TOOLKIT

Retooling Forensics

A Toolkit for Local Organizers to Reform Forensic Evidence

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AT DUKE LAW

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What is Forensic Evidence and Why Does it Matter?

So what is forensic evidence?

Forensic evidence is concerned with the evaluation of physical evidence in criminal cases.

Americans tune in to *Forensic Files, CSI*, and other programs where technicians perform lab tests that appear to show—without a shadow of doubt—a clear connection between a suspect and evidence left at a crime scene. But how do we see the application of forensic science in real world cases?

Dr. David Fowler gained national attention after providing expert testimony for the defense in the trial of Derek Chauvin, accused of murdering George Floyd in one of the most notorious cases of police violence in the nation's history. The former Medical Examiner for the state of Maryland, Dr. Fowler, ruled George Floyd's cause of death "undetermined." His testimony galvanized hundreds of doctors across the nation—who now feared what other conclusions Dr. Fowler had previously made in other cases—to call for an independent review of all of his work in Maryland over the years.

One of those Maryland cases was the 2018 killing of Anton Black—a 19-year-old Black teenager murdered on tape by three police officers and a civilian vigilante who wore a Confederate motorcycle helmet. In 2019, Dr. Fowler ruled Anton's death "accidental" despite video showing Anton being tased and pinned to the ground for six minutes.

To learn more about the Anton Black case and how Dr. Roger Mitchell, former Chief Medical Examiner for Washington, D.C.—now head of Pathology at Howard University—discussed deaths in police custody on NBC Nightly News and Meet the Press, please visit the links below:

DATELINE featuring Anton Black case

"MEET THE PRESS" segment featuring Dr. Roger Mitchell

A transformational police reform law bearing Anton Black's name, Anton's Law, was passed in Maryland in the wake of George Floyd's murder. This was one of the most comprehensive laws enacted following a national outcry for police accountability and reform, yet the new law did not contain provisions relating to reforming forensic evidence. And that is understandable. People rarely view forensic evidence reform as police reform.

This toolkit connects those dots and provide a plan of action for local organizers, advocates and activists to enact substantive forensic reform in their jurisdictions.

In addition to individual cases where the forensics conclusions are on their face—deeply illogical and biased, headlines have captured large-scale crime lab audits and reviews across the country for decades. These forensic failures will continue until lab practices are carefully regulated. Labs should be independent from law enforcement. Labs should use only accurate methods. And all labs should have appropriate oversight.

Could it be Happening in Your City or County?

Learn more by watching the Netflix series

How to Fix a Drug Scandal

Perhaps the largest-scale reversal of criminal convictions in American history occurred due to rampant misconduct in two massive Massachusetts drug testing labs. It took years for police to uncover the lab misconduct, and still more years for judges to take action. Prosecutors were not quick to disclose what had happened or to share records with the defense. Tens of thousands of cases were reversed, others are being reexamined, and the cost of the audits have soared to about thirty million dollars.

The large-scale fraud at the Massachusetts labs was of record size but it was no exception. Unjust outcomes more frequently result from unchecked errors and poor quality controls.

We have documented over 130 crime lab reviews, involving errors, misconduct, or audits at labs across the country.

These are situations in which reviews occurred in response to problems. Such reviews should be routine. But we may never know how often issues arose and did not result in any public response. Failures to test evidence have also occurred on a massive scale, without adequate response. In some jurisdictions, tens of thousands of rape kits have languished untested. Flawed police priorities and/or flawed science have contributed to wrongful convictions and failures to focus on serious crimes in our communities.

To safeguard public safety and protect people's rights, we need to reform how forensic evidence is applied in the criminal legal system, from the crime scene, to the crime lab, to the courtroom.

This toolkit:

- explains why and how to accomplish reforms, from approaching this issue in our communities, at the local level, to the larger goal of global, transformational reform over time;
- includes ideas to reform police, prosecutor, and local lab practice; and
- highlights models of robust, statewide forensic reform.

Only when our local activists, advocates, and organizers educate the community about the need for forensic reform can we expect change.

How Does Forensic Evidence Go Wrong?

There are a range of ways that poor forensic evidence can lead to error, negligence, and even misconduct, from incentives baked into the criminal legal system through funding decisions, to human factors, like cognitive bias. Sometimes "forensics gone wrong" means that the underlying method has not been scientifically validated. Sometimes validated methods have been misapplied. And sometimes forensic analyses are exaggerated. Error and misconduct can only flourish in insufficiently regulated environments. Let's take a closer look, beginning with how we fund forensic work:

Finances & Forensics

The forensic testing and CSI techniques used in criminal cases cost money, and more and more funds have been spent to expand the use of forensics. The budgets of publicly funded crime labs, which conduct most of the forensic testing in the United States, have grown considerably. In 2014 they totaled $1.7 billion. At the same time backlogs have grown as the demands on labs have increased. Following the money sheds important light on why forensics face so many challenges in the United States. The crime lab funding at the state and local levels is skewed towards prosecution priorities. It encourages labs to do quicker tests, but not necessarily to improve how well they do their work or catch errors.

Lab Fees: How are crime labs funded, exactly?

In many states, all people convicted of a crime are charged a fixed crime lab fee, say $50 or $60. In at least 25 states, state law requires that fees be assessed and the money sent to crime labs if a person is convicted.[1]

Sometimes fees are laid on top of fees. For example, a person charged with a crime may be charged a basic fee for forensic evidence, whether they have the ability to pay or not, but then a larger fee, $600 in

North Carolina, if a forensic test is actually done in the case, and if the person is convicted. In Kansas, a person convicted must "pay a separate court cost of $400 for every individual offense if forensic science or laboratory services or forensic computer examination services are provided in connection with the investigation." In Washington state, any conviction involving lab analysis involves a $100 lab fee.

How much of this money is actually collected may vary. After all, many people accused of crimes cannot afford to pay any fee, no matter how small. There may be consequences for their nonpayment, including that their parole may not end so long as the fees are unpaid. But the labs may not collect the money.

Nor does the money always go to labs. The money from these fees may go directly to the crime lab, or it may just go to the state's general operating budget. For example, in Michigan, everyone who is convicted is assessed a series of fees, including crime lab fees, which are sent to a Justice System Fund; however, the state crime lab receives funds in proportion to the number of people convicted in the state.[2]

Researchers Roger Koppl and Meghan Sacks have described how Arizona, Alabama, California, Illinois, Kansas, Kentucky, New Jersey, New Mexico, North Carolina, Missouri, Tennessee, Virginia, Washington, and Wisconsin, all have provisions of that type, providing labs with funding through fees, but only if a person is convicted. In some labs, court fees provide most of the funding for entire labs. Roger Koppl has described, for instance, that fees made up 94% of revenues for Louisiana's Acadiana Criminalistics Laboratory. Fees averaged about a million dollars per state, according to a study by Jeremy Triplette conducted in 2013.[3]

Given this reality, many funding structures, whether intentional or not, are set up to incentivize convictions. Therefore, it is all the more important that we have an adequate indigent defense system that enables proper checks on prosecutorial power. However, the longstanding reality on the defense side is that funding is often nonexistent for experts who can attack the credibility of forensic results.

Judges often refuse requests from indigent defendants for funds to hire their own expert. As a result, jurors often only hear from crime lab analysts. There usually is no battle of the experts. The one-sided presentation of forensic science amplifies bias. Research shows that a defense expert can make a real difference in a case, even if that expert speaks just to the limitations of methods, and does not re-analyze the evidence.[4]

Policy choices are often accomplished through funding decisions. In our system of crime labs, the cards and resources are heavily stacked against the accused.

Some factors' impact on forensic results can be easily understood, e.g., unvalidated forensic disciplines or techniques, an underfunded defense system, or the fact that many labs are funded per conviction (fines and fees) versus forensic test. But what about other factors, including psychological phenomena, that

cannot be seen but that can bias the forensic examiner, whose findings will have a profound impact on questions of life and liberty?

Watch this video to learn about how unconscious bias can infect a forensic analysis: https://www.youtube.com/watch?v=-76A8hvjd8U&t=1s

To read more about how cognitive bias works in a real case, read the COGNITIVE BIAS CASE STUDY in the appendices on Brandon Mayfield Case.

And what about when forensic methods or tools have biases built into them? Let's take a look at an example of where implicit bias can play a role in the development of an algorithm police use to develop suspects:

Read the FACT SHEET on Bias and Facial Recognition in the appendices.

So we can see that it isn't simply systemic or human factors/cognitive bias, from funding incentives to racial bias, that seeps into the forensic lab; sometimes, it is the very inaccuracy of the forensic disciplines and tests in and of themselves that require regulation. To learn more about just some examples of where these forensic analyses can go wrong, please click on the following links to facts sheets on:

Read the FACT SHEET on Crime Scene Drug Testing in the Appendices.

Read the FACT SHEET on Fingerprints in the Appendices.

Read the FACT SHEET on Bite Mark Evidence in the Appendices.

Read the FACT SHEET on Firearms Evidence in the Appendices.

Additional resources to learn more generally about forensic science and its misapplications:

- National Academy of Sciences Report – "Strengthening Forensic Science in the United States: A Path Forward"
- The Organization of Scientific Area Committees for Forensic Science (OSAC) National Institute of Standards & Technology
- Center for Statistics and Applications in Forensic Science
- Report: Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods President's Council of Advisors on Science & Technology
- Texas Forensic Science Commission

Podcasts:

- CSI on Trial
- Admissible
- The Untold Story

Docuseries:

- CSI on Trial

Pillars of Reform:

Independence, Accuracy, & Oversight

This toolkit focuses on three areas of reform, each of which can deeply enhance the capacity of forensic evidence to provide our criminal legal system with reliable answers:

1 Independence

2 Accuracy

3 Oversight

The trial of Derek Chauvin is just one high-profile example of why forensic reform is needed to accomplish police reform. To show the importance of lab independence, we turn to the structure of medical examiner offices and crime labs, a large source of the problem.

PILLAR 1: Independence

We need independent scientific crime labs and not crime labs that are a part of police departments. The National Academy of Sciences report, *Strengthening Forensic Sciences in the United States: A Path Forward*, warned that a "lack of independence" in crime labs can damage the objectivity of forensic science. Yet very few labs in the United States are independent. The first crime labs in the United States were created by police agencies and housed in police departments. That is mostly still the case. A survey of about 300 labs conducted in the 1980s found that 79% were located within law enforcement or public safety agencies and most would only examine evidence submitted by law enforcement officials.[5] As one leading scholar has explained, "the police agency controls the formal and informal system of rewards and sanctions for the laboratory examiners." [6]

Today, there are over four hundred publicly funded crime labs.[7] While more labs are independent than in the past, most are law enforcement labs. In a handful of states, there is some amount of independence to a lab's budget and organizational structure, yet they still largely conduct testing requested by law enforcement, return results back to law enforcement, and their budgets are still largely law enforcement-directed. Most labs are part of law enforcement, and some report to prosecutors directly.

Biased Forensics

It is not just the budgets and structure, but also the work that forensic examiners do that is linked to police. Evidence collection is often handled by police, who determine which cases to prioritize. They decide what evidence to collect and what to send for forensic testing. Even the forms that police use to submit evidence to a crime lab can include all sorts of biasing information, like a suspected person's race and criminal record.

Independence and scientific accountability are deeply needed. Several high-profile research studies also highlight the importance of this problem. Fortunately, in addition to lab independence, a range of reforms can ensure that the *work* that forensic examiners do is independent. They need to be de-biased. Forensic examiners should not receive biasing information from police. They should only receive information relevant to their scientific task.

Put simply, we need scientists and not "cops in labcoats," a term coined by law professor Sandra Guerra Thompson.

This means financial and functional independence from law enforcement. It also means accountability and scientific oversight.

How can this be done?

- Procedures must ensure evidence is not biased by assumptions about a person's race, poverty, income status, neighborhood, membership in a vulnerable group, criminal history, or other characteristics.
- Procedures must ensure evidence is not biased by police pressure to convict.
- Procedures must ensure that labs must disclose information to both prosecution and defense and provide equal access to information.
- Crime lab staff should be blinded from task-irrelevant information, such as the race of a person of interest or suspect, and their work should be set up to avoid the negative influence of cognitive biases.
- Police evidence collection should also be led by scientists from crime labs to avoid bias and contamination at the crime scene.
- Sound science and accountability should govern all forensic evidence collection.

As the American Law Institute stated in its Principles of Policing:

As much as is practicable—to the extent permitted by legal rules and court orders—forensic-evidence work should be conducted independent of law enforcement, and the results should be made available to the prosecution and the defense on equal terms.

PILLAR 2: Accuracy

Thousands of people have been wrongly convicted in the United States due to unreliable forensic evidence. The National Academy of Sciences report, *Strengthening Forensic Sciences in the United States: A Path Forward*, put it diplomatically, stating that "some forensic science disciplines are supported by little rigorous systematic research to validate the discipline's basic premises and techniques." Yet there is "no evident reason why such research cannot be conducted."

Slowly, as the research has been conducted, we have learned just how often forensic methods can and do go terribly wrong. We need reforms to prevent unreliable forensics from being used. We need to make sure that the real error rates for the forensics that are used are shared with lawyers, judges, jurors, and the public. We all deserve to know how accurate this evidence really is.

Ensuring accuracy must start at the beginning of the process – when evidence is collected. Evidence should be collected carefully, and ideally by people with scientific training. The decision to collect crime-scene evidence and the manner in which it is collected are often influenced by police. But these decisions involve policy choices and so should be governed by written policy informed by scientific standards and research. Crime scene evidence collection deeply matters, and it increasingly requires specialized crime-scene technicians—or oversight by trained scientists. Otherwise, crucial evidence may be lost, contaminated, or degraded.

