the complete removal of crime laboratories from law enforcement. . . . Several organizations oppose the removal of crime laboratories from law enforcement agencies, but support different degrees of autonomy within the parent law enforcement agencies.").

suggests in all events that a (strong) form of independence could have real costs. How would fully independent crime laboratories assist, if at all, with evidence collection and crime scene response; to the extent a role is envisioned, would independence delay response or undermine working relationships between law enforcement officers and their "independent" colleagues; will evidence collection instead fall within the domain of law enforcement, and do resources exist to manage that transition?[217] In the course of an investigation, would fully independent laboratories mean more formalized submission and prioritization decisions for testing; would discretion in regard to submission and prioritization be committed to investigators, or to analysts? These are critical questions to be answered in connection with the independence proposal, ones with which the NAS Report itself does not grapple.

Of course, as Part I aimed to show, there were fair reasons why the NAS Report itself did not squarely take on these concerns, and thereby assume a more systemic (and correspondingly invasive) posture toward the role of forensic science in the criminal justice system. Nevertheless, these concerns cannot fall out of the reform agenda that is solidifying in the Report's aftermath, and that is likely to dictate the terms of both policy response and academic inquiry going forward. In this regard it is worth reflecting on comparative approaches that reflect a more integrated, systemic approach to forensic science oversight. Consider the recent government-commissioned inquiry into the state of pediatric forensic pathology in Ontario, Canada, prompted by a number of high profile wrongful convictions and other events indicating serious deficiencies in forensic pathology practice. The Goudge Report, as the massive four-volume document is known, examined and issued 169 recommendations concerning the forensic pathology field, including proposals largely analogous to those of the NAS Report, touching on training, education, professional protocols, and oversight of practitioners.[218] But while "much of the focus must be on forensic pathologists and the issues surrounding their training, education, accreditation, oversight, and accountability[,]" report includes "specific recommendations . . . designed to ensure that [police, prosecutors, and defense attorneys] will be as effective as possible in th[e] task" of "protecting the public against the introduction of flawed or misunderstood pediatric forensic pathology into the system."[219] In recognition of the fact "that other participants in the criminal justice system have important roles to play in protecting the public against the indtroduction of flawed or misunderstood pediatric forensic pathology into the system," the Report's recommendations also target police and prosecutors (among others), and

[217] State of N.Y. Office of the Inspector General, Report of Investigation of the Monroe County Public Safety Laboratory 31-32 (June 2012), available at http://www.scribd.com/doc/96850360/Monroe-County-Laboratory-Report; Horvath & Meesig, supra note __, at 966-67 (urging that "improvements in the mutual exchange of information among investigators and others involved in the collection, analysis, and use of physical evidence would enhance the value that such evidence has" more than reforming identity or institutional role of particular actors in collection and analysis); Peterson et al., Forensic Evidence and the Police, supra note __, at 75; Roman et al., supra note __, at 9, 349-50 (discussing consequences of delayed crime laboratory response to crime scene, and poor working relationships among police and crime scene responders, and need to tailor individual training protocols to particular institutional culture).

[218] Stephen T. Goudge, 3 Inquiry Into Pediatric Forensic Pathology in Ontario 437-57 (2007), available at http://www.attorneygeneral.jus.gov.on.ca/inquiries/goudge/report/index.html [hereinafter "Goudge Report"].

[219]See id. at 46—47, 78-83 (devoting entire chapter of recommendations to this concept).

encourage changes to practices in the substance and timing of information flow among pathologists, corners, and police, increased training for police with regard to pediatric forensic death investigation and generally confirmation bias in investigation, and special considerations for prosecutors in regard to case preparation and disclosure issues.[220]

Consider also the British example. In recent years the British government has produced at least two reports on scientific evidence in criminal investigations that have examined the roles of producers and users as integrated functions in the field of forensic science.[221] This integration extends as well to national oversight of forensic science, which has long been a feature of the British system, most recently through the role of the Forensic Science Regulator and the Forensic Science Advisory Counsel.[222] In addition to the promulgation of standards for forensic science practice at the laboratory level, the Forensic Science Advisory Council has also undertaken the task of promulgating "End-User Requirement" for forensic science services, directed to the roles of police, prosecutors, judges, and others in utilizing scientific evidence.[223] Matters addressed by the End User Specialist Group have included, for example, codes of conduct relating to crime scene canvassing and the appropriate roles for evidence-gatherers, and to proper interactions between police and forensic pathologists.[224]

This is not, of course, to suggest that Canadian or British models of forensic science oversight ought to, or even could, be borrowed by the United States, particularly given the important differences between these countries and the United States in terms of criminal justice administration as a general matter. Both Canada and the United Kingdom feature far more centralized bureaucratic control over policing and criminal adjudication in general, and forensic science in particular; and both have many fewer provincial and local police and prosecutorial organizations.[225] In the United Kingdom as well, policing has as a general matter for the last three decades been at the vanguard of a broader trend toward data-based accountability for

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[220] See id. at 437-57.

