When President Obama’s Council of Advisors on Science and Technology’s (PCAST’s) report *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods (PCAST Report)* was published in September 2016, to say it drew strong responses from all sides is putting it mildly. Many among the defense bar, academia, and interested media gave high praise to the group and its findings; many prosecutors, members of law enforcement, and forensic science groups reacted in an equal yet opposite manner. Supporters called for changes ranging from reasoned improvements in the various forensic science fields to an immediate and complete moratorium on the use of certain forensic disciplines. Critics of the report quickly issued rebuttals—some sought to wholly discredit the PCAST group based on its membership and allegations of agenda-driven policymaking, while others issued point-by-point responses to the criticisms offered therein.

This article will briefly review the *PCAST Report*’s major critiques of seven common feature comparison disciplines, assess the responses to these critiques, and then consider various ways in which members of the justice system can move forward.

**FEATURE COMPARISON DISCIPLINES**

The report assesses seven of the most often used feature comparison methods in the criminal justice system. The summary that follows—which is not intended to endorse or rebut PCAST’s findings—relies heavily on the original language of the report, both for the sake of brevity and in an effort to accurately capture PCAST’s meaning and intent.

It is important to note the report’s definitions of the terms “foundational validity” and “validity as applied,” which the authors used to frame their assessment of the disciplines and which they equated to the requirements of Federal Rule of Evidence 702:

For complete clarity about our intent, we have adopted specific terms to refer to the scientific standards for two key types of
scientific validity, which we mean to correspond, as scientific standards, to the legal standards in Rule 702 (c,d):

(1) by “foundational validity,” we mean the scientific standard corresponding to the legal standard of evidence being based on “reliable principles and methods,” and

(2) by “validity as applied,” we mean the scientific standard corresponding to the legal standard of an expert having “reliably applied the principles and methods.”

(PCAST report, supra, at 43.)

The use of these terms has already generated much discussion and, frankly, substantial confusion among those seeking to interpret and apply the report. At the risk of further muddying the water around these terms, they may be summarized as follows: “foundational validity” means that a discipline is repeatable, reproducible, and accurate, while “validity as applied” refers to the discipline actually being reliably applied in practice. The report assesses each method with respect to these two types of validity. Additionally, the report considers whether each method was subjective and/or objective in nature—favoring objective methods over subjective because of protections against confirmation bias, contextual bias, and other forms of human judgment-based error.

The report also relies heavily on whether the validity and reliability of subjective feature comparison methods can be tested using “black box” studies (“black box” referring to methods in which only input and output data can be determined without fully being able to measure the evaluation methods occurring within the “black box” in the examiner’s head). PCAST evaluated the strength of a given subjective method based on the number of studies in which error rates were determined from examiners rendering decisions in independent tests (typically, involving “questioned” samples and one or more “known” samples).

DNA analysis of single-source and simple-mixture samples. The majority of DNA analysis involves samples from a single individual or a simple mixture of two individuals (such as evidence collected from a rape kit). (Id. at 7.) PCAST notes that DNA analysis in these cases is an objective method because lab protocols are precisely defined and little human judgment is required to interpret the results. Therefore, the report finds that such analysis is “foundationally valid” because the reliability of each step can be determined, and no black-box studies are required. However, the report warns that the method’s validity as applied is “not infallible in practice,” and that errors can still arise from sample mix-ups, contamination, incorrect interpretation, and errors in reporting. The report notes that the FBI requires its labs to follow quality assurance standards, which include the use of control samples and regular proficiency testing. Nevertheless, the report still concludes that “there is a need to improve proficiency testing” in this area.

DNA analysis of complex-mixture samples. “Complex mixture samples” refer to complex mixtures of biological samples from multiple unknown individuals in unknown proportions (e.g., mixed bloodstains from crime scenes or victim/suspect clothing, “touch DNA” recovered from surfaces touched by multiple individuals). (Id. at 7–8.) The analysis of these samples differs from single-source and simple-mixture samples in the way the resulting DNA profile data is interpreted—and therein lies the problem for PCAST.