After forensic evidence is collected, agencies must preserve it in case there is a need for later analysis. Forensic evidence can be crucial in cold cases or closed cases that are reopened. Preservation of evidence is also important because new methods for conducting forensic analysis may be developed, or new, independent analyses may produce different results. Police agencies should have sound policies for preservation of evidence.

To read more about an example from a real case, this one involving bitemark evidence, go to the appendices to read about A CASE STUDY: The Bite Mark Case.

PILLAR 3: Oversight

We can regulate laboratories in this country to make sure they do accurate work and people's rights are not abused. We already do this for labs across the country that test medical evidence. Yet we have never regulated crime labs. A few states have created forensic science commissions, but none of them have robust oversight authority and resources to do routine oversight of labs. We need to follow the federal model developed for clinical labs so that the same level of quality control that goes into testing a case of strep throat goes into testing a fingerprint that might result in a long prison sentence. Only Maryland has adopted such a model, but because the regulations have not been meaningfully enforced, quality control issues in local labs have continued to be a problem.

American crime laboratories must be accredited, but those who study the misapplication of forensic science universally conclude that accreditation by itself is insufficient in assuring proper oversight. Proper quality control measures must also be put in place. Let's take a look at a couple of options:

One model for oversight is importing best practices from clinical oversight to the forensic setting.

To learn about the history of how medical labs sought regulatory measures in their casework, you can read the LAB ACCREDIT-ATION & REGULATION IN CLINICAL LABS FACT SHEET in the appendices.

To learn more about the effort to seek quality controls in crime laboratories in Maryland based on the clinical model, you can read THE MARYLAND EXPERIENCE CASE STUDY.

While the clinical model likely promises the most robust and uniform answer to crime lab oversight, there are other models available that do not require legislation but merely policy change at the crime laboratory level.

To learn more about an example from Texas, please read about the Houston Forensic Science Center's investment in quality control, INVESTING IN QUALITY CONTROL: THE HOUSTON FORENSIC SCIENCE CENTER FACT SHEET, in the appendices.

What Reforms Can Make a Difference?

This Toolkit seeks to give you resources you need to learn about the forensic policies and practices in your local police agency, crime laboratory and prosecutor's office, and identify a course of action that can make sizable improvements to forensic analysis in your backyard.

Models for Reform

Long term change can only be achieved through the enactment of concrete reforms and improvements in the field of forensics. This section:

- Explores potential reforms
- Provides examples of actions taken in jurisdictions around the country that successfully model these reforms
- Offers some questions you can ask and tools you can use to both take inventory of your jurisdiction's local landscape and help to reform forensic policy where needed

Local Reforms

Police Reforms

Assuring Independence

A sound forensic analysis process begins with thorough police investigations that collect evidence in an unbiased manner. Cognitive and contextual biases of officers analyzing crime scenes can affect the

investigative process.[8] It is important that procedures are instituted that improve the flow of information to crime lab analysts, including procedures that selectively blind them to irrelevant and potentially biasing information. Maintaining structured and impartial collaboration between crime labs and law enforcement is crucial to ensuring forensic evidence's proper use in the criminal legal system.

Independent CSI

One major reform goal is to ensure that a jurisdiction has structures for crime scene investigation that maintain independent and bias-free operation of forensic laboratories. Most laboratories are not independent. The most recent federal survey of 300 crime laboratories showed that 79% were located with law enforcement agencies and 57% only examined evidence submitted by law enforcement officials. Independence allows lab directors to have voice in making decisions and setting priorities. While communication and cooperation between forensic laboratories and law enforcement is necessary, such communication should not bias laboratory operations. In order to achieve independence for statewide crime labs, the state must establish an agency with an independent director, separate from the department of justice, that prohibits the employment of law enforcement officers. Removing forensic laboratories from the administrative control of law enforcement is an important step for reform.

In addition to removing forensic laboratories from the administrative control of law enforcement, there are additional quality assurance practices that assure more independence in those methods used to conduct forensic work, such as blind proficiency testing:

Blind Proficiency Testing

Proficiency testing is a quality control tool used to examine the performance of personnel and to determine whether personnel are following industry standards. Blind proficiency testing is where the proficiency test item is indistinguishable from normal customer items or samples received by the laboratory.[9] One example of a blind proficiency test is providing samples with known levels of alcohol or drugs to unknowing examiners at drug testing laboratories for analyses to determine whether examiners produce an accurate result. The National Academy of Sciences recommends blind proficiency testing in crime labs as a way to accurately assess the quality of a person's work.[10]

Improving Accuracy

Evidence preservation policies

As new technologies are developed that make it possible to analyze evidence in new ways, collecting and preserving physical evidence is increasingly important. Many criminal cases rely on forensic

evidence throughout the criminal legal process.[11] For example, in sexual assault cases, rape kits are a vital part of solving crimes.

Most states have enacted some form of an evidence preservation statute, which requires the preservation of evidence for both cold cases and also for adjudicated cases after trial so that evidence may be available for testing connected to innocence claims. Yet many of these statutes are limited in substance and scope and create huge loopholes that permit early destruction of evidence that could have shed light on a person's guilt or innocence. For instance, many laws that guide the postconviction preservation of evidence allow for premature destruction by only requiring evidence be preserved if a petitioner requests that it be retained. Yet we know there are many reasons someone might not petition for the retention of the evidence connected to their case, including not knowing this right is available to them under the law.

Even in the states that have evidence retention statutes, the protection provided by these statutes is fragmented and is subject to numerous limitations, so agencies charged with retaining evidence should maintain their own preservation policies. The Department of Justice, which created a Technical Working Group to provide guidance to entities that preserve biological evidence require the following baseline retention recommendations: preserve all biological evidence in adjudicated homicides, rapes, felony assaults, kidnappings and felony robberies for—at minimum—the length of time a person remains incarcerated for the offense, regardless of whether the conviction was secured through a plea agreement. But we believe there should be even longer retention since people can still have consequences after release from incarceration (e.g., sex offender registration).

Ban the Use of Unregulated Databases

State law typically governs the scope of DNA collection that can be taken from individuals, either at the point of arrest or conviction. Despite these laws, however, some police agencies operate unregulated DNA databases comprised largely of people who have volunteered their DNA samples for the purposes of helping the police to solve crime by eliminating themselves as suspects. What the people in these databases do not realize, however, is that oftentimes their DNA profiles are permanently maintained by the police agency in an unregulated database. These databases should be banned, as they keep largely people of color in a perpetual suspect status. This not only breaks community trust and has a chilling effect on community participation in crime-solving with law enforcement; it could even lead to wrongful convictions.

Ban Presumptive Color-based Field Drug Tests

Another risk for wrongful conviction is law enforcement's use of color-based field drug tests. These

are “presumptive” drug kits, often used during roadside stops, that are used to attempt to determine if a given observed substance is a narcotic. The problem is that these color-based field tests are not reliable. They have identified household items like folic acid, jolly ranchers, soap, and cat litter as illegal drugs. Because of the unreliability of color-based presumptive field tests, substances that test positive are supposed to be sent to a crime lab for a more reliable test to confirm whether it is actually a narcotic. Unfortunately, that rarely happens. Why is that? Because most people, facing detention, the loss of their jobs, housing or custody, will understandably plead guilty to avoid these issues and end up with a permanent conviction on their records. And who is affected most frequently? People of color arrested for low-level drug offenses.

Read the FACT SHEET on Crime Scene Drug Testing in the Appendices.

Police agencies, if they currently use presumptive color-based field drug tests, should stop using them, as the Houston Police Department did following over 100 wrongful drug arrests based on these tests.

If a police department is going to use these presumptive tests, then they must take other steps so that a conviction is not entered before a crime lab has tested the substance and confirmed the test result. To prevent innocent people from pleading guilty in the face of a positive presumptive field drug test, police should never detain people during the period of time between a presumptive field drug test and confirmatory lab test.

Facial Recognition Technology

And yet another entry point to a wrongful conviction is the use of facial recognition technology, which has been shown to develop unreliable “matches”. As of the publication of this Toolkit, we are aware of seven highly publicized wrongful arrests based on the use of this technology, six of whom are Black people. Most recently, facial recognition technology led to the wrongful arrest of a pregnant woman who was handcuffed on her front lawn in front of neighbors and her children despite the fact that the initial description of the suspect included no notation of pregnancy. Had she not been visibly pregnant, we do not know if her innocence would have ever been established. Far more unreported cases have likely occurred.

We should never use a technology to develop suspects that has not been adequately tested. Further, its use to develop suspects can bias the memory of eyewitnesses and lead to eyewitness misidentification. Until facial recognition technology has been fully and independently validated (which the National Academy of Sciences in an important 2024 report has determined is not presently the case), it should not be used by law enforcement or private companies.

Lab Level Reforms

Improving Accuracy

Requiring Accreditation & Quality Programs

According to data from the Department of Justice, 88% of crime laboratories are accredited.[12] While this is a positive development, accreditation does not involve robust review of how well labs actually perform and meet those standards. Accreditation largely involves review of policies on paper and is no substitute for using scientifically vetted methods and quality controls.

Quality assurance practices are management procedures that help improve the validity and reliability of findings by establishing standard processes and methods for conducting forensic work.

Blind Proficiency Testing

Proficiency testing is a quality control tool used to examine the performance of the crime lab personnel and to determine whether personnel are following industry standards. Blind proficiency testing is where the proficiency test item is indistinguishable from normal customer items or samples received by the laboratory. One example of a blind proficiency test is providing samples with known levels of alcohol or drugs to unknowing examiners at drug testing laboratories for analyses to determine whether examiners produce an accurate result. The National Academy of Sciences recommends blind proficiency testing as a more precise test of a worker's accuracy.[13]

Blind Verification

A second examiner is provided with evidence to analyze but is not aware of the results of any other examiner also analyzing the evidence. Their results are then compared for consistency and accuracy.

Standards for Testimony and Reporting

The American Statistical Association (ASA) guidelines provide a strong basis for the development of statistically sound reporting policies. The guidelines state that all statements and opinions should "accurately convey the strengths and limitations of forensic findings." Thus, it is crucial that examiners "prepare reports and testify using clear and straightforward terminology, clearly distinguishing data from interpretations, opinions, and conclusions and disclosing known limitations that are necessary to understand the significance of the findings." Simply put, the statistical strengths and limitations of the methods need to be set out in all reporting.

Ban the Use of Unregulated Databases

State and federal law defines the scope of permitted DNA collection that can be taken from individuals, either at the point of arrest or conviction. Despite statutory protections, however, some crime labs operate unregulated DNA databases. These unregulated databases should be banned as they are not subject to oversight under DNA collection statutes.

Enabling Oversight

Case Review

Case review and/or reanalysis involves evaluating case related materials and determining if appropriate work was conducted. The review may also identify what additional work should be conducted, which may help reveal the truth about an event.

Corrective Actions

"Corrective actions" are potential solutions that eliminate or minimize the risk of repeating the nonconforming work or departure from policies and procedures. The purpose of quality corrective action is to bring about continuous improvement; corrective action is not considered punitive in nature. These practices specify steps and requirements to ensure a nonconformity is corrected and post corrective action monitoring is performed to avoid recurrence.

Assessments

Formal assessments can be used to check whether or not an individual meets the standards of performance. Methods of assessment include observation, trainer reports, review of performance products, oral or written examinations, and more.

Transparency

Many crime laboratories and other agencies involved in forensics work do not make their policies available to the public. Such standards should be shared with outside entities that review the work of a lab.[14]

Prosecutor Agency Reforms

Assuring Accuracy

Reject unvalidated forensic disciplines or assays

Some forensic disciplines, like bitemark evidence, or assays or tests, like presumptive field drug tests, have not been validated in a clinical setting and therefore have no evidentiary value or have some value, but no known error rate. Absent validation, these forms of evidence should be avoided or rejected.

Ban the Use of Unregulated Databases

Unregulated local DNA databases should be banned as they are not subject to oversight under the DNA collection statutes. More generally, all forensic databases should be regulated to protect privacy, fairness, and accuracy in their use.

Reject Plea Agreements Based on Presumptive Drug Tests

Even if a prosecutor's office does not want to outright reject cases that have been referred to them based on the use of a presumptive field test, it can implement a policy that only permits a plea agreement, upon the request of a defendant, pending a confirmatory test.

Open File Discovery for Forensics

It is not uncommon for crime labs to regard police or prosecutors as their "customers" and therefore share findings, conclusions, and underlying information and notes that inform those findings and conclusions only with one side of the adversarial system. Not only could this be cured at the crime lab level, it could also be addressed through what is known as "open file discovery." In an open file system, the information in the prosecutor's file is available to the defense. Open file discovery as a policy has the added benefit of providing evidence to the defense in advance of a plea agreement to avoid coercion of the innocent.

Crime labs should adopt open file discovery policies, just as prosecutors have in many jurisdictions, or laws should require it. Often, discovery rules only require sharing basic lab certifications or summary reports with the defense, and not the complete file, which may contain the information needed to understand how the forensic analysis was documented and conducted.

State Level Reforms

Enabling Oversight

State Forensic Science Commissions

Forensic Science Commissions provide oversight and guidance to crime laboratories to help ensure complete and accurate evidence collection and analysis. Members of these commissions are often determined by gubernatorial or legislative appointments and typically consist of individuals thought to have professional stake in ensuring thorough forensic review (often lawyers, academics, law enforcement, forensic scientists, etc.).