[221] See Her Majesty's Inspector of Constabulary, Under the Microscope Revisited (2002); Her Majesty's Inspector of Constabulary, Under the Microscope (2000).

[222] See Forensic Science Regulator, available at http://www.homeoffice.gov.uk/agencies-public-bodies/fsr (describing functions of independent Forensic Science Regulator located within British Home Office).

[223] See Forensic Science Regulator, End User Specialist Group Terms of Reference, (Mar. 21, 2011), available at http://www.homeoffice.gov.uk/publications/agencies-public-bodies/fsr/end-user-sg-terms-of-ref?view=Binary

[224] See End-User Specialist Group, Minutes of Meeting (Mar. 2, 2010), available at http://www.homeoffice.gov.uk/publications/agencies-public-bodies/fsr/end-user-sg-02032010mins?view=Binary.

[225] See Kent Roach, Forensic Science and Miscarriages of Justice: Some Lessons from Comparative Experience, 50 Jurimetrics J. 67, 75 (2009); Kent Roach and M.L. Friedland, Borderline Justice: Policing in the Two Americas, 23 Am. J. Crim. L. 241, 255-60 (1996). Cf. Seth Waxman, Police and National Security: American Local Law Enforcement and Counterterrorism After 9/11, 3 J. Nat. Security L. & Pol'y 377, 387-88 (2009) (contrasting American and British institutional relationships concerning policing and resulting difficulties in information-sharing and oversight).

government services,[226] which has provided incentive and opportunity for creating and funding the capacity to scrutinize and regulate law enforcement use of forensic science.[227] Nevertheless, the Canadian and British examples show that the instinct to view oversight through a more systemic lens is not quite so counterintuitive as it would seem when set against the dominant American paradigm.

III. Another Path Forward: Systemic Integration of Forensic Science

The primary goal of this Article is diagnostic: It aims to reveal deficiencies in forensic science usage that are systemic, driven by forces outside the laboratory, and unlikely to be addressed---indeed, perhaps exacerbated---by the prevailing approach to reform. Developing remedies for those ills will be at least as complex and multi-faceted as the dynamics that drive them, and is thus an ongoing project for future work (my own and, hopefully, that of others). But one must strike while the iron is hot. The NAS Report has generated not only academic foment, but also a (perhaps surprisingly) energetic level of response from policy corners. Two bills have been introduced in Congress in its aftermath, each largely tracking the NAS Report's proposed reform agenda with regard to theoretical and applied research and expanded standard-setting in the forensic sciences, as well as the creation of national oversight capacity; neither specifically incorporates or addresses the laboratory independence recommendation. Meanwhile, at the executive level the last three years have seen an array of working groups discussing the merits of the NAS Report proposals, and white papers from that process, which are in turn likely to shape pending legislation, are soon to issues.[228] To the extent the NAS Report is driving these processes---and it undoubtedly is---now is a critical time to raise a dissenting, or at least qualified concurring, voice in relation to the trajectory of the path forward.

Accordingly, this Section outlines some quite provisional proposals for ways in which the NAS Report's path forward might be widened. The first category addresses several of the NAS Report's proposals on their own terms, and suggests revising or revisiting them in critical respects that account for the concerns raised in Part II: The Report's research and standard-setting agenda should encompass police and prosecution practices such as evidence gathering, testing decisions, and disclosure regimes; policymakers should prioritize enhancing state-level oversight as a complement, or alternative, to national oversight of the field through the proposed

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[226] See Robin Williams & Paul Johnson, Genetic Policing: The Use of DNA in Criminal Investigations 102-05 (2008) (discussing trend).

[227] See id. This was largely the outgrowth of a Thatcher-era embrace of New Public Management and related strategies of broad privatization. See generally Robin Williams, What Price a Free Market in Forensic Science Services?: The Organization and Regulation of Science in the Criminal Process, 36 Brit. J. Crim. 37 (1996).

[228] See Forensic Science Standards Act of 2012, available at http://democrats.science.house.gov/sites/democrats.science.house.gov/files/documents/H.R.%206106%20-%20Forensic%20Science%20and%20Standards%20Act%20of%202012.pdf; Criminal Justice and Sentencing Reform Act of 2011, available at http://www.opencongress.org/bill/112-s132/show; National Science and Technology Council Subcommittee of Forensic Science, http://www.whitehouse.gov/sites/default/files/sofs_charter_2012_signed.pdf (describing progress of subcommittee in creating draft reports in response to NAS recommendations and forthcoming white paper).