The difficulty in analyzing these mixtures arises because the sample produces a DNA profile that “superimposes multiple individual DNA profiles.” It is often impossible to determine how many separate individuals contributed to a particular mixture, making it equally difficult to discern the DNA profiles of each contributor within the mixture. This further complicates an examiner’s ability to reliably calculate the probabilities that a particular individual is likely included or excluded as a possible contributor to the mixture.

The report notes that approaches to interpreting these complex mixtures have changed over time. Examiners using more subjective methods and simplified calculations are more likely to fall prey to analytical errors and confirmation bias. PCAST determined that the subjective analysis of complex DNA mixtures was not foundationally valid and not a reliable methodology.

However, several developers have created computer programs designed to more objectively interpret complex mixtures using algorithms, which PCAST called a “major improvement” over subjective interpretation methods. PCAST concluded that the objective methods have foundational validity in interpreting certain three-person mixtures, but would not declare general foundational validity until further studies were conducted.

Bitemark analysis. PCAST found little redeeming value in bitemark analysis. This discipline involves an examiner first determining whether questioned marks left on a victim were in fact left by teeth; the examiner then determines the likelihood that those marks were left by a particular suspect. It assumes both that individuals have greatly differing dental characteristics and that skin (or some other mark-bearing surface in question) is the type of surface that can reliably capture and retain the marks clearly enough to support an identification.

PCAST criticized this subjective method for not having well-defined standards about the identity of the features being examined or the amount of similarities that must exist to support a reliable conclusion about the likely source of a questioned dentition. PCAST concluded that very few black-box studies existed to support foundational validity, and even those few studies were highly suspect in their design and implementation. Moreover, the black-box studies that exist demonstrate significant error rates (greater than 10 percent)—not only were
the examiners inconsistent in accurately identifying the source of a bitemark, there also was disagreement about whether the injuries in question were in fact bitemarks at all.

PCAST concluded that this method of feature comparison was so “far from meeting the scientific standards for foundational validity” that “the prospects of developing bitemark analysis into a scientifically valid method” were low and undeserving of having significant resources devoted to the pursuit. (Id. at 8–9.) Indeed, the Texas Forensic Science Commission has recommended a moratorium on the use of bitemark analysis in court. (Tex. Forensic Sci. Comm’n, Forensic Bitemark Comparison Complaint Filed by National Innocence Project on Behalf of Steven Mark ChaneY—Final Report (2016) http://tinyurl.com/mpfy07y.)

Latent fingerprint analysis. Latent fingerprint analysis has been used for criminal identification purposes for more than 100 years and has long gone without significant question. Criticism in the 2009 National Research Council report, Strengthening Forensic Science in the United States: A Path Forward (NRC Report), prompted substantial work to strengthen confidence in foundational validity and to measure and improve reliability. The PCAST report praised work by the FBI Laboratory in this regard, but noted there was still considerable work to be done in order “to move the field from a purely subjective method toward an objective method.” (PCAST Report, supra, at 9.)

Latent print analysis involves comparing a complete or partial fingerprint impression left on an item by an unknown subject with one or more “known prints” (collected under a controlled setting from a known subject). The examiner may also examine multiple unknown prints to determine a common source. Identification is determined by comparing features of the unknown print with that of a known suspect or by searching computerized databases of identified prints to pinpoint an individual.

PCAST found that latent fingerprint analysis is a foundational valid subjective methodology but noted substantial false positive rates. PCAST also expressed concern that these false positive rates would be underappreciated by jurors, who PCAST believes have grown accustomed to the perceived infallibility of the discipline. The report calls for analysts to disclose false positive rates based on properly designed validation studies in reporting the results of their latent fingerprint examinations.

While determining the discipline to be foundational valid, PCAST nevertheless observed several issues concerning validity as applied, including: confirmation bias (noting that FBI examiners were found to have modified their initial observations to comport to the characteristics of an apparently matching exemplar); contextual bias (noting that examiners’ conclusions could be affected by information about the facts of the case); and the need for more rigorous proficiency testing.