Twenty-one states have forensic science commissions or advisory boards, but all are not created equal. Many have membership skewed towards the perspectives of law enforcement and forensic practitioners and lack both scientific perspectives and balanced composition that give equal weight to the opinions of both prosecutors and defense attorneys. Many commissions lack investigative authority, standards-setting authority, or the ability to take corrective action. The Texas Forensic Science Commission is an exception to this trend and has the authority to investigate, take corrective action, and set standards.[15]

Improving Accuracy

Standards-setting

Standards-setting for forensic laboratories is important to create uniformity and reliability in the forensic field. Currently, standards-setting is developing at many levels. The National Commission on Forensic Science (NCFS), whose charter expired in 2017, adopted certain standards for federal agencies. There are also efforts to create standards at the national level through the Organization of Scientific Committees for Forensic Science (OSAC). OSAC is only gradually developing guidelines that can be adopted as standards, and some laboratories have already committed to adopting such standards once they are eventually complete. Unfortunately, many of these guidelines do not reflect the input of scientists or the research base for a forensic discipline. They do not, for example, comply with the simple American Statistical Association statement regarding statistics in forensics. At the state level, forensic science commissions, like the Texas Forensic Science Commission mentioned earlier, can set and enforce standards for the labs within their state. Few states have such a body, however.

Taking Action!

What can we do to reform forensics?

To get a better understanding of where things stand and what you might accomplish in your jurisdiction, here are some questions to ask specific agencies and offices in your community:

General Questions for Police Agencies/Crime Labs Relating to the Accuracy of Forensic Evidence:

- What types of forensic analyses does your local police agency or crime lab conduct?
- What standards do they have for collecting evidence?
- What are their standards for reporting on forensic analyses?
- What words do they permit examiners to use to describe their conclusions?
- Do they share their work equally with prosecutors and the defense?
- What are the error rates and the reliability of the types of forensics that they use?
- What procedures do they adopt to measure proficiency of experts?
- What standards do they have for preserving evidence?
    - Does your agency preserve biological evidence connected to homicide, rape, felony assault, kidnapping and robbery adjudicated cases, as recommended by the Department of Justice, so that testing can be conducted postconviction?
    - For these crime categories, does your agency require that this evidence be preserved for at least the length of time in which a person remains incarcerated and regardless of whether the person pleaded guilty?

Specific Questions to ask Police Agencies:

Oversight

- What are the avenues for review of forensic analysis in your jurisdiction?

Independence

- Do your state's policing agencies' code of ethics include a duty to impartially collect evidence? Are there any state laws or policies in place to support enforcement of this duty?
- Do the forensic laboratories in your jurisdiction operate individually from policing agencies?
    - Is the lab located physically within the law enforcement offices?
    - Does the lab analyze evidence other than what is submitted by police?

Accuracy

- Does the law require you to collect DNA profiles from people arrested - but not convicted - of crimes?
    - If so, what crime categories prompt the collection of DNA?
    - Are there any crime categories for which DNA arrestee collection is NOT required by law but that your agency collects anyway? Which crime categories?
    - If a person is arrested and not subsequently convicted, what is the process for the removal of that DNA sample and/or profile from the possession of law enforcement?
- Do you use facial recognition technology as an investigative tool? For which crime categories or under what conditions?
- Does your policy agency use presumptive field drug tests? Which testing kits does your agency use, e.g. is it a colorimetric test? What is the error rate of the test(s) you use?
- Does your state have an evidence preservation statute? If so, what are the protections and limitations of the statute? Does the statute minimally comply with the recommendations issued by the Department of Justice, e.g. require retention of evidence automatically upon conviction in adjudicated murders, rapes, kidnappings, felony assaults and robberies for the length of time a person is incarcerated for those crimes, regardless of whether a plea agreement was reached in the case?
    - If the lab is under your auspices, how is it funded? Municipal, county or state budget? Is it partially or entirely funded by court fines or fees?
    - If the lab is under your auspices, what steps do you take to address cognitive bias? Has your agency implemented blind proficiency testing?

Specific Questions to Ask Crime Laboratories:

Independence:

- Is your lab administratively independent from the police department?
- Do you share your work equally with the prosecution and the defense?

Accuracy:

- Do your local crime laboratories or forensic agencies have written standards which are publicly accessible?
- What standards do the labs in your jurisdiction follow for reporting?
- Are you entirely or partially funded through court fines and fees, e.g. by conviction or funded through the (jurisdiction's) budget?
- What steps do you take to address cognitive bias? For instance, has your lab implemented blind proficiency testing?

Oversight:

- Does your state require accreditation of forensic laboratories?
- If your local forensic laboratories are accredited, which organization was responsible for their accreditation?
- What quality assurance practices do your forensic laboratories implement? If your local labs do implement quality programs, what bodies are responsible for the implementation or review of these programs?

Specific Questions to Ask Your Prosecutor's Office:

Accuracy:

- Does your office have an open file discovery policy, enabling early and automatic sharing of information with the defense?
- How are your line prosecutors educated about the possible misapplications of forensic science?
- How does your office keep abreast of advancements in forensic science? What efforts does your office make to ensure that potential forensic evidence has been validated?
- How does your office know when consensus in the scientific community changes or evolves with respect to the utility of a particular forensic discipline?
- Does your office pursue plea agreements on the basis of field drug tests?

Once you have a better sense of the state of play in your area, you should make determinations about the best focus for your reform effort. Ask yourself the following:

- Do I want to focus on local reforms to the police agency (target: police chief), the crime lab (target: crime lab director), the prosecutor's office (target: local prosecutor), or instead focus on lawmakers like mayors, city managers, county commissioners or state lawmakers (who have more control over issues of independence and funding)?
- What themes have emerged? Have a look at these charts to streamline your focus and look at some basic talking points relating to different entities engaged in producing or using forensic evidence, which can be converted into advocacy tools, like letters to officials, testimony at local hearings, op-ed writing, etc.

For the Police Agency:

Topic	Questions for Police Agencies	Talking Points
Evidence Collection	Are you guided by a Code of Ethics for the collection of forensic evidence?	Sound forensic analysis requires that evidence is collected in an unbiased manner. Police evidence collection should be led by scientists from crime labs to avoid bias and contamination at the crime scene. Maintaining impartial collaboration between law enforcement and the lab is crucial to ensuring the proper collection of evidence, including procedures that selectively blind officers to irrelevant and potentially biasing information. A Code of Ethics that ensures the objective collection of crime scene evidence should be implemented.
Lab Independence	Does the forensic lab in your jurisdiction operate independently from the police agency? Is the lab located physically within the law enforcement agency? Does the lab analyze any evidence that was not submitted by law enforcement?	A robust criminal justice system should require lab independence from law enforcement but since that is not the case here, every effort should be made to ensure that both prosecutors and defenders are treated equally. Therefore it should be the policy of this lab to test evidence that comes from parties outside of law enforcement officials. The "customer" for a lab should not be law enforcement but rather any party in the criminal legal system that is seeking more information about the forensic evidence collected.
Steps to Diminish Impact of Cognitive Bias	What procedures do you have to measure the proficiency of your forensic analysts? What steps do you take to diminish the impact of cognitive bias? Do you have blind proficiency testing?	Since our lab does not operate independently from law enforcement, we must ensure that there are structures in place for forensic analyses that maintain independent and bias-free operation of labs, including quality assurance practices that assure more independence even within an agency under law enforcement control. These include blind proficiency testing programs, which we call upon your lab to implement immediately.

Topic	Questions for Police Agencies	Talking Points
Unregulated DNA databases// Collecting & databasing DNA profiles from the community.	Does the law require you to collect DNA profiles from people arrested (but not convicted) of crimes? If so, what crimes? Do you collect any DNA from people who have been arrested and where the law does not require collection? Do you have a process for expunging DNA profiles if a person is arrested but not subsequently convicted or for a person who volunteers a sample for the purposes of being excluded as the source of the DNA?	Police agencies should never collect and develop profiles of DNA collected from anyone beyond the scope of the law. This means that police should not be collecting evidence from people either convicted or arrested for a crime unless the law specifically requires its collection. To the extent anyone in the community provides their DNA to your agency for the purposes of excluding themselves as a suspect, there should be an easily understood policy in place to allow for the destruction of the DNA sample and the profile derived from it. No unregulated databases of any kind should be maintained by law enforcement outside of what is explicitly permitted by law.
Facial Recognition Technology	Does your agency use facial recognition technology as an investigative tool? For which crimes?	Facial recognition technology should not be used in our community to develop suspects. Using a tool that has been shown to disproportionately harm people of color will not only provide an entry point for a wrongful conviction, it will breed distrust with the community. If the technology is going to be used anyway, it should only be used in the narrowest of circumstances.
Banning or Diminishing the Use of Unreliable Field Drug Tests	Does your agency use presumptive, field drug tests? What types of tests (e.g. is it color-based test, the least reliable field test)? What is the error rate of the test you use?	Presumptive field drug tests, particularly color-based ones, have high error rates and can easily coerce pleas from innocent people seeking to avoid detention or other consequences of detention, like job loss. Presumptive tests should never be used unless combined with a "cite and release" policy that prevents coerced plea agreements. (In fact, all drug possession cases should require laboratory tests before a plea can be taken and we recommend "cite and release" in all cases of drug possession.)
Preserving Biological Evidence	What is your policy for the preservation of evidence in cases that have already been adjudicated? What evidence do you save and for how long?	The Department of Justice issued guidance to evidence custodians, including the recommendation that all biological evidence connected to murder, rape, robbery, kidnapping and felony assault, regardless of plea, should be retained minimally for the length of incarceration. Biological evidence connected to adjudicated cases should be preserved for the length of time a person remains incarcerated or subjected to the collateral consequences of a conviction, e.g. sex offender registration. No evidence connected to a case in which there was a plea agreement should be prematurely destroyed.
Lab Funding	If the lab is under the police agency's auspices, how is it funded? Fines or fees? Municipal, county or state budget?	Fines and fees should never drive funding for a lab since they incentivize convictions. Labs should be funded by local or state budgets and should never be funded on the basis of conviction but rather by forensic test.

After you have gathered information about the forensic policies and practices from the police agency in your area based on the questions you asked, you are ready to seek change by first approaching the police chief.

Use the chart above to narrow down the issues you want to address, the questions you want to ask, and talking points you can use in a letter to the police chief, seeking a meeting to discuss a range of policy reforms.

The following "model" letter, which can be modified to the specific issues you wish to address (and using the talking points above), was drafted based on the following scenario: a lab located in a police agency and funded through fines and fees without administrative independence from the police agency. The police agency also uses presumptive field drug tests, which have been shown to have high error rates and coerce guilty pleas from the innocent:

TOOL: MODEL LETTER TO POLICE CHIEF

If you are reading the paper-based Toolkit, this letter is also contained in the "Model Letters" section at the end of the toolkit.

For the Crime Lab:

Topic	Questions for Crime Labs	Talking Points
Lab Independence	Do you operate administratively independently from a police agency?	A robust criminal justice system should require lab independence from law enforcement. In addition, every effort should be made to ensure that the prosecution and the defense are treated equally by the lab. Therefore, it should be the policy of this lab to test evidence that comes from parties outside of law enforcement officials and to share evidence and underlying bench notes with both the prosecution and the defense. The "customer" for a lab should not be law enforcement but rather any party in the criminal legal system that is seeking more information about the forensic evidence collected.
Written Standards	Do you have written standards that are publicly accessible?	Every crime lab should publicly post their Standard Operating Procedures so the public can better understand quality assurance programs in place, how conclusions are reached, what language is used in report-writing, etc.
Funding	How are you funded? Fines and fees? Municipal, county or state budget?	Fine and fees should never drive funding for a lab since they incentivize convictions. Labs should be funded by local or state budgets and should never be funded on the basis of conviction but rather by forensic test.

Topic	Questions for Crime Labs	Talking Points
Human Factors/ Cognitive Bias	What steps do you take to address cognitive bias? Has your lab implemented blind proficiency testing?	Despite the best intentions of people acting within the criminal legal system, human factors come into play and efforts should be made to ensure crime lab staff are blinded from task irrelevant information. Further blind proficiency testing should be part of your quality assurance program.
Accreditation & Quality Assurance	Are you accredited? Beyond accreditation, do you take any additional steps to assure quality? What quality programs does your lab have in place?	In addition to accreditation, there are a host of quality assurance protocols that should be implemented to assure justice. This includes, but is not limited to: • blind proficiency testing • blind verification (where results of the same evidence are tested independently by two analysts in order to compare the results for accuracy and consistency) • standards for testing and reporting that accurately convey the limitations of the forensic finds; and • standards for testimony that distinguishes data from interpretations and opinions.

The following "model" letter, which can be modified to the specific issues you wish to address (and using the general talking points above), was drafted based on the following scenario:

A medical examiner's office funded through fines and fees also maintains an unregulated DNA database that contains profiles of people in the community who volunteered their DNA for the purposes of exclusion and worse, contains no process to ensure expungement.

TOOL: MODEL LETTER TO CRIME LAB DIRECTOR OR MEDICAL EXAMINER

- This letter will incorporate talking points that can be used to approach any crime lab director, speaking to the general lab and funding issues articulated above.
- Specialized language that is highlighted can be used in letters specifically sent to medical examiners.

If you are reading the paper-based Toolkit, this letter is also contained in the "Model Letters" section at the end of the toolkit.