NIFS; and, perhaps most controversially, the Report's "independence" recommendation should be reflected upon in light of the concerns raised in Part II. If the proposals are not surprising or groundbreaking, they do have the advantage of feasibility, plausibly fitting into the reform landscape that is already taking shape in the aftermath of the NAS Report; indeed, happily, some have the advantage of potentially being *more* feasible than the Report's proposed reforms. The second category of proposals is more ambitious as well as more provisional, suggesting that the goals of enhancing forensic science use and integrity challenge foundational themes of existing criminal procedure doctrine .

A. **The NAS Report: A Fuller Reform Agenda**

1. Research, standard-setting, and training

The lion's share of the NAS Report's recommendations aim to enhance our confidence in the forensic sciences by broadening and deepening the knowledge base concerning both the scientific foundations of its disciplines, as well as the technical aspects of forensic science practice. A corollary aim is for this research to inform the development of more formal, detailed, and binding standards of practice for analysts.[229] So too should police and prosecutorial training and practices vis-à-vis forensic science be put under the proverbial microscope.

Much like the non-DNA forensic disciplines in the years prior to the NAS Report, the subject of police and prosecutorial practices with respect to scientific evidence have been relatively neglected by U.S. researchers and, critically, by federal research grants.[230] An extremely small community of researchers have been the recipient of such funds over the past four decades, and while their work, particularly that of Joseph Peterson, has been critical in opening the black box of forensic science at the investigative stage, it has been conducted in an extremely small number of jurisdictions, at a rate that lags far behind the pace of scientific advances that might be predicted to affect upstream practices. Particularly glaring in its absence from the field is any significant number of qualitative, observational studies illuminating why and how it is that the data on significant filtering of physical and scientific evidence, reported by Peterson and a small number of other researchers, comes to pass.[231] Also relatively neglected

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[229] See supra Part I.

[230] See National Institute of Justice, Fiscal Year 2011 Awards, available at http://www.nij.gov/funding/awards/2011-table.htm (showing all NIJ grant awards, including those related to forensic science); National Institute of Justice, Fiscal Year 2010 Awards, available at http://www.nij.gov/funding/awards/2010-table.htm (showing all NIJ grant awards, including those related to forensic science); see also Analysis of 2010-2011 Forensic Science Award Abstracts (on file with author) (showing that among 678 total grants related to Forensic Science, 363 had available abstracts to review for applicability to non-laboratory work, and only .89% had any such component); see also supra note __ and accompanying text (describing limited pot of non-DNA-specific funding for forensic science).

[231] A recent NIJ-sponsored study on the use of DNA in property crimes helpfully combined quantitative and qualitative assessment in this regard. See Roman et al., supra note __.

has been the issue of cognitive bias, an area susceptible to study,[232] and which the NAS Report singled out as a priority on the laboratory side of the equation.

With respect to standard-setting and incorporation of best practices into policy guidance concerning forensic science, law enforcement users lag even farther behind the laboratories that are the subject of the NAS Report. Reviews of forensic science practices that have followed the NAS Report have recognized this deficiency,[233] but their calls for reform have not enjoyed the prominence of the NAS's recommendations, and have not to date influenced draft implementing legislation. By contrast, a surprising number of jurisdictions have in recent years been convinced to adopt (sometimes voluntarily, often following legislative mandate) detailed policies, informed by best available science, concerning eyewitness identification and interrogations, informed by best available science ---two critical tools of investigation to be sure.[234] That similar energy has not been seen with regard to forensic evidence undoubtedly owes in large part to the comparative lack of research in that arena, though there may also be a sense that practices with respect to forensic science in the investigative or other pretrial contexts defy standardization.

As a blanket premise, this is misguided. Indeed, as with SWGs and other voluntary, non-binding standard-setting bodies in the forensic science field, there are currently examples of voluntary efforts internal to the police and prosecution fields to propose best practices bearing on forensic evidence, though adoption is limited.[235] Evidence collection, for example, is a field of practices that are susceptible to far more standardization than is currently seen, in particular with regard to role differentiation and coordination among patrol, investigative, and scientific personnel. But even more investigative tasks could be treated less improvisationally than they are in the status quo. One could imagine more default standards for what evidence will be submitted prior to arrest in particular cases---similar to the sorts of investigative "checklists" that have been proposed as mechanisms to improve documentation and discovery in criminal

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[232] To the author's knowledge, the most illuminating research in this area with respect to police has been done in Sweden; little has been done in the United States. See supra note __ and accompanying text.

[233] See N.Y. Bar Ass'n Report, supra note __, at 91.

[234] See, e.g., The Innocence Project, Eyewitness Identification, http://www.innocenceproject.org/fix/Eyewitness-Identification.php (last visited Sept. 1, 2012) (describing jurisdictions that have adopted requirements concerning law enforcement identification procedures); The Innocence Project, False Confessions and Mandatory Recording of Confessions, http://www.innocenceproject.org/fix/False-Confessions.php (last visited Sept. 1, 2012) (discussing jurisdictions that have adopted requirements concerning law enforcement interrogation procedures); see also Garrett, Convicting the Innocent, supra note __, at 270 (discussing reform momentum).