But PCAST did not relegate latent print analysis to the trash bin, concluding that as a subjective method, it could still be improved by additional empirical studies to estimate error rates. PCAST advocates for converting latent print analysis from a subjective method to an objective method using a fully automated analysis, work which has already begun using the “machine learning” techniques that have produced advances in facial recognition and interpreting medical images. PCAST also called for the creation of “huge” databases containing known prints and corresponding simulated latent prints of varying degrees of quality for comparison purposes, which would then be made accessible to researchers in academia and industry for use in advancing the discipline. This approach, however, has drawn criticism from law enforcement agencies in that it would violate legal restrictions imposed on such databases by disclosing confidential information. (See FBI, Comments on President’s Council of Advisors on Science and Technology Report to the President Forensic Science in Federal Criminal Courts: Ensuring Scientific Validity of Pattern Comparison Methods (Sept. 20, 2016), http://tinyurl.com/k3rbfor [hereinafter FBI Comments on PCAST Report].)

Firearms analysis. Firearms analysis involves an analyst determining whether particular ammunition recovered from a crime scene can be associated with a specific suspect firearm based on toolmarks produced by the suspect weapon. The evaluation is conducted in two stages: first, bullets or cartridges must be included within permanent and predetermined class characteristics of a particular manufacturing process. If that analysis leads to inclusion, then the individual characteristics of the unknown bullet or cartridge are compared with the actual markings created by being fired from the particular suspect gun.

This feature comparison method came under fire when the 2009 NRC Report concluded that sufficient studies had not been done to understand the reliability and reproducibility of the methods, which PCAST found to mean that foundational validity had not been established. But PCAST noted the 2014 Ames Laboratory study—“the first appropriately designed black-box study of firearms” since 2009 that reported a false positive rate of 1 in 66, and as high as 1 in 46. (PCAST Report, supra, at 11, 109–10.) However, because only one such study is known to date, PCAST found that there is still not enough evidence for foundational validity.

PCAST concluded that the ultimate decision whether firearms analysis should be admissible belongs to the courts, but cautioned that the referenced black-box study’s reported error rate must be disclosed and further cautioned against any claims of higher accuracy. Additionally, PCAST called for testifying experts to demonstrate performance under rigorous proficiency testing and protection from context bias that could have influenced their opinion.

PCAST recommended two areas of improvement for the future. First, as a subjective method, additional black-box studies and more rigorous proficiency testing of examiners would benefit the discipline. Second, PCAST believes that firearms analysis—like latent print analysis—should be converted to an objective method through similar advances in image-analysis technology. As with latent print analysis, the report lamented that progress in this area would be slow because of lack of access to large and complex databases that could be used to refine the methods. Toward that end, PCAST called upon the National Institute of Standards and Technology (NIST) and the FBI Laboratory to champion the release of both “appropriate large datasets” and funding to spur on research and improvements in this area. (Id. at 114.)

Footwear analysis: identifying characteristics. Footwear analysis involves comparing a known shoe to a complete or partial impression recovered from a crime scene and determining
whether the known shoe likely left the impression in question. Like firearms analysis, it is a two-step identification process—first, determine whether an inclusion exists based on comparison of class characteristics (in this case: design, physical size, and general wear of the shoe), then refine the association by looking at specific “identifying characteristics” or “randomly acquired characteristics” (such as marks on the shoe caused by cuts, nicks, and gouges from individualized wear).

PCAST took little issue with whether footwear analysis examiners could reliably determine class characteristics, noting that “it is not inherently a challenging measurement problem to determine class characteristics, to estimate the frequency of shoes having a particular class characteristic, or (for jurors) to understand the nature of the features in question.” (Id. at 115.) However, PCAST found that the discipline lacked foundational validity because there are no appropriate black-box studies to support the analysis used to associate shoeprints with particular shoes based on specific identifying marks.