For the Prosecutor's Office:

Topic	Questions for a Prosecutor's Office	Talking Points
Transparency	Does your office have an open file discovery process?	Given that most wrongful convictions grounded in misconduct can be attributed to exculpatory evidence that was never turned over to the defense, every prosecutor's office should have a policy of open file discovery. This will not only prevent wrongful convictions; it will assure informed plea agreements. In the realm of forensics, discovery will allow the defense to explore the value of the forensic evidence in advance of a plea agreement or trial.
Accuracy	How are your line prosecutors educated about possible misapplications of forensic science? How does your office keep abreast of advancements in forensic science? What efforts has your office made to ensure that potential forensic evidence has been validated?	Every prosecutor's office should make every effort to keep abreast of advancements in forensic science. It is not uncommon for wrongful convictions to grow out of outdated forensic conclusions. For instance, in 1992, the National Fire Protection Association changed its own standards relating to conclusions about whether a fire was intentionally set, yet many prosecutors' offices continued to prosecute crimes based on antiquated science.
Oversight	How does your office know when consensus in the scientific community changes or evolves with respect to the utility of a particular forensic discipline? Does this ever lead you to review past convictions?	When there are evolutions in our understanding of science, it is critical that a prosecutor's office be willing to open up past convictions, or conduct an independent audit of past cases, to identify anyone that may have been wrongfully convicted on the basis of a misapplication of forensic science or expert repudiation of past testimony. When prosecutors learn of these changes, they have a duty to investigate and correct, and also to notify possible affected parties, including people already convicted of crimes on the basis of this evidence, and their lawyer of record.
Preventing Coerced Pleas from Presumptive Field Drug Tests	Does your office pursue plea agreements on the basis of color-based presumptive field drug tests or do you wait for a confirmatory lab result?	We know that coerced plea agreements based on the use of color-based presumptive field drug tests is a huge driver of wrongful convictions. To prevent this, your office should have a policy of never agreeing to a plea without the result of a confirmatory drug test in a crime lab, unless at the request of the defendant. Further, your office should have a policy of clearing the records of people who were previously convicted on the basis of a presumptive field test that was never confirmed in the lab. No innocent person should live with a conviction on the basis of a faulty presumptive drug test.

The following “model” letter, which can be modified to the specific issues you wish to address (and using the talking points above), was drafted based on the following scenario:

A prosecutor’s office in a state without open file discovery rules does not appear to have a process to in place to better understand the reaches of the scientific evidence it offers in court and in appropriate circumstances, prevent its use or understand the scope of its past misuse. The letter uses presumptive

field drug tests as an example of how a prosecutor's office can attempt to address the risks of relying on an unreliable forensic test.

TOOL: MODEL LETTER TO PROSECUTOR'S OFFICE

If you are reading the paper-based Toolkit, this letter is also contained in the "Model Letters" section at the end of the toolkit.

Tools for Other Government Officials Relating to Funding & Oversight at County & State Level:

If you are reading the paper-based Toolkit, this letter is also contained in the "Model Letters" section at the end of the toolkit.

MODEL LETTER FOR CITY OR COUNTY OFFICIALS RELATING TO FUNDING & INDEPENDENCE

MODEL LETTER TO STATE LEGISLATURE'S JUDICIARY & APPROPRIATIONS CHAIRS Seeking the Creation of an Independent Forensic Science Commission

MODEL LETTER TO STATE JUDICIARY CHAIRS seeking:

- Prohibition of Funding of the State Crime Lab Through Fines and Fees
- The Development of a Funding Program for Public Defenders to Hire Experts
- A Requirement that Information be Shared with Prosecutors and Defense Attorneys at the Same Time

Glossary of Terms

The following terms, sometimes misused, are frequently used by the forensic community and policymakers to describe aspects of forensic analysis and policy:

Accreditation: The process of assuring that a forensic laboratory follows procedures and protocols as set forth by a professional organization such as ISO (International Organization for Standardization) or ASCLD/LAB (American Society of Crime Laboratory Directors). Gaining accreditation involves examinations of policies, procedures, staff education and training, and general laboratory operations. This review is undertaken by the organization that would grant the accreditation status and usually involves a site visit. Accredited laboratories may be audited by the accrediting body to check compliance.

Black box study: Black box studies are studies that are used to measure the reliability of methods and techniques that rely on human interpretation/judgment.

Clerical error: A clerical error is an error due to a minor mistake or inadvertence and not one that occurs from judicial reasoning or determination. It can be a mistake made in a letter, paper, or document that changes the meaning of the same. Typographical errors or the unintentional addition or omission of a word, phrase, or figure in writing or copying something on the record are all examples of clerical error.

Cognitive bias: Cognitive bias refers to systematic patterns of distortion and error in human judgment caused by how we process information. The human brain doesn't absorb every detail or data point in front of us. Instead, we use shortcuts or heuristics to make decisions. The result is that different people end up interpreting the same information in different ways based on a variety of factors

Contributing factor: Something that helps cause a result or is partly responsible for a development or phenomenon.

Crime laboratory: A crime laboratory, also called forensic laboratory, is a facility where analyses are performed on evidence generated by crimes or, sometimes, civil infractions. Crime laboratories can investigate physical, chemical, biological, or digital evidence and often employ specialists in a variety of disciplines, including behavioral forensic science, forensic pathology, forensic anthropology, crime-scene investigation, and ballistics.

Crime Scene Investigation (CSI): Crime scene investigations refer to science used in determining facts during legal proceedings. The goals and objectives of a crime scene investigations unit are the collection, preservation, packaging, transportation, and documentation of physical evidence left at the crime scene.

CSI effect: A term used to describe increased public awareness of forensic science as a result of the American television show CSI and its spin-offs still airing in many parts of the world. The increased awareness may have had impacts on expectation of forensic science by law enforcement agencies and justice systems and probably played a role in the increasing number of students pursuing forensic science degrees in the early to mid-2000s.

Error rate: The frequency with which errors are made. Examples include the proportion of an experimenter's data recordings that are wrong or the number of Type I errors that occur during significance testing.

Indigent person: An impoverished person who is unable to afford the necessities of life. A defendant who is indigent has a constitutional right to court-appointed representation.

Proficiency testing: The testing of laboratory analysts as part of obtaining or maintaining a certification from a professional association. For example, to obtain certification from the American Board of Criminalistics (ABC), a person must complete written tests as well as laboratory proficiency testing in their area of specialization.

Quality Assurance (QA) or Quality Management System: A set of activities working to ensure the quality of the work of the entire laboratory. QA focuses on how well assays are running as a whole, consistency of results, and the adequacy of the scientists' performance. QA is proactive – it attempts to develop and improve the scientific processes that are used in the laboratory so that errors are prevented.

Quality Control: A set of activities performed on individual lab tests to ensure that the results being obtained are accurate. QC is reactive, whereby it aims to identify problems in the run and to correct the defects in individual results. QC may include the use of blanks, internal standards, negative controls, positive controls, etc. to measure the accuracy of the test on a certain sample.

Source identification: The identification of the source for an object with an unknown source.

Spot-checking: A quick examination of a few members of a group instead of the whole group.

Model Letters

1. **Model Letter to Police Chief**
2. **Model Letter to Crime Lab Director or Medical Examiner**
3. **Model Letter to Prosecutor's Office**
4. **Model Letter for City or County Officials Relating to Funding & Independence**
5. **Model Letter to State Legislature's Judiciary & Appropriations Chairs** seeking the Creation of an Independent Forensic Science Commission
6. **Model Letter to State Judiciary Chairs** seeking prohibition of funding of the State crime lab through fines and fees; the development of a funding program for public defenders to hire experts; and a requirement that information be shared with prosecutors and defense attorneys at the same time

Model Letter to Police Chief

NAME OF PERSON/NAME OF ORGANIZATION
ADDRESS
ADDRESS
PHONE NUMBER
EMAIL

DATE

Chief Dann Florek
NAME OF POLICE AGENCY
ADDRESS
ADDRESS

Dear Chief Florek:

We write to you as concerned citizens who have come together to seek changes to the application of forensic science in our community. We believe any robust system for the delivery of forensic science analysis must have independence and oversight to ensure accurate outcomes and prevent wrongful conviction. Given our review of funding and practices in our community, we respectfully seek a meeting with you to discuss the following matters and to offer a set of possible reforms to address them:

FUNDING & INDEPENDENCE:

First, we have learned that there is a foundational problem that requires your attention, namely that the crime lab that operates under your auspices is partially/entirely funded through the collection of court fines and fees from those accused of crimes and that your laboratory is not administratively independent of your police agency. This kind of funding and administrative structure not only lacks independence, it incentivizes convictions over non-biased forensic tests. At a minimum, a quality management program should be implemented to prevent cognitive bias that can affect both the quality and scope of evidence collected at a crime scene and the outcomes of forensic analysis of that evidence.

EVIDENCE COLLECTION & ANALYSIS FREE OF COGNITIVE BIAS:

Sound forensic analysis begins with the requirement that evidence is collected in an unbiased manner. Police evidence collection should be led by scientists from crime labs to avoid bias and contamination at the crime scene. Efforts should be made to divorce evidence collection from the law enforcement function but if this is not immediately possible, maintaining **impartial collaboration between law enforcement and the lab is crucial to ensuring the proper collection and analysis of evidence, including procedures that selectively blind officers to irrelevant and potentially biasing informatio**n. A Code of Ethics that ensures the objective collection of crime scene evidence should be implemented immediately.

ENSURING ACCURACY:

There are additional steps you can take to ensure there are proper checks on evidence that is produced by a crime lab that lacks independence. A robust criminal justice system should require **quality assurance practices** that promise more independence even within an agency under law enforcement control. These include **blind proficiency testing programs**, used to determine whether lab personnel are following industry standards. Additionally, since your lab is not independent from law enforcement, every effort should be made to ensure that both prosecutors and defenders are treated equally. Your **lab's "customer" should not be law enforcement or the prosecution but rather any party in the criminal legal system** that is seeking more information about the forensic evidence collected. This information should be shared equally as an added layer of oversight and to ensure fair trials and should be made official policy.

PROMOTING COMMUNITY TRUST:

These are fundamental changes that will build trust with the community. In addition to making these affirmative changes to build trust and assure the quality of forensic analyses, it is just as important to eliminate other policies or tools that harm trust and reduce or prevent community participation in crime-solving. One example of that is the use of the presumptive field drug test, an error-prone test that indicates the presumptive presence of narcotics in a sample collected by law enforcement. Unfortunately, these tests have been shown to indicate the presence of narcotics on basic household items, including jolly ranchers and folic acid. Worse, time and again, these tests have been shown to coerce plea agreements from actually innocent people seeking to avoid detention and its consequences, including job and housing loss.

The disparity of false drug arrests that used this tool are reflective of disparate drug enforcement based on race. This can be seen in data from Harris County, Texas, where officials took the unusual step of confirming presumptive lab tests in the lab *after* people charged with drug possession had pleaded guilty. To date, the National Registry of Exonerations has counted more than 100 exonerations of drug convictions in which a person originally pled guilty. **Black residents of Harris County were 5.2 times more likely to have pled guilty after a false arrest based on a faulty field drug test than white residents.** It is our strong hope that your agency will **cease the use of presumptive field drug tests**. If your agency persists in using the test, it should only issue "desk appearance tickets" upon a "positive" test and never permit detention before that test can be confirmed in the lab.

We appreciate your consideration of the recommended actions in this letter and we are approaching you directly with these proposals before approaching the mayor, city council, or other public officials to see what we might be able to accomplish collectively. Please let us know when we might be able to set up a meeting to discuss this in more detail.

Sincerely,
NAME

Model Letter to Crime Lab Director or Medical Examiner

This letter will incorporate talking points that can be used to approach any crime lab director, speaking to the general lab and funding issues. Specialized language that is highlighted can be used in letters specifically sent to medical examiners.

NAME OF PERSON/NAME OF ORGANIZATION
ADDRESS
ADDRESS
PHONE NUMBER
EMAIL

DATE

Dr. Melinda Warner
NAME OF CRIME LABORATORY/NAME OF MEDICAL EXAMINER OR CORONER OFFICE
ADDRESS
ADDRESS

Dear ME Warner:

We write to you as concerned citizens who have come together to seek changes to the application of forensic science in our community. We believe any robust system for the delivery of forensic science analysis must have independence and oversight to ensure accurate outcomes, reduce bias and prevent wrongful conviction. While these themes must be addressed in any laboratory setting, they are even more pronounced in the area of forensic pathology. Misapplications of the science and the introduction of bias can lead to medicolegal misdiagnoses on both ends, resulting in both wrongful convictions and murders that aren't—but should be—designated as such. Given our review of crime lab practices, specifically those related to the activities at the medical examiner's office, we respectfully seek a meeting with you to discuss the following matters and to offer a set of possible reforms to address them:

EVIDENCE COLLECTION & ANALYSIS FREE OF COGNITIVE BIAS:

Sound forensic analysis begins with the requirement that evidence is collected in an unbiased manner. Efforts should be made to divorce any evidence collection from the law enforcement function but if this is not immediately possible, maintaining **impartial collaboration between law enforcement and the lab is crucial to ensuring the proper collection of evidence, including procedures that selectively blind officers to irrelevant and potentially biasing information**. A Code of Ethics that ensures the objective collection of crime scene evidence should be implemented immediately.

ENSURING ACCURACY:

There are additional steps you can take to ensure there are proper checks on evidence that is produced by a crime lab that lacks independence. A robust criminal justice system should require **quality assurance practices** that promise

more independence even within an agency under law enforcement control. These include **blind proficiency testing programs**, used to determine whether lab personnel are following industry standards.

Further, **contextual information about the case or the person suspected of the crime, such as the race of the suspect, should never be shared with your examiners** and your internal policies and practices should reflect this foundational requirement to unbiased forensic analyses; otherwise we will continue to observe on the one hand the murders of our Black and brown community members characterized as "accidental" or "undetermined", preventing justice for their families and our communities, and on the other hand deaths that should have been deemed "accidental" or "undetermined" classified as murder, enabling wrongful convictions.