[235] See, e.g., Commission on Accreditation for Law Enforcement Agencies, Inc., Law Enforcement Agency Standards, Chapters 41, 42, 83 (containing standards relating to forensic evidence and investigations); Am. Bar Ass'n, ABA Standards for Criminal Justice, Third Edition, DNA Evidence, 16-1.1 (2007); American Prosecutors Research Institute, DNA Evidence: Policy Considerations for the Prosecutor 3-5 (2004), available at http://www.ndaa.org/pdf/dna_evidence_policy_considerations_2004.pdf (proposing case assessment team model for DNA cases).

cases.[236] Similarly, one could imagine the development of standards of practice concerning the type of forensic analysis that will, in the ordinary course, be conducted in particular types of cases, taking evaluation of both resource and reliability questions out of the hands of individual investigators in individual case contexts, and committing law enforcement to standards of evidentiary evaluation that are rooted in the scientific objectivity they aim to exploit in their investigations.

More structural reforms might be entertained as well. Some have proposed that laboratories be organized to assign "independent case managers" to take responsibility for interfacing with law enforcement over submission and testing decisions, thereby segregating that assessment function from analysis.[237] Analogously, Rachel Barkow and others have proposed more segregation within prosecutors' offices, to separate investigative from adjudicative decisionmaking.[238] One could well imagine a more modest version of Professor Barkow's proposal taking hold with respect to decisions concerning scientific evidence, either within police departments or prosecutors' offices: A dedicated supervisor (or committee) could oversee decisions regarding forensic evidence submission and follow-up response to testing, thereby countering some of the effects of time pressures, habit, and cognitive biasf that might limit an individual investigator's or prosecutor's consideration of the question. Whereas Professor Barkow's proposal draws inspiration from administrative law,[239] the instinct here is instead to incorporate some of the lessons of science into the investigative and prosecutorial realm---at least where those realms are drawing on scientific products to do their work.[240]

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[236] See Ellen Yaroshefsky et al., New Perspectives on *Brady* and Other Disclosure Obligations: Report of the Working Groups on Best Practices, 31 Cardozo L. Rev. 1961, 1974 (Jun. 2010) (presenting proceeding of working group endorsing use of checklists by prosecutors and police); Commission on Accreditation for Law Enforcement Agencies, Inc., Law Enforcement Agency Standards, Chapters 42 (mandating checklists for investigators).

[237] See Risinger et al., supra note __, at 46—47 (suggesting creation of "an evidence control unit that is staffed by the most highly trained and highly respected personnel in the laboratory . . . responsible not only for coordinating work among examiners in different specialties, but also for being the sole contact point between the entity requesting the test and the laboratory"); Barbara O'Brien, A Recipe for Bias: An Empirical Look at the Interplay Between Institutional Incentives and Bounded Rationality in Prosecutorial Decision Making, 74 Mo. L. Rev. 999, 1045—46 (2009) (discussing structural debiasing options and their limitations, including Dutch model of using independent forensic analysts to check investigation, and studies showing bias injected when analysts knew police theory).

[238] See generally Barkow, supra note 83.

[239] Id. at 896 ("In the case of agencies, the law mandates structural separation within the agency itself or aggressive judicial review of the record to ensure unbiased decision making. In the case of U.S. Attorneys' Offices, no check has yet been put in place. But a corrective modeled along the lines of the APA's separation requirement would be feasible and desirable in the case of federal prosecutors' offices.").

[240] Cf. Ask et al., supra note __, at 1246 (noting that while good scientific practice dictates that "the person administering a procedure or recording an observation to the fullest possible extent be blind to the hypothesis underlying the study, to avoid any influence from reconceptions and preferences with regard to the results . . . . this stringent standard is not feasible in criminal investigations," creating a challenge for investigators who must "discount the knowledge of the case that is irrelevant to the assessment of reliability").

Finally, just as training and education is viewed in the NAS Report as a critical piece of the reform puzzle, so to with respect to police and prosecutors. Calls from criminal justice researchers to ensure that law enforcement officials fully understand "the value of forensic evidence for *investigative* purposes"[241] rather than just adjudicative advantage should be heeded as part of the forensic science reform agenda. So too, though, should users of forensic science be trained in the *risks* of overreliance on science, including the risk of erroneous "cold hits" from databases, as well as the risks of cognitive bias.[242]

All of these proposals offer a "fix" to some of the pathologies that emerge from the portrayal in Part II. If, accordingly, they offer the promise of better, more reliable outcomes in the criminal justice system, one could flippantly say that their advantages are self-evident. But of course such a claim, even if research could bear it out, will likely always be somewhat speculative, and in the meantime the demands of these proposals in terms of behavioral change, cultural shift, and resource allocation mean that they are unlikely to be attractive candidates for adoption. That said, all of them are of a piece with analogous changes that have been seen among isolated police and prosecutor organizations, often in the wake of some public breakdown highlighting the risks that the manner of practice described in Part II creates.[243] Indeed, an advantage of the sort of sustained attention to these matters that this Article calls for is that such responses might be informed by research concerning best practices rather than ad hoc political priorities.