Every effort should also be made to ensure that both prosecutors and defenders are treated equally. Your **lab's "customer" should not be law enforcement or the prosecution but rather any party in the criminal legal system** that is seeking more information about the forensic evidence collected. This information should be shared equally as an added layer of oversight and to ensure fair trials and should be made official policy.

PROMOTING COMMUNITY TRUST:

These are fundamental changes that will build trust with the community. In addition to making these affirmative changes to build trust and assure the quality of forensic analyses, it is just as important to eliminate other policies that harm trust and reduce or prevent community participation in crime-solving. One example of that is the collection of DNA and the development of profiles from people who volunteer their biological material for the purposes of excluding themselves as suspects, only to learn later that their profiles are maintained in an unregulated database, operating outside of the DNA collection laws.

This policy communicates to that community that they are viewed as perpetual suspects, even when their very presence in the database grew out of their participation in helping the police agency to solve a particular crime. **We question the very legality of maintaining an unregulated DNA database outside of the proscriptions of the DNA collection statute. To the extent this extremely concerning practice continues and to the extent anyone in the community provides their DNA to law enforcement for the purposes of excluding themselves as a suspect, there should be an easily understood policy in place to allow for the destruction of the DNA sample and the profile derived from it in the database at your agency.** If no such policy exists, we request its development and implementation.

We appreciate your consideration of the recommended actions in this letter and we are approaching you directly with these proposals before approaching the mayor, city council, or other public officials to see what we might be able to accomplish collectively. Please let us know when we might be able to set up a meeting to discuss this in more detail.

Sincerely,
NAME

Model Letter to Prosecutor's Office

The following "model" letter, which can be modified to the specific issues you wish to address, was drafted based on the following scenario: a prosecutor's office that is located in a state *without* open file discovery rules that does not appear to have a process to in place to better understand the reaches of the scientific evidence it offers in court and in appropriate circumstances, prevent its use or understand the scope of its past misuse. It uses presumptive field drug tests as an example of how a prosecutor's office can attempt to remedy injustice wrought by an unreliable forensic test.

NAME OF PERSON/NAME OF ORGANIZATION
ADDRESS
ADDRESS
PHONE NUMBER
EMAIL

DATE

Honorable Jack McCoy
NAME OF PROSECUTOR'S OFFICE
ADDRESS
ADDRESS

Dear Mr. McCoy:

We write to you as concerned citizens who have come together to seek changes to the application of forensic science in your office. We believe any robust system for the delivery of forensic science analysis must ensure the prevention of wrongful conviction and take corrective action in the face of the misapplication of forensic science. We respectfully seek a meeting with you to discuss the following matters and to offer a set of possible reforms to address them:

ENSURING ACCURACY:

We learned from the groundbreaking 2009 National Academy of Sciences report, *Strengthening Forensic Science in the United States: A Path Forward*, that there is a "notable dearth of peer-reviewed, published studies establishing the scientific bases and validity of many forensic methods," making it ever more critical that all parties in the criminal legal system perform oversight and gatekeeping responsibilities. We would like to better understand **your office's policy to ensure you are keeping abreast of advances in forensic science**. As you know, it is not uncommon for wrongful convictions to grow out of outdated forensic conclusions. For instance, in 1992, the National Fire Protection Association changed its own standards about how to conclude whether a fire was set intentionally or not. Yet we know many prosecutors' offices still use antiquated science offered to them by fire analysts using outdated methods. Does your office have a process to make determinations about which forms of evidence it will accept and use in a courtroom? Further, we would like to better understand the policies your office has in place to ensure that it is only using **validated science and never permitting the overstatement of forensic conclusions to judges and juries**?

PROMOTING TRANSPARENCY:

We appreciate that our state law does not require the sharing of criminal evidence beyond what is required under *Brady v. United States*, but we are aware of several prosecutors' offices who have concluded that this approach is woefully insufficient to preventing wrongful convictions. Poor discovery practices, including poor discovery relating to forensic evidence, are one of the key contributors to wrongful convictions. The National Registry of Exonerations examined the first 2,400 exonerations in the United States and found that concealing exculpatory evidence—the most common type of misconduct—occurred in nearly half of the exonerations. While the *Brady* rule requires that prosecutors share exculpatory evidence with the defense, the cognitive biases that understandably inform these evaluations lead prosecutors to determine some evidence—that the defense might find critical to further investigation—is immaterial and therefore doesn't have to be shared.

Given that the lion's share of wrongful convictions grounded in misconduct can be attributed to exculpatory evidence that was never turned over to the defense, **every prosecutor's office should have a policy of open file discovery**. This will not only prevent wrongful convictions; it will assure informed plea agreements. In the realm of forensics, discovery will allow the defense to explore the value of the forensic evidence offered by law enforcement in advance of a plea agreement or trial.

PROMOTING COMMUNITY TRUST:

These are fundamental changes that will build trust with the community. In addition to making these affirmative changes to build trust and assure the quality of forensic analyses, it is just as important to eliminate other policies or tools that harm trust and reduce or prevent community participation in crime-solving. One example is the use of the presumptive field drug test, an error-prone test that indicates the presumptive presence of narcotics in a sample collected by law enforcement. Unfortunately, these tests have been shown to indicate the presence of narcotics on basic household items, including jolly ranchers and folic acid. Worse, time and again, these tests have been shown to coerce plea agreements from actually innocent people seeking to avoid detention and its consequences, including job and housing loss.

The disparity of false drug arrests that used this tool are reflective of disparate drug enforcement based on race. This can be seen in data from Harris County, Texas, where officials took the usual step of confirming presumptive lab tests in the lab *after* people charged with drug possession had pleaded guilty. To date, the National Registry of Exonerations has counted more than 100 exonerations of drug convictions in which a person originally pled guilty. **Black residents of Harris County were 5.2 times more likely to have pled guilty after a false arrest based on a faulty field drug test than white residents.** It is our strong hope that your agency will only accept a conditional plea agreement based upon a presumptive field drug test and **only permit the adjudication of that plea agreement pending confirmation in a crime lab.** Your office should also support a **"clean slate" policy** for anyone who previously pleaded guilty based on the performance of a field drug test but who cannot now benefit from a confirmatory lab test because the sample no longer exists to test.

We appreciate your consideration of the recommended actions and look forward to meeting with you to see what we might be able to accomplish collectively. Please let us know when we might be able to set up a meeting to discuss this in more detail.

Sincerely,
NAME

Model Letter to City or County Officials Relating to Funding & Independence

NAME OF PERSON/NAME OF ORGANIZATION
ADDRESS
ADDRESS
PHONE NUMBER
EMAIL

DATE

For:
MAYOR
-or-
CITY MANAGERS
-or-
COUNTY COMMISSIONERS
ADDRESS
ADDRESS

Dear Commissioners XXX:

We write to you collectively as concerned citizens who have come together to seek changes to the application of forensic science in our city. We believe any robust system for the delivery of forensic science analysis must have independence and oversight to ensure accurate outcomes and prevent wrongful conviction. Having undertaken an analysis of the status of the delivery of forensic science in our county, we have several concerns about the state of affairs.

FUNDING:

After reaching out to government officials, we have learned that our county crime lab is largely funded through the collection of court fines and fees from those accused of crimes. In our state, funding to labs is only made available through those forensic tests that result in conviction. This is extremely concerning to us; this funding structure implicitly incentivizes convictions over unbiased tests.

We appreciate that the development of the budget is a complicated and onerous process, and that it is natural to seek ways to defray costs through various fees; however, forensic outcomes, which can bear on life and liberty, is one area where we cannot allow incentives to enter the equation. We come to you to help our county identify a different source of funding and we are seeking your support in the development of working group of county commissioners to identify possible solutions.

Further, we recommend that this same working group examine other ways we might improve the accuracy and delivery of forensic services in our county, including contemplation of the following areas for potential reform:

EVIDENCE COLLECTION, PRIORITIZING EVIDENCE FOR BIAS-FREE ANALYSIS

Sound forensic analysis begins with the requirement that evidence is collected in an unbiased manner. Police evidence collection should be led by scientists from crime labs to avoid bias and contamination at the crime scene. Efforts should be made to divorce evidence collection from the law enforcement function but if this is not immediately possible, maintaining **impartial collaboration between law enforcement and the lab is crucial to ensuring the proper collection and analysis of evidence, including procedures that selectively blind officers to irrelevant and potentially biasing information**. A working group could pull in relevant experts to craft a model Code of Ethics that ensures the objective collection and analysis of crime scene evidence that could govern all labs in our county, including those located in police agencies.

We appreciate your consideration of a well-balanced working group with members of the scientific community to address and identify solutions to address misapplications of forensic science in our county. Please let us know when we might be able to set up a meeting to discuss this in more detail.

Sincerely,
XXXXX

Model Letter to State Legislature's Judiciary & Appropriations Chairs seeking the creation of an Independent Forensic Science Commission

NAME OF PERSON/NAME OF ORGANIZATION
ADDRESS
ADDRESS
PHONE NUMBER
EMAIL

DATE

Senators XXX; Assemblypeople XXX
Chairs, Judiciary Committees
Chairs, Appropriations or Ways & Means Committee
[STATE] Senate// [STATE] Assembly
ADDRESS
ADDRESS

Dear Chairs XXX, XXX, XXX, & XXX:

We write to you collectively as concerned citizens who have come together to seek changes to the application of forensic science in our state. We believe any robust system for the delivery of forensic science analysis must have independence and oversight to ensure accurate outcomes and prevent wrongful convictions. Having undertaken an analysis of the status of the delivery of forensic science in our state, we have grave concerns about the state of affairs.

FUNDING:

After reaching out to government officials, we have learned that the state crime lab is largely funded through the collection of court fines and fees from those accused of crimes. In our state, funding to labs is only made available through those forensic tests that result in conviction. This is extremely concerning to us; this funding structure implicitly incentivizes convictions over unbiased tests.

We appreciate that the development of the budget is a complicated and onerous process, and that it is natural to seek ways to defray costs through various fees; however, forensic outcomes, which can bear on life and liberty, is one area where we cannot allow incentives to enter the equation. We come to you to help our state identify a different source of funding and we are seeking your support in the development of an interim committee to identify possible solutions.

Further, we recommend that this same committee examine other ways we might improve the accuracy and delivery of forensic services in our state through the development of a state forensic science commission, which could examine the following areas for potential reform:

EVIDENCE COLLECTION, PRIORITIZING EVIDENCE FOR BIAS-FREE ANALYSIS

Sound forensic analysis begins with the requirement that evidence is collected in an unbiased manner. Police evidence collection should be led by scientists from crime labs to avoid bias and contamination at the crime scene. Efforts should be made to divorce evidence collection from the law enforcement function, but if this is not immediately possible, maintaining **impartial collaboration between law enforcement and the lab is crucial to ensuring the proper collection of evidence, including procedures that selectively blind officers to irrelevant and potentially biasing information**.

This is important for several reasons, including the fact that research suggests that important forensic evidence collected at crime scenes often goes untested, setting the stage for wrongful convictions. Sometimes critical evidence may not be collected from a crime scene in the first place. Further, untested evidence can allow the guilty to remain undetected. One study, for example, found that 40% of unanalyzed rape and homicide cases were estimated to have testable DNA evidence.

A Commission could help develop best practices for bias-free evidence collection. Further, a Commission could craft a model Code of Ethics that ensures the objective collection of crime scene evidence that all crime labs in the state could adopt. Further, a Commission could establish clear rules governing when evidence must be submitted for forensic testing; police can overwhelm laboratories with evidence of insufficient quality for analysis, or fail to collect potentially valuable evidence. Policies can require an initial examination to reveal whether the evidence is of sufficient quality to conduct further testing.

A Commission is also well-positioned to recommend the prohibition of certain forensic disciplines, such as handwriting or bite mark comparisons, that hold the potential to enable wrongful convictions and result in substantial civil settlements. A Commission can recommend the substitution of newer technologies for older labor-intensive methods.

It is noteworthy how often legislation and policy do *not* address decisions of whether to test evidence, when to audit testing, how to prioritize testing, and how to allocate costs. If empirically informed decisions were already being made, then we could have some confidence that further oversight is unnecessary. At the present time, we cannot have such confidence.

While more than a dozen states have established forensic science commissions, only a few are composed in a balanced manner and develop policies and practices that the community can trust and embrace. Texas has developed such a model and we encourage your committees to examine the enabling legislation that created it and review the scope and quality of its work.

We appreciate your consideration of the creation of a state forensic science commission and look forward to meeting with you to see what we might be able to accomplish collectively. Please let us know when we might be able to set up a meeting to discuss this in more detail.

Sincerely,
NAME

Model Letter to State Legislature's Judiciary seeking the prohibition of funding of the state crime lab through fines and fees; the development of a funding program for public defenders to hire experts; and a requirement that information be shared equally with the prosecution and the defense

NAME OF PERSON/NAME OF ORGANIZATION
ADDRESS
ADDRESS
PHONE NUMBER
EMAIL

DATE

Senator XXX; Assemblyperson XXX
Chairs, Judiciary Committees
[STATE] Senate// [STATE] Assembly
ADDRESS
ADDRESS

Dear Chairs XXX & XXX:

We write to you collectively as concerned citizens, who have come together to seek changes to the application of forensic science in our state. We believe any robust system for the delivery of forensic science analysis must have independence and oversight to ensure accurate outcomes and prevent wrongful conviction. Having undertaken an analysis of the status of the delivery of forensic science in our state, we have grave concerns about the state of affairs.