2. Oversight

In proposing the formation of NIFS to oversee forensic science at the national level, the NAS Report ran head on into a long-entrenched resistance from the law enforcement and forensic science communities alike to outside regulation of the field.[244] Perhaps the only proposal that would garner more opposition would be oversight of law enforcement and prosecutors themselves. And yet, to a certain extent, this logical takeaway from Part II is that the actions of those critical players in the production and use of forensic science cannot be immune

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[241] Strom & Hickman, Criminology & Public Policy, supra note __, at 398; Horvath et al., supra note __, at 112.

[242] See Goudge Report, supra note __, at 79, 447 (recommending that Ontario "police should be trained to be viligant against confirmation bias in their investigative work . . . . This training is best accomplished through increased professionalism, and enhanced awareness of the risks of confirmation bias, the promotion of an evidence-based culture, and complete transparency regarding what is communicated between the police and the forensic pathologist.").

[243] See, e.g., Minjae Park, Davis to Law Enforcement: Report Rape Kit Backlog, Texas Tribune (May 30, 2012) http://www.texastribune.org/texas-legislature/82nd-legislative-session/wendy-davis-author-rape-kit-law-clarifies-intent (describing legislation enacted to mandate testing of rape kits); David W. Ogden, Memo re Issuance of Guidance and Summary of Actions Taken in Response to the Report of the Department of Justice Criminal Discovery and Case Management Working Group (Jan. 4, 2010), http://www.justice.gov/dag/dag-memo.pdf (announcing mandated discovery policies in federal prosecutors offices in wake of *Brady* scandals including Ted Stevens prosecution).

[244] See supra Part I.

from scrutiny if the goal of enhancing the contributions of scientific evidence is to be taken seriously.

One major deficiency of NIFS from the standpoint of this Article's goals is that in service of the NAS Report's goals of standardization and uniformity, it sacrifices geographic and professional footholds in the thousands of state and local jurisdictions where its standard-setting will most often play out. Indeed, as the Report acknowledges, "[o]versight of the forensic science community and medical examiner system will sweep broadly into areas of criminal investigation and prosecution"[245]; yet by design NIFS lacks acertain context sensitivity. Consider evidence collection and preservation, for example, which is an important issue for forensic science oversight, but which is closely tied to issues of institutional organization, local practices, and even state law.

Policymakers should therefore consider supplementing—or perhaps for the foreseeable future before NIFS is launched, substituting—state-level institutes of forensic science ("SIFS"). The creation of SIFSs could be administered through NIFS, or could more immediately (again, prior to the creation of NIFS) be created through a more robust version of the existing Coverdell grant program, which conditions federal funds for state forensic science programs on the designation of a state agency responsible for receiving and investigating complaints stemming from the conduct of crime laboratories.[246] Apart from the Coverdell mandate, a number of states have already created forensic science commissions. Models range from bodies with narrow mandates to accredit or otherwise create standards for laboratory practice, to entities having investigative functions as well, with authority to investigate complaints of forensic science negligence or misconduct on their own motion or through the receipt of complaints.[247] While none of these entities possesses a mandate to engage in oversight of police and prosecutors, those with broader investigative functions have done important work in assessing the role of forensic evidence in the construction and investigation of a case, in some instances exposing deficiencies in the manner in which police and prosecutors have responded to scientific evidence.[248] These state-level entities are well-positioned to develop recommendations for best practices in regard to the types of issues raised by Part II. Of course, proximity also carries the risk of undue influence, and it may well be that a SIFS entity is, though more knowledgeable about local context, far less politically inclined to push for change.[249] One way to address this concern is to

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[245] NAS Report, supra note 8, at 17.

[246] See 42 U.S.C. § 3797(k)(4) (Supp. IV 2007) (requiring that laboratories receiving federal grants create mechanisms for external independent investigations). See Oversight of the Department of Justice's Forensic Grant Programs: Hearing Before the S. Comm. on the Judiciary, 110th Cong. (2008) (statement of Glenn A. Fine, Inspector General, U.S. Department of Justice); Oversight of the Justice For All Act: Hearing Before the S. Comm. on the Judiciary, 110th Cong. (2008) (statement of Peter Neufeld on Behalf of The Innocence Project); see also Garrett & Neufeld, supra note __, at 94 (discussing neglected state of Coverdell oversight mandate).

[247] See generally Goldstein, supra note __ (discussing models).

[248] See, e.g., __.