After reaching out to government officials, we have learned that our state crime lab is largely funded through the collection of court fines and fees from those accused of crimes. In our state, funding to labs is only made available through those forensic tests that result in conviction. This is extremely concerning to us; this funding structure implicitly incentivizes convictions over unbiased tests.

We appreciate that the development of the budget is a complicated and onerous process, and it is natural to seek ways to defray costs through various fees; however, forensic outcomes, which can bear on life and liberty, is one area where we cannot allow incentives to enter the equation. We come to you to help our state identify a different source of funding and we are seeking your support in the development of an interim committee to identify possible solutions.

Further, we recommend that this same committee examine other ways to create fairness and parity in a system of justice that is adversarial in structure and nature. Given the reality of how our lab is presently funded, it is natural to conclude that many funding structures, whether intentional or not, are set up to encourage convictions. Therefore, it is all the more important that we have an adequate indigent defense system that enables proper checks on prosecutorial power, yet the longstanding reality on the defense side is that funding is often nonexistent for experts that can attack

the credibility of forensic results. It is common for judges to refuse requests from indigent defendants for public funding to hire their own expert. The one-sided presentation of forensic science amplifies bias and is manifestly unfair. Research shows that a defense expert can make a real difference in a case, even if that expert speaks just to the limitations of methods and does not reanalyze the evidence.

Policy choices are often accomplished through funding decisions and in this setting, the cards and resources are stacked against the accused. It's time to level the playing field through an honest exploration of the disparities in resources provided to the prosecution versus the defense. This disparity can be seen not only with respect to funding but in other ways, including the disparity in information provided by crime labs to the prosecution and the defense. We implore you to consider a law change, recently enacted in the District of Columbia, which requires the crime lab to share records with both prosecutors and defense attorneys at the same time. Such a shift promises the prevention of wrongful convictions and the earlier detection of people who commit crimes.

We appreciate your consideration of these matters and look forward to meeting with you to see what we might be able to accomplish collectively. Please let us know when we might be able to set up a meeting to discuss this in more detail.

Sincerely,
NAME

Appendices

APPENDIX I

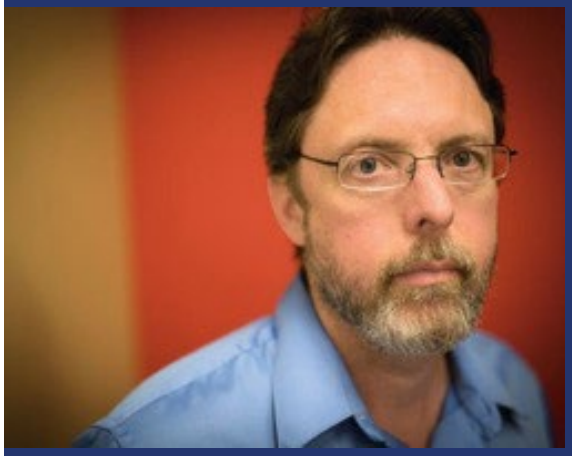
Cognitive Bias Case Study: The Brandon Mayfield Case

"That's not my fingerprint, your honor," said the defendant.

Yet, the Federal Bureau of Investigations expert explained that he studied high-resolution images of the prints on a computer screen, identified fifteen points they shared, and reached a firm conclusion: a "100 percent identification." Next, he asked two experienced colleagues to review the prints: the chief of his unit and a retired FBI examiner with 35 years of experience. Each of the three experts agreed 100%.

The judge sided with the FBI and ordered Mayfield detained as a material witness to terrorism. Mayfield knew that he was innocent. He had converted to Islam years earlier, and the FBI theorized that perhaps he had formed an allegiance to militant Islamic groups and traveled under a fake name. The FBI placed Mayfield under 24-hour surveillance, and then arrested him. Mayfield's lawyer counseled him that he could be detained indefinitely and might face the death penalty.

Then, on May 20, 2004, the prosecutor stood up in court and told the judge something unexpected: that morning the government "received some information from Spain," which "casts some doubt on the identification." Spanish authorities "determined completely" that the print belonged to a known Algerian terrorist. The FBI agreed to release Mayfield, dropped all charges a few days later, apologized to Mayfield, and a federal investigation followed.



Brandon Mayfield

Image Source: https://pamplinmedia.com/ht/117-hillsboro-tribune-news/358625-238233-inside-the-maelstrom-brandon-mayfield-reflects-on-america-13-years-later

A = latent print lifted from the bomb.

B = Mayfield's "matching" print.

People assume fingerprint evidence is nearly infallible. Fingerprint comparisons are fallible, however, including because of bias. Bias played a role in this error. Fingerprints that are lifted from crime scenes are often smudged, incomplete, or found on a surface that is not ideal for preserving the fingerprint pattern. Examiners are almost always operating under circumstances where the materials are ambiguous and, thus, there is room for interpretation and judgment.

Several forms of bias may have played a role. Each of the three experts noticed clear differences between Mayfield's print and the crime scene print (above), but downplayed them after hearing that their colleagues thought there was an "identification." The process they used involved looking back and forth between the suspect and the crime scene print. Circular reasoning resulted, as a later investigation found, buttressing their faulty conclusion that there was a match. Mayfield was a practicing Muslim, and post-9/11, the FBI may have believed that based on his religion, he was more likely to be involved in terrorist activities, despite never having been to Spain and not having left the country in years.

Everyone is biased—and that is usually a good thing—unless life and liberty are at stake in a criminal case. Every day we make use of decision-making shortcuts in trivial ways. For example, without knowing it, we will often make decisions based on how attractive or pleasing something appears, such as picking a book or a wine bottle based on the design on the label. We also tend to gravitate towards options that are familiar rather than risk something new. Often a book or a bottle of wine with an artistic label *will* be a good one. And if we are wrong, then the consequences are pretty limited. Forensic analysis is different. If a forensic examiner relies on shortcuts and falls prey to bias, an innocent person goes to prison while the culprit remains free.

In psychology, the decision-making shortcuts that can contribute to biased decisions and errors are called "heuristics" or "cognitive biases" and are defined as:

> **The class of effects by which an individual's preexisting beliefs, expectations, motives, and situational context may influence their collection, perception, or interpretation of information, or their judgments, decisions, or confidence.**[16]

There are several different kinds of cognitive bias. For instance, "confirmation bias" occurs when people have existing beliefs, and this frames how they perceive and evaluate information. Put another way, people who already have an opinion about what the right answer is will struggle to objectively evaluate the evidence and come to an impartial conclusion.

To provide a concrete example, consider a fingerprint analyst who receives a latent fingerprint from a crime scene to compare to a suspect print. The analyst has worked with the lead investigator before and knows him to be a great detective who rarely sends through samples for analysis unless he has done a

lot of investigative work already. Based on the analyst's past experiences with this investigator, they are fairly certain the suspect print will match. Unfortunately, this means the analyst will tend to examine the fingerprints in a way that will confirm this belief.

This would not be a problem if fingerprint work, or other forensic disciplines were so objective that it would be very hard for bias to influence one's decisions. However, there is a great deal of subjectivity in patterns like latent fingerprints. There is often a great deal of room for interpretation. Thus, "contextual bias" is a term to describe situations where irrelevant or only tangentially relevant information influences a person. When the correct decision in a situation is not immediately apparent, people will normally begin to look for other information that might help.

Consider again the fingerprint analyst example. For instance, if the police investigator tells them that "this guy has been in and out of jail for most of his adult life," then this provides powerfully biasing contextual information. We often do not want jurors to hear about a person's criminal history because it is so prejudicial. Yet there are no rules preventing a forensic examiner from hearing such information.

There are often no rules for what police may share with forensic examiners. The case file might contain information about other forensic evidence that suggests the suspect is guilty—such as a confession. The case file may say what race the suspect is or detail the person's criminal history. None of this biasing information is needed to conduct the forensic analysis, yet police may include this biasing information on the very forms they use to submit information to a crime lab.

Empirical Work on Cognitive Bias in Fingerprint Analysis

In perhaps the most famous study in all of forensics, five highly experienced fingerprint examiners reviewed prints in the course of their ordinary work. Itiel Dror, David Charlton, and Ailsa Peron conducted this study in 2006, two years after the Mayfield debacle. These fingerprint examiners were told that the prints they would be examining were the ones that the FBI erroneously matched, leading to their wrongful accusation of Mayfield.

What these experts did not know was that the crime scene fingerprint and suspect fingerprint they were shown were actually materials that each had examined already, in their routine work, and judged to be from the same source. Many of these experts reached a different conclusion this time, in light of this additional, highly biasing contextual information. Three of the experts now decided that these fingerprints were not a match, and one concluded that there was insufficient information to make a call. Only one examiner made the same decision again despite the contextual information and judged the fingerprints to be a match.

This study showed that expert examiners are not immune to the powerful influence of extra information that is not directly relevant to the task at hand. Second, even the methods used in a well-established discipline like fingerprint analysis cannot prevent biasing effects. Finally, it is *possible* for examiners to make the correct judgment even in the face of biasing information, but the majority of examiners will fail to do so.

Studies like this have now been conducted in a host of forensic disciplines. There are other important sources of bias. Experts are also biased by the side that hires them. If forensic examiners at crime labs feel that they are retained only by police and prosecutors, they will tend to view their role in a different way than an expert hired by the defense. This has troubling consequences in criminal cases, where often the defense does not receive any funds for an expert.

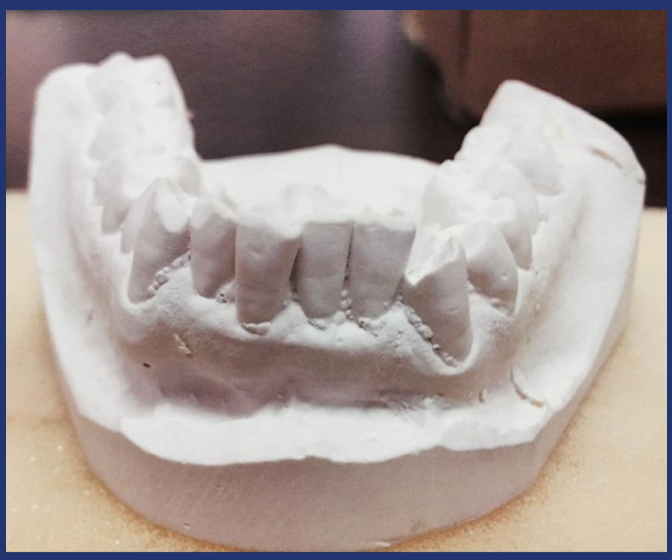
We are all biased and all experts can be biased as well. What can be done about this problem? Labs can prevent examiners from receiving such biasing information. Rather than work as part of a team with law enforcement, the science function should be kept independent. A scientist conducts experiments impartially, making observations based on data and not based on personal beliefs. In the same way, forensic professionals should be required to do their work without the types of case-details that will affect their analysis. Their work should be focused on careful analysis—not getting the results that police desire.

APPENDIX II

A Case Study: The Bite Mark Case

In 1982, a murder trial in Newport News, Virginia dubbed "the bite mark case," turned into a media sensation, as the community heard dentists describe how they compared bite marks on the victim's legs to molds of the defendant's teeth. In the early morning, a man broke into a home near the navy yards in Newport News, Virginia. Inside the home, he beat a man to death with a crowbar, and then repeatedly raped his wife. During the assault, he bit her thighs and calves. She survived, called the police, and they swabbed and photographed the bite marks. She was unable to identify the person who assaulted her—it was dark in the house at the time—but she described him as a white male wearing a white sailor's uniform with three nested V's, the insignia of an E-3 naval sailor. The USS Carl Vinson, a nuclear aircraft carrier, was under construction nearby—and it had thousands of E-3 sailors on board. Keith Harward was one of them.

In perhaps the most massive dental dragnet ever conducted, dentists examined the teeth of every one of the navy sailors on board the USS Vinson. About three thousand sailors took turns assembling in the mess hall, as two dentists shined flashlights in their mouths, looking for a tell-tale rotated tooth. The dentists examined Harward's teeth once, and they called him back to take a mold of his teeth, shown in the above figure. When they first compared his teeth to the marks on the victim, they excluded him. Tellingly, "the gauntlet," as Harward referred to that ordeal, turned up no leads.



One dentist testified to "a very, very, very high degree of probability those teeth left that bite mark," referring to Keith Harward's teeth. Three times "very" must be a really good match. The dentist added, "My conclusion would be that with all medical certainty, I feel that the teeth represented by these models were the teeth that made these bite marks."

"There are no differences?" asked the prosecutor. "I found absolutely no differences."

Next, a second dentist testified that it was a "practical impossibility that someone else would have all [the] characteristics in combination." Again, the prosecutor asked him to elaborate. He said that he had found "with reasonable scientific certainty, Mr. Harward caused the bite marks on the leg." The prosecutor asked, "If you look hard enough, could you find someone with similar teeth, theoretically?" "I sincerely doubt that," responded the dentist.

This testimony was incredibly forceful. The jury convicted Harward in September 1982 and sentenced him to death. After an appeal on a sentencing issue, in 1986, Harward was convicted at a second trial and sentenced to life without parole. By now, six different dentists had all said he made the bite marks.

By the early 2000s, Harward had given up on appeals and post-conviction challenges. Another inmate, though, told him about the Innocence Project, and he sent a letter. The Innocence Project took his case and obtained access to crime scene material for DNA testing. The swabs taken from the victim, in multiple places, all shared a single male DNA profile. That profile belonged to another person, also a sailor on the USS Vinson. That man died in prison in Ohio over a decade before, while serving time for burglary and kidnapping. Harward was released in 2016, after 33 years in prison.