[249] William C. Thompson & Rachel Dioso-Villa, Turning a Blind Eye to Misleading Scientific Testimony: Failure of Procedural Safeguards in a Capital Case, 18 Alb. L.J. Sci. & Tech. 151, 189—91 (2008).

conceive of SIFS as advisory bodies for NIFS, responsible for supplying local data that could inform proposed (and financially incentivized) standards emanating from a national entity.

3. Independence Reconsidered

In the view of many observers prior to the NAS Report, independence was the sine qua non of forensic science reform. The greatest likelihood as a political matter is that implementation of any strong form of this proposal via any federally sponsored agenda is unlikely. But some modified structural reforms aimed at the ills of bias and professional control that the Report sought to remedy may well emerge.[250] Moreover, the ideal of independence may well continue to be touted, and could take hold as a matter of state-level reform. Hence, it is well to consider the lessons of this Article's systemic view for the independence debate.

As already previewed in Part II, the account herein suggests a number of risks from independence, at least in its strongest form. At the same time, it suggests that laboratory independence might well not by its own force solve some of the bias concerns that, while not addressed by the NAS Report, nevertheless bedevil the integration of scientific evidence into criminal investigations.

The twin goals of building professionalism in forensic science and creating organizational firewalls against undue investigative influence over scientific analysis should not, need not obscure some of the advantages of collaboration between forensic scientists and law enforcement personnel. One of the more important contributions of a move toward organizational reform of the sort that the NAS Report calls for could and should be to identify those areas where collaboration is most advantageous, as well as those areas that, from the standpoint of reliability and integrity of investigative outcomes, are best committed to laboratory discretion, and best committed to law enforcement discretion. Where tasks like evidence collection, evidence submission, and testing priority should be lodged should be the subject of this sort of reasoned inquiry into best practices---not ad hoc determinations. The goal in this context should be similar to what Dan Richman has argued for in relation to other dynamics of criminal investigations: "to promote teamwork," to enable "each player [to] orient[] to his distinct institution and professional culture" such that "interaction presents less a risk of capture than an opportunity for both productive collaboration and mutual monitoring."[251]

B. The Criminal Justice Conversation Must Account for Forensic Science and Upstream Dynamics – Particularly Assuming a World of More, Early Science

[250]See D. Michael Risinger, The NAS/NAS Report on Forensic Science: A Path Forward Fraught With Pitfalls, 2010 Utah L. Rev. 225, 238 ("[A]ny hope of congressional action to coerce or encourage the establishment of independence of forensic labs from law enforcement control is also dead on arrival."; Presentation of Jamie Downs, Texas Criminal Justice Integrity Unit-Forensic Science Commission Forensic Science Seminar, Jun. 4, 2012 (on file with author) (reporting that working groups are unlikely to agree on independence recommendations).

[251] Richman, supra note __, at 813.

An implicit though important lesson of Part II is that criminal procedure doctrine currently has little role to play in the dynamics that this Article aims to highlight. True, the Fourth Amendment formally serves as a pervasive regulatory backdrop for the work of law enforcement in the investigative stage of a case, particularly where gathering and exploiting *stuff* is concerned---that is to say, in relation to search and seizure---as is fundamentally the case in relation to all physical evidence in a case. But for reasons described above---in particular diminished warrant strictures and weakened remedies---Fourth Amendment doctrine serves as a fairly light constraint, and an even weaker affirmative mandate in regard to law enforcement activity around forensic evidence.[252] Other areas of criminal procedure doctrine are even less relevant: While the Fifth, Sixth, and Fourteenth Amendments speak (haltingly) to police work in relation to eyewitness identification and suspect interrogations,[253] notions of due process are viewed as irrelevant to scientific evidence absent evidence of, essentially, fabrication or framing in the course of an investigation.[254] *Brady* doctrine entitles the defense, as a feature of due process, to favorable information within the control of the state, but this has to date been limited to known rather than potential exculpatory evidence, and continues to be tethered solely to trial.[255]

This is reflective of more foundational commitments, reflected in the prevailing majorities (and occasionally vocal dissents) in United States Supreme Court cases over the last half century of evolving constitutional criminal procedure. American criminal procedure doctrine is fairly preoccupied with policing a declared line between the inquisitorial and accusatorial features of our criminal justice system, the former attending the investigative work that police and prosecutors do in developing evidence in a case, and the latter attending the trials in which that evidence is tested.[256] Closely related, of course, is a tradition of substantial

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[252] An exception to this rule is the barrier that the Fourth Amendment may, or may not, create to the suspicionless collection of DNA specimens for purposes of populating the CODIS databases. The Supreme Court appears likely this term to take up the question of whether the Fourth Amendment bars such collection and retention on a showing of probable cause to arrest. See Maryland v. King, 567 U.S. __ (2012) (granting stay of lower court judgment against the state of Maryland in litigation over arrestee DNA collection, based on likelihood that cert would be granted and judgment reversed).