What went wrong? We now know that not only were the dentists making exaggerated claims, but they were flat-out wrong that all of those details matched Harward's teeth. What are the chances that six dentists separately reached the same false conclusion? They may have all been biased by pressure from police, and by each other. Before his first trial, Harward had been arrested in an altercation with his girlfriend, where she grabbed him and he bit her arm. She dropped the charges. But the police and prosecutors clearly decided he was a "biter," and that may have encouraged the dentists to change their story to fit what the prosecutors wanted: a conviction. The dentists convicted an innocent man and let a murderer go free. Yet, at the time, the "bite mark case" was celebrated as a triumph of forensics.

APPENDIX III

Bias & Facial Recognition Fact Sheet

Bias can be baked into technologies that police and crime labs use. Willie Allen Lynch, convicted of drug charges, is serving an eight-year sentence largely based on a blurry cellphone photo. Undercover detectives in Jacksonville, Florida, conducted a $50 crack purchase, and while they did not make an arrest at the time, one detective took a photo of the seller. The local police in Jacksonville accessed the FBI's facial recognition database, the Facial Analysis, Comparison, and Evaluation (FACE) service, with access to 641 million photos (almost double the U.S. population). Just eight days before trial, Lynch's lawyers learned he was identified using such facial recognition. Apparently, four other faces were also identified. His photo was given a "one star" rating. Lynch's lawyers were not informed what that meant, or what the other four faces looked like. Even at trial, the judge did not allow the defense any access to forensics databases or complete results.

Lynch's lawyers argued that Lynch, who is Black, may have been more likely to have been wrongly identified due to his race. Several facial recognition databases have been shown to make more errors when searching Black faces. And this software had never been tested. Plus, there were specific reasons for concern in Lynch's case. A lab analyst showed a detective who had observed the drug transaction a single photo of Lynch, asking if he was the one. That was very suggestive: they did not use a proper police lineup, with a group of photos. The analyst also told the detectives that she knew Lynch's criminal history, which included prior convictions for drug sales.

The appeals judges explained that the prosecutors were not required to turn the evidence over to Lynch. In 2019, the Florida Supreme Court declined to hear the case, so Lynch is still serving an eight-year sentence.

At the time of publication, we have documented seven wrongful arrests generated by facial recognition, six of them Black people. The most recent wrongful arrest was of a pregnant woman who was arrested in her front yard in front of her children and neighbors.

You may be in that FACE database. Half of all adults in the United States had their faces included by 2016, and many more have their faces added each year. The Georgetown Law School Center on Privacy and Technology, the first to report this, aptly calls it a "perpetual lineup." Law enforcement should not be allowed to use these algorithms until we know how accurate they are and whether they are racially biased.

APPENDIX IV

Crime Scene Drug Testing Fact Sheet

In Houston, hundreds of wrongful convictions resulted from botched drug tests by police, and almost all of those innocent people pleaded guilty. In the 1960s, police began to commonly test drugs using inexpensive and simple kits in the field. They put a small amount of the substance in a baggie, with prepackaged chemicals designed to react and change color, depending on the substance. These $2 tests report whether evidence is a controlled substance or not. However, these commercial kits can be untested and of unknown reliability. Studies have found these kits can have shockingly high error rates. The field tests are supposed to be followed up by a more rigorous lab test. In the meantime, a person may be arrested for drug possession and face great pressure to plead guilty, particularly if they are poor, denied bail, and remain in jail waiting for a day in court.

In Harris County, Texas, an audit by the prosecutor's Conviction Integrity Unit uncovered that 456 cases involving field drug tests were erroneous. In 298 of the cases, there were no controlled substances, and in the other cases, it was the wrong drug or wrong weight. The convictions in those cases were all reversed. The Texas Forensic Science Commission, in 2016, said that these field tests are too unreliable to use in criminal cases, and there should also be a follow-up lab test. In 2017, Houston police banned the use of those field drug tests.

APPENDIX V

Fingerprints Fact Sheet

For decades, forensic analysts of different types testified they were 100% certain. As federal judge Harry T. Edwards put it, "The courts had been misled for a long time because we had been told, my colleagues and I, by some experts from the FBI that fingerprint comparisons involved essentially a zero error rate, without our ever understanding that's completely inaccurate."

Yet, no one had carefully tested the basic assumptions that fingerprint experts have relied upon for decades. First, are each person's fingerprints unique? You have probably long assumed that fingerprints are unique and that no two are alike. About 95 percent of people believe fingerprints are unique. People think fingerprints are like snowflakes. Fingerprint examiners similarly assumed that all fingerprint patterns are completely different from each other, and not just that they are somewhat or mostly different from each other. Experts made the same strong assumption about bite marks, fibers, toolmarks, shoeprints, and a range of other types of forensics. We do not know if that strong assumption is true for fingerprints; it has never been tested.

Second, how often can one person's fingerprint look like another person's crime scene latent print? We do not know how often a smeared, partial latent fingerprint from a crime scene might look very much like someone else's print. It may depend on what level of detail one has in a print. We now know that errors can happen.

Third, how good are experts at making fingerprint comparisons? We need to know the error rates; after all, we are trusting experts to make decisions that can send people to prison or even death row. The U.S. Department of Justice standards explain that a fingerprint identification is "a statement of an examiner's belief." The National Academy of Sciences report emphasized fingerprint examiners rely on "a subjective assessment" that lacks adequate "statistical models." We do not know how common or rare it is to have particular features in a fingerprint.

The President's Council of Advisors on Science and Technology (PCAST) report from September 2016 emphasized that experts must tell jurors about the error rates of forensic disciplines/tests. What is a valid error-rate study? For a more objective method, like a drug test, you can test each step in the process by seeing whether it produces accurate results. However, for subjective techniques like fingerprinting, there are not clearly defined and objective steps. The person is the process: an examiner whose mind is a

"black box" that reaches judgments based on experience. To test a "black box" examiner, you can give the examiner evidence where the correct answer is known in advance. Ideally, the participants should not know that they are being tested. The samples, whether fingerprint, bite mark, or firearm evidence, should be of realistic difficulty.

The PCAST report described how researchers had conducted two properly designed studies of the accuracy of latent fingerprint analysis. That alone is deeply disturbing. It was generous for the report to say that just two studies were enough to permit a technique to be used in court. While neither study is perfect, both found nontrivial error rates. One of the two studies was a larger-scale study supported by the FBI. The second was a smaller study by the Miami-Dade police department. The false positive rates could be as high as 1 in 306 in the FBI study and 1 in 18 in the Miami-Dade study. To be sure, the people participating in the FBI study knew that they were being tested. They knew that it was an important study for the field. They were likely very cautious in their work. That FBI study also reported that a massive 85% of the 169 examiners made at least one false negative error. If false negatives are a much greater problem in real labs, as they are in studies, it could mean that untold thousands of guilty culprits are not identified in real cases.

Some of the errors that analysts made in these studies may have been clerical errors. Yet in the Miami study, for example, if one leaves out possible clerical errors, the error rate could still be as high as 1 in 73. Many would argue, however, that clerical errors should be included; they can have grave real-world consequences. We do not know whether the prints used in these studies were realistic or sufficiently challenging, either. We know that other fingerprint examiners may perform differently, based on their training and skill.

These findings still provide a wake-up call. It would shock jurors to hear of either a 1 in 18 or a 1 in 306 error rate. When a public defender in Joplin, Missouri, asked prospective jurors in a 2018 case about fingerprint evidence, they said things like, "I believe fingerprints are 100 percent accurate," "fingerprints are everything when it comes to a crime scene," and "I mean, it's an identifier . . . We've been taught all our lives that [the] fingerprint is what identifies us, and that it is unique."

APPENDIX VI

Bite Mark Evidence Fact Sheet

The National Academy of Sciences, in its 2009 report, concluded that more research is needed "to confirm the fundamental basis for the science of bite mark comparison." They said that it has "not been scientifically established" that human dentition is unique. The scientists who wrote the PCAST report concluded that since no valid studies of error rates have been done, the techniques were simply not valid.

What we do know about reliability is disturbing. The American Board of Forensic Odontology, the professional association of forensic dentists, conducted a study to test its members. In the late 1990s, they gave dentists bite mark evidence of medium to good quality. The dentists were asked to compare four bite marks to seven sets of teeth, four of which made each of the marks. (This is called a "closed set" study, since there was a correct answer for each of the four marks. In a real case, one does not know if a suspect's teeth produced any of the evidence.) Of the sixty dentists asked to take the study, only twenty-six filled it out, and those dentists were wrong in nearly half of their responses. Other studies found high error rates as well. None of these troubling findings blunted the testimony dentists delivered in court, nor did dentists make a habit of describing these studies in their reports or testimony.

APPENDIX VII

Firearms Evidence Fact Sheet

Of all the pattern-comparison techniques used, firearms comparisons are perhaps the most common, possibly even more so than fingerprint comparisons. Firearms violence is a major problem in the United States, with over 10,000 homicides involving firearms and almost 500,000 other crimes committed using firearms each year. Firearms comparisons are in great demand. Examiners seek to link crime scene evidence, such as spent shell casings or bullets, with a firearm. The assumption is that manufacturing processes used to cut, drill, and grind a gun leave markings on its barrel, breech face, and firing pin. When the firearm discharges, those components contact the ammunition and leave marks on it. Experts assume different firearms should leave different toolmarks on the ammunition. They believe toolmarks allow them to definitively link spent ammunition to a firearm.

For over a hundred years, firearms experts have testified in criminal trials. Firearms experts traditionally testified in court by making "uniqueness" claims much like those made about fingerprints. Experts said that "no two firearms should produce the same microscopic features on bullets and cartridge cases such that they could be falsely identified as having been fired from the same firearm." By the late 1990s, experts premised testimony on a "theory of identification" set out by a professional association, the Association of Firearms and Tool Mark Examiners (AFTE). AFTE instructs practitioners to use the phrase "source identification" to explain what they mean when they identify "sufficient agreement" when examining firearms. At a general level, these firearms examiners examine markings that a firearm leaves on a discharged bullet of cartridge casing. AFTE's so-called theory is circular: An identification occurs when the expert finds sufficient evidence, defined as enough evidence to find an identification.

In recent years, scientists have called into question the validity and reliability of such testimony. In a 2008 report on ballistic imaging, the National Academy of Sciences (NAS) concluded that definitive associations like "source identification" were not supported. In its 2009 report, the NAS followed up and stated that categorical conclusions regarding firearms or toolmarks were not supported by research, and that, instead, more cautious claims should be made. The report stated that the "scientific knowledge base for tool mark and firearms analysis is fairly limited." The AFTE theory of identification "is inadequate and does not explain how an expert can reach a given level of confidence in a conclusion." Judges have also raised concerns that this theory represents "unconstrained subjectivity masquerading as objectivity," is "inherently vague" and "subjective," or "either tautological or wholly subjective.

By 2016, only a single black box study had been done, showing an error rate that could be as high as 1 in 46. This single study had not been published. The authors of the PCAST report concluded firearms comparisons, very commonly used in criminal cases, fall short and are not valid. The rate of inconclusive errors in that study was almost 35%. An "inconclusive" answer was an error; that study had correct "yes" or "no" answers on every item. A follow-up study had even more inconclusive errors—over half of all responses. Further, large numbers of examiners dropped out of the study, making the entire still-unpublished effort highly problematic.

Yet, to this day, firearms examiners use terms like "source identification" in court—although some judges have begun to step in and require more cautious wording. The Department of Justice announced guidelines in 2019: experts should use the term "source identification," which they define as "an examiner's conclusion that two toolmarks originated from the same source." The guidelines sound much like the AFTE theory: examiners may call it an identification when they decide that it is one. Until serious research is done to address concerns about a subjective process, lack of documentation of the work, and evidence of very high error rates, this technique should not be used to definitively link evidence in court.

APPENDIX VIII

Lab Accreditation & Regulation in Clinical Labs Fact Sheet

After World War II, medical laboratories conducted an experiment to assess the level of agreement across medical laboratories in Pennsylvania. They found a shocking number of errors. Lives were at stake if diseases, for example, were not correctly identified. Soon, a consortium of medical laboratories began circulating specimen samples to determine their accuracy. In 1967, federal legislation was passed to ensure that medical labs conducted accurate proficiency tests, the Clinical Laboratory Improvement Act (CLIA). Then, in the mid-1980s, reporters at the *Wall Street Journal* wrote about misdiagnosed cancer and lax standards at labs conducting cytology tests of Pap smears. Their Pulitzer Prize-winning series included such headlines as "Lax Laboratories," "Physician's Carelessness with Pap Tests," and "Risk Factor: Inaccuracy in Testing Cholesterol." The reporters documented "large numbers of false negative results" of failure to detect cancerous cells, which resulted in "unnecessary suffering and even death in women who did not receive prompt treatment for cervical cancer."

The swift response by lawmakers to these clinical lab failures was completely different from the indifferent response to crime lab failures. In 1988, Congress passed a tougher federal law extending regulation to basically all clinical laboratories, whether public or not. The law required that proficiency testing reflect "to the extent practicable . . . normal working conditions" to make tests realistic. The law also permitted the agency to conduct "announced and unannounced on-site proficiency testing of such individuals." After all, the lawmakers concluded, "regular proficiency testing was vital evidence of a laboratory's competence." While not perfect, in part because it does not insist on blind testing, the law contains comprehensive regulation of quality control at clinical laboratories. In the area of cytology, or cancer screening for abnormal cells, analysts who do not receive scores of at least 90 percent must be retested. If an analyst fails a second test, they must receive remedial training and have all of their casework reexamined. If an analyst fails a third test, the analyst may not resume work absent remedial training and retesting. All labs must permit random samples to be validated through inspections, and the federal agency can monitor and supervise on-site any labs not found to be fully compliant.