[253] See, e.g., Colorado v. Connelly, 479 U.S. 157 (1986); Manson v. Brathwaite, 432 U.S. 98 (1977); United States v. Wade, 388 U.S. 218 (1967).

[254] See Arizona v. Youngblood, 488 U.S. 51 (1988) (rejecting contention that due process was violated by loss of potentially favorable evidence, in favor of standard requiring showing of official bad faith to make out constitutional destruction of evidence claim); California v. Trombetta, 467 U.S. 479 (1984) (rejecting argument that failure to preserve breath test samples for later analysis violated due process unless exculpatory value was apparent and comparable evidence is unavailable to defendant).

[255] See Moore v. Illinois, 408 U.S. 786, 794 (1972) ("We know of no constitutional requirement that the prosecution make a complete and detailed accounting to the defense of all police investigatory work on a case," and therefore prosecution was not required to disclose (non-exculpatory) statements of witnesses).

[256] Withrow v. Williams, 507 U.S. 680, 692 (1993) (quoting Murphy v. Waterfron Comm'n of New York Harbor, 378 U.S. 52, 55 (1964)); McNeil v. Wisconsin, 501 U.S. 171, 181 n.2 (1991) ("Our system of justice is, and has always been, an inquisitorial one at the investigatory stage").

discretion enjoyed by police and prosecutors in performing the investigative tasks committed to their discretion, which has led courts to exercise minimal oversight in regard to decisionmaking by those individuals. Indeed, what oversight exists is always carefully and expressly calibrated so as not to disrupt these lines: Warrant doctrine cabins police and prosecutorial discretion with magistrate review, but only so much;[257] *Brady* doctrine has been doggedly constrained;[258] and, at least until recently, the Court has roundly resisted the notion that the plea bargaining that displaces trial practice in the overwhelming majority of criminal cases should enjoy something like the scrutiny that attends courtroom proceedings.[259]

Embracing the centrality of scientific evidence in the criminal justice system, and understanding that evidence, as the NAS Report does, as a distinctive evidentiary product created under conditions of scientific rather than forensic legitimacy, challenges this settled understanding---at least with respect to the role of forensic evidence in the inquisitorial, investigative stages of criminal proceedings.[260] Others precede me in making this sort of observation in the context of the accusatorial stages of criminal adjudication, and in doing important work to think through how modes of scientific inquiry might appropriately reshape the adversarial modes of legal inquiry with respect to forensic science.[261] The concerns raised herein push on a different front, however. The question is whether quite so much of what transpires in the investigative, inquisitorial stages of our criminal justice system is appropriately committed to the unfettered discretion of police and prosecutors, at least where forensic evidence is concerned. It is fair to ask why some standards to promote attitudes and practices consistent with scientific values---including, in particular, the value of *inquiry*---should not be imposed upon those investigative stages and decisions that rely upon scientific evidence. Critically, whereas police and prosecutors surely do possess comparative competence in making the mine run of evaluations and decisions in the development, evaluation, and funneling of cases prior to trial, any such claim with regard to forensic evidence is far less clear---all the more so in a post-NAS-

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[257] See, e.g., Hudson v. Michigan, 547 U.S. 586 (2006); Franks v. Delaware, 438 U.S. 154 (1974).

[258] Connick v. Thompson, 563 U.S. __, __ (2011) (Scalia, J., concurring) (characterizing claim of right to potentially exculpatory forensic evidence as lying on the "frontier" of *Brady* doctrine); United States v. Ruiz, 536 U.S. 622, (2002) (rejecting extension of *Brady* to pretrial plea stage); United States v. Bagley, 473 U.S. 667, 674-75 (1985) (emphasizing that *Brady* supplements rather than supplants adversarialism).

[259] See Lafler v. Cooper, 132 S. Ct. 1376, 1397 (2012) (Scalia, J. dissenting) ("In the United States, we have plea bargaining a-plenty, but until today it has been regarded as a necessary evil.").

[260] See Brian Forst, Errors of Justice: Nature, Sources, and Remedies __ (2004) (arguing that scientific evidence problematizes adversarial-inquisitorial line); Susan Haack, Irreconcilable Differences?: The Troubled Marriage of Science and Law, 72 L. & Contemp. Probs. 1, 12-13 (2009) (contrasting "the core business of science: and that of a legal system); see also District Attorney's Office for the Third Judicial District v. Osborne, 557 U.S. 52, 74 (2009) (**"**DNA evidence will undoubtedly lead to changes in the criminal justice system. It has done so already. The question is whether further change will primarily be made by legislative revision and judicial interpretation of the existing system, or whether the Federal Judiciary must leap ahead—revising (or even discarding) the system by creating a new constitutional right and taking over responsibility for refining it.").

[261] See, e.g., Giannelli, *Daubert* and Forensic Science, supra note 40; Mnookin et al., supra note 3, at 773; Murphy, New Forensics, supra note __, at 790.

Report world that acknowledges a professionally and ethically distinct field attending the production of such evidence.

What might be the consequences of pressing on the inquisitorial-accusatorial line that has tended to demarcate the appropriate boundaries of judicial oversight? An adequate answer depends on much fuller examination than can be undertaken in the confines of this Article, but some provisional thoughts are in order. Fourth Amendment doctrine might take a more demanding view of the warrant requirement where forensic evidence is concerned. Imagine, for example, a requirement that exculpatory facts concerning forensic evidence be detailed in an arrest warrant if they would be credited by a reasonable officer---a requirement that goes beyond current doctrine. As a matter of incentives, such a requirement might force more reflection on the part of investigators, as well as naturally bring additional perspectives into the process, since more demanding warrant requirements are likely to encourage supervisory or prosecutorial review.[262] The right of defense access to favorable evidence would also be the subject of reconsideration under these different assumptions. The notion that information concerning forensic evidence should not be subject to disclosure at the earliest possible stage---i.e., reasonably promptly after it is available to the state---seems a tactically driven uncomfortable fit with the goals of greater exploitation of science in the criminal justice system, all the more so in a world in which forensic analysts are understood as independent scientific contributors to the adjudicative process.[263] More innovatively, we might imagine expanded opportunities for defendants to affirmatively test the science-supported premises of an investigation, including (as a small number of states have instituted) a right to compel testing of evidence *not* developed by the state.[264]

For the time being, the Supreme Court has registered its resistance to rethinking any fundamental features of criminal procedure doctrine in light of the influence of forensic science, although its posture has been more "wait and see" than "nevermore."[265] Thinking outside existing criminal procedure boxes is therefore more than a proverbial academic exercise. As the Supreme Court watches and state legislatures and courts pursue more innovative responses to the

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[262] See Richman, supra note __, at 782, 802-04; see also Findley & Scott, supra note __, at __; Barbara O'Brien, Prime Suspect: An Examination of Factors that Aggravate and Counteract Confirmation Bias in Criminal Investigations, 15 Psych., Pub. Pol'y & L. 315 (2009) (finding that forcing individuals to articulate why a guilt hypothesis might be wrong mitigated confirmation bias, but that forcing individuals to generate multiple hypotheses had no such effect). Cf. Chip Heath et al., Cognitive Repairs: How Organizational Practices Can Compensate for Individual Shortcomings, 20 Res. Organizational Behav. 1, __ (1998)

[263] Indeed, a small number of states have adopted discovery reforms reflecting a robust concurrence with this view.

[264] See 725 Ill. Comp. Stat. § 5/116-5 (2005) (permitting defendant in any case where DNA may be relevant to the defense investigation or at trial to move the court for an order requiring the state police to conduct certain genetic tests, or to make certain comparisons or searches within the database); Ga. Code Ann. § 24-4-63 (2005) (providing similar rights); ABA Criminal Justice Standards on DNA Evidence, Standard 8.3 (approved by ABA House of Delegates, Aug. 2006); N.Y. Bar Ass'n Report, supra note __, at 99; see also Lynch, supra note __, at __ (arguing that pretrial phase of case might bear more adversarial process).

[265] District Attorney's Office for the Third Judicial District v. Osborne, 129 S. Ct. 2308 (2009).

pressures of forensic science on our settled understandings of competence, deference, and oversight in criminal investigation and adjudication, it becomes all the more important to develop a principled approach to reconciling these accommodations within existing criminal procedure theory and doctrine.

Conclusion

The NAS Report has fundamentally altered the landscape for forensic science in the criminal justice system. This is to be celebrated. But the accomplishments of the Report must not obscure the vast terrain that remains untouched by the path of reform that it charts. This Article has aimed to illuminate one important aspect of that currently neglected territory, namely, namely, the manner in which upstream *users* of forensic science---police and prosecutors to be precise----will select priorities, initiate investigations, collect and submit evidence, choose investigative techniques, and charge and plead cases in ways that have critical and systematic, though poorly understood, influences on the accuracy of forensic analysis and the integrity of its application in criminal cases. By broadening our understanding of how forensic science is created and used in criminal cases---by adopting a systemic perspective---we begin to see a raft of yet unaddressed issues concerning the meaning of scientific integrity and reliability in the context of investigative decisions that are by in large committed to the discretion of decidedly unscientific actors. Moreover, we see that decisions with respect to oversight of one corner of the system---the laboratory, in the case of the NAS Report---cannot be made in isolation. Undoubtedly, the Article has raised at least as many questions as it has answered. This is for the best. The account here only scratches the surface of the sorts of systemic concerns that we might reflect upon---that hopefully the active reform conversations will take up---as we commit our criminal justice system to more, and more institutionally entrenched, forensic science.