All clinical labs must have quality management plans as well. Every lab needs a quality management plan in place. They need to conduct ongoing quality assessments. These involve:

- Ongoing monitoring of each process used in a laboratory to identify errors or potential problems that could result in errors;

- Taking corrective action; and
- Evaluating corrective actions taken, to ensure they will be effective to prevent recurrence.[17]

As part of this work, lab leadership must develop and review a laboratory's quality management plan. They must review the laboratory's proficiency testing enrollment and performance. They must review all corrective actions. Fundamentally, they must take responsibility for quality control throughout the lab, by constantly testing it and taking action to improve it.

We need similarly serious legislation and quality controls imposed on crime labs. It could be federal, but similar regulations could be adopted at the state and local levels. More local labs are at least considering quality control programs, with blind testing, independent testing, auditing, and more. The Houston Forensic Science Center is one example of a lab that adopts a lab-wide quality program.

APPENDIX IX

Regulating Crime Labs: The Maryland Experience Case Study

Unlike crime laboratories, in healthcare, clinical laboratories have been strictly regulated by federal legislation since Congress passed the Clinical Laboratory Improvement Amendments (CLIA) to the Public Health Services Act. Enacted in 1988, these Amendments strengthened pre-existing regulations for federal oversight and certification of clinical laboratory testing on specimens from humans for the purpose of diagnosis, prevention, treatment of disease, or assessment of health. The CLIA also provided transparency by publishing an annual registry of any clinical laboratory or person that has committed a violation of CLIA, has been convicted of fraud, or has had their accreditation or certification removed. These standards help ensure that the assessments are performed by qualified individuals, the results are accurate, and any lapses of certification or instances of fraud are public knowledge.

There are many similarities between clinical laboratories and forensic laboratories; they even conduct quite similar types of analysis on bodily fluids, DNA, and tissue. The CLIA, as well as other federal and state regulations, govern clinical labs, but in most of the country, forensic labs are not subjected to the same rigor of regulations.

One exception is Maryland, the first state that began licensing crime labs in 2007 after a discredited state police ballistics and fire armor expert was found to have falsified his academic credentials. Joseph Kopera worked for 37 years with the Baltimore Police Department and the state police. In 2007, defense attorneys and state prosecutors uncovered that Kopera had repeatedly misstated his education credentials, falsely claiming degrees from Rochester Institute of Technology and the University of Maryland. As a result of Kopera's falsifications, over 4,041 cases were reviewed for discrepancies. In response to this misconduct, Maryland enacted legislation and regulations for forensic laboratories. Here, we describe the Maryland model, but also how when other states consider adopting similar regulations, they should consider stronger enforcement mechanisms.

The Maryland Legislation

The new law that was passed, Maryland General Code § 17-2A, focuses on regulations for standards and requirements for forensic laboratories. The law covers crime laboratories in Maryland, but also people unaffiliated with licensed laboratories performing forensic analysis, as well as out-of-state labs performing analysis in Maryland cases. The law includes a section with definitions (§ 17-2A-01), standards for proficiency

testing and compliance for labs (§ 17-2A-02; § 17-2A-03), licensing processes and standards (§ 17-2A-04 through § 17-2A-09), rules prohibiting discrimination or retaliation against employees and the penalties for violations (§ 17-2A-10; § 17-2A-11), and finally an outline of a Maryland laboratory advisory committee.

This statute applies to crime laboratories the types of rules that had applied to medical laboratories in the State. Maryland is the only jurisdiction in the United States that adopts many of the same rules for clinical and medical laboratories. Maryland General Code § 17-2 outlines the requirements for operating a medical laboratory in the state. While statutes § 17-2 and § 17-2A are similar, the standards for medical laboratories are more detailed, including proficiency testing programs for physicians. Such provisions could be added to § 17-2A to create regulations for forensic and medical laboratories that are on par with each other.

The regulations in Title 10.51 of the Code of Maryland Regulations provide more specific and detailed information for forensic laboratories, including guidance necessary to employ qualified employees, operate and perform forensic analyses under reliable procedures, effective quality control and quality assurance programs, and qualified supervision.

The statute also calls for a Maryland Forensic Laboratory Advisory Board to provide oversight over compliance with the law and regulations. That board consists mostly of crime lab professionals and forensic practitioners.

Enforcement

Since the introduction of forensic laboratory regulations in 2007, there have been a number of cases where auditors and whistleblowers uncovered or identified procedural issues within Maryland Forensic Laboratories. A few noteworthy instances of process or quality issues are outlined below.[18]

- Baltimore Police Department revealed that their lab analysts had been contaminating evidence with their own DNA. The Department had also broken standard protocol by not collecting and storing samples of all employee-DNA as a protective measure against contamination (Innocence Project, 2008). The crime lab director was dismissed as a result of these findings (Bykowicz, 2008). In response to the information, the Innocence Project filed a request for investigation, re-examination of cases and a public report on findings with Maryland State Police (Innocence Project, 2008).
- During regular audits in 2018, it was revealed that over 6,500 rape kits were untested and stored with police and laboratories in Maryland. Additional investigations into the high number of untested kits revealed that a previous lab manager in Prince George County had incorrectly reported only 99 cases in the previous audit (compared to the accurate 2,747 in 2018). The lab manager had been terminated prior to the secondary audit (Rentz, 2018).
- The Harford County State's Attorney's Office discovered that a Pennsylvania chemist was not certified, despite testing over 4,400 drug cases for Maryland prosecutors. The lack of certification breached

the contracts between the Maryland State Police and the Pennsylvania-based National Service, which stipulated that all chemists were required to be state-certified to avoid being called for testimony in court. According to the CEO of the Pennsylvania lab in question, the Maryland regulation created an impossible situation where the chemists were required to be certified for the contract with MSPD to be signed, yet the certification was not permitted by Maryland Department of Health until the chemists were actively doing business in Maryland (Whitlow, 2021).

- Whistleblower forensic scientists alerted Baltimore City Council that fingerprint kits from Baltimore property crimes were not analyzed. The information was provided by Ken Phillips and Roy Michael Jones who each spent over 30 years in forensic analysis, some of which with the Baltimore Police Department crime lab (Fenton, 2021). In response to the whistleblowers, the Department confirmed that they had a backlog of 11,000 fingerprints from crime scenes to be analyzed due to a staffing shortage.[19] An audit that followed identified that test kits from property crimes were retained and tested "if/when requested" but were by default placed into a "decline" category. Maryland Department of Health and the American National Standards Institute's accreditation board reviewed the case and did not find any conflicts with their policies or procedures (Fenton, 'Serious questions' raised by reports on problems inside Baltimore Police crime lab, 2021). Additionally, the audit uncovered that over a 10-month period, one of the firearms examiners had misplaced, mislabeled, or switched swabs from at least 3 evidence packages. The examiner had previously been retrained in June of 2020 because of corrective action, and once his mistakes were uncovered again in 2021, all firearms swabbing was paused for four weeks to understand the scope of damage (Fenton, 2021). To help resolve the backlog, the Department of Justice granted over $1.8 million to six Maryland law enforcement agencies (The United States Attorney's Office District of Maryland, 2021).

The response to whistleblower complaints is a positive example of the quality assurance and audit process at work. In 2008, the Innocence Project was able to request a public report on the findings due to the provisions in Md. General Code Ann. § 17-2A-03, which state: "A forensic laboratory shall make discrepancy logs, contamination records, and test results available to the public within 30 days of a written request." In 2018, a regular audit identified a discrepancy in the number of kits within the backlog and the county was able to self-resolve the reporting issues.

However, there is still room for concern about the transparency and efficacy of the Maryland forensic laboratories. In the 2021 Baltimore case, the whistleblowers reportedly had unsuccessfully attempted to address the concerns internally for months—including writing to Mayor Brandon Scott and filing complaints with the Office of the Inspector General and their own department—before going public (Fenton, 'Serious questions' raised by reports on problems inside Baltimore Police crime lab, 2021). The necessity for the whistleblowers to go public indicates an opportunity to improve the process of responding to employee complaints of irregularities.

Additionally, the 2021 example of unlicensed Pennsylvania chemists performing tests for Maryland police agencies indicate opportunities to improve the certification process. As identified by the CEO of the impacted Pennsylvania lab, the current requirements for chemists to be certified in Maryland prior to beginning work for the state conflicts with the guidance from the Maryland Department of Health, which expects a chemist to be actively doing business with the state before receiving a certification. Resolving the procedural conflict would streamline and strengthen the licensure and certification process.

The audit expectations for different certifications can be improved. The regulation currently requires permitted forensic laboratories to submit to a routine audit within six months of starting operation. However, forensic laboratories are not subject to the same rigorous requirements if they are undergoing routine on-site assessments conducted by an accreditation organization. Further, the 3-year "letter of permit" exception allows individuals and entities to provide forensic services within specific disciplines for extended periods of time, without the requirements for additional audits.

Finally, the Maryland Forensic Laboratory Advisory Board could benefit from transparency standards provided on a federal level to clinical laboratories through the CLIA. Making information about the licensure and certification statuses as well as suspensions or revocations would allow independent auditors or researchers access to information and create consistency across the different types of laboratories—forensic and clinical.

Conclusion

The Maryland Forensic Laboratory statute provides an example of well-written and considered regulations for forensic laboratories that, nonetheless, has real space for improvement. Recent cases of procedural breaches in the Maryland State Police and Baltimore Police indicate that the auditing process may need to be reexamined to identify the gaps that allowed kits to go untested, whistleblower complaints unaddressed, and licensure requirements for chemists omitted. Nevertheless, the Maryland experience shows that medical laboratory regulations can be extended to crime labs. However, it is also important for those regulations to be robustly enforced.

APPENDIX X

Investing In Quality Control: The Houston Forensic Science Center Fact Sheet

In 2003, a DNA test exonerated George Rodriquez, who had been convicted based on testimony by an examiner from the Houston Police Crime Lab. In 2002, just before Rodriguez sought this DNA testing, journalists uncovered errors in the Houston lab DNA unit's work. A man named Josiah Sutton, convicted of rape and kidnapping based on DNA test results, had spent four and a half years in prison. Blatant errors were uncovered in Sutton's case, too. The lab was closed. A 2003 New York Times headline asked whether Houston had "the Worst Crime Laboratory in the Country."

To their credit, the County ordered a comprehensive audit of the crime lab by an entire team of lawyers and forensic scientists. The lab, reopened in 2014 and renamed the Houston Forensic Science Center (HFSC), is now run by scientists, and headed by Peter Stout. Stout had a different vision for a crime lab: not just independence, but also constant oversight and quality control. Stout created a quality division with seven people whose full-time jobs are to prevent and detect errors in the lab.

A new blind proficiency testing program was created: five percent of all cases in the lab are in fact a test, where answers can be checked to detect errors. All of the analysts at the lab know that any case that they work on might be a test, across all of the seven disciplines: toxicology, controlled substances, digital evidence, DNA, firearms, toolmarks, and latent prints.

All of this quality control is costly, but as Peter Stout points out, so are errors. George Rodriguez brought a civil rights case and received about $4 million from the State in compensation. That would pay for years of quality control at even a large lab like HFSC.

Some states have required that their labs be accredited, but the most important thing to understand is this: accreditation is good but it is no substitute for quality control. Accreditation should be required but it is not enough—and alone, it is highly inadequate. What is accreditation? It is review by a professional body that mostly focuses on paper: the written policies that a lab adopts. That is a great start. Nearly nine in ten (88%) of the nation's 409 publicly funded forensic crime laboratories were accredited by a professional science organization in 2014. Accreditation is a good step to ensure minimal standards are being met, at least in the procedures and management systems adopted in a laboratory. However, accreditation does not ensure that valid methods are used. It does not ensure that reliable and consistent casework is being

done. Accreditation is not sufficient to ensure that adequate quality controls and standards are followed in a crime laboratory.

The International Organization for Standardization (ISO) is a worldwide federation of standard-setting groups, and it develops detailed requirements for quality controls, including in laboratories. When there are complaints, or errors occur, or there is nonconforming work, the ISO requires that a lab must "take action to control and correct" the problem or "address the consequences," and do so "as applicable." That language does not create clear responsibilities. When people may be in prison due to past errors or "nonconforming" work, then labs should have ethical obligations to do far more. They must notify all of the people potentially harmed and notify the courts. Then they should review and correct any potential errors.

The American Bar Association (ABA) has called for "demanding written examinations, proficiency testing, continuing education, recertification procedures, an ethical code, and effective disciplinary procedures" for all forensic analysts. Other countries also adopt more serious oversight of forensic labs. In Ontario, Canada, for instance, the Centre of Forensic Sciences (CFS) supplements the required proficiency tests with an in-house program of blind proficiency testing managed by the CFS Quality Assurance unit.

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[18] Maryland's chief medical examiner, Dr. David Fowler, testified in Derek Chauvin's case that the cause of death of Mr. Floyd was "inconclusive". The testimony causes 432 doctors from across the country (including D.C. former chief medical examiner) to write to the Attorney General and Governor and question all previous work done by Dr. Fowler. The Attorney General initiated an investigation into all previous work done by Dr. Fowler (Associated Press, 2021).

[19] It is worth noting that the lab's staffing has more than doubled from 72 people in 2014 to 167 in 2019 (Fenton, 2021).

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