**Hair analysis.** Hair analysis involves an examiner comparing the microscopic features of an unknown hair with hairs of a known source to determine whether a particular person may be the source of that hair. PCAST did not conduct a detailed evaluation of microscopic hair analysis, noting that as it was completing its report the Department of Justice (DOJ) released proposed guidelines for testimony on hair examination along with documentation discussing the validity and reliability of the discipline. (Id. at 118.) Instead, PCAST reviewed DOJ’s evaluation of the hair analysis method.

PCAST questioned DOJ’s conclusion that “microscopic hair comparison has been demonstrated to be a valid and reliable scientific methodology,” noting that DOJ relied on studies from the 1970s and 1980s—which PCAST found to be unpersuasive to establish foundational validity and reliability. Even so, the DOJ report recognized limitations on the discipline, noting that “microscopic hair comparisons alone cannot lead to personal identification and it is crucial that this limitation be conveyed both in the written report and in testimony.” (Id.)

Further limiting use of the method, PCAST cited a 2002 FBI study in which mitochondrial DNA analysis was used to determine whether FBI microscopic hair analysis of 170 samples in older cases was a reliable means of associating the source of the unknown hairs. The study found that in 11 percent of the cases where FBI analysts found the hairs to be microscopically indistinguishable, DNA analysis actually showed that the hairs came from different individuals. (Id. at 121.) PCAST used the FBI study to refute DOJ’s statement that the discipline was “a valid and reliable scientific methodology,” citing this as the reason why scientific evaluations of such a discipline are best left to science-based agencies not involved in the application of forensic science within the legal system. (Id. at 122.)

**RECOMMENDATIONS**

PCAST made recommendations concerning work to be done by NIST, the Office of Science and Technology Policy (OSTP), and the FBI Laboratory:

- NIST should take a leadership role in transforming latent fingerprint analysis, firearms analysis, and DNA analysis of complex mixtures into objective methods.
- NIST should improve the Organization of Scientific Area Committees (OSAC), which was established to develop and promulgate standards and guidelines to improve best practices in the forensic science community.
- OSTP should coordinate the creation of a national forensic science research and development strategy.

PCAST also made several recommendations to the United States Attorney General (USAG) (which then-USAG Loretta Lynch respectfully declined—see further discussion below). Specifically, PCAST said the USAG should direct federal prosecutors to ensure that the forensic feature comparison methods used in court are foundationally valid and that expert testimony supporting the method is constrained by empirically supported evidence and does not imply a higher degree of certainty. (Id. at 140.) PCAST also recommended that the USAG require examiners to provide information about error rates for feature comparison methods where such exist, and should wholly refrain from offering testimony based on those disciplines where no such studies exist to demonstrate error rates. (Id. at 141.) And, examiners should always testify “that errors can and do occur, due both to similarities between features and to human mistakes in the laboratory.” (Id.)

**PROSECUTORS, DEFENSE ATTORNEYS, AND THE FORENSIC SCIENCE COMMUNITY RESPOND**

The National District Attorneys Association (NDAA) issued several statements in response to the *PCAST Report*. First, in a statement prior to the official *PCAST Report* release, NDAA criticized PCAST for disregarding large bodies of scientific evidence and legal precedence, discrediting the adversarial courtroom process to test the admissibility and weight of forensic evidence, and irresponsibly calling for an end to the use of most forensic evidence in criminal investigations and prosecutions. (Press Release, Nat’l Dist. Attorneys Ass’n, National District Attorneys Association Slams President’s Council of Advisors on Science and Technology Report (Sept. 2, 2016), http://tinyurl.com/7ppnh3.)

NDAA Executive Director Kay Chopard then testified before the PCAST Council, raising concerns that PCAST itself contained no forensic scientists and that the “majority of the working group is composed of well-known critics of forensic science and of the pattern analysis and matching methods in particular.” (Testimony of Kay Chopard, Nat’l Dist. Attorneys Ass’n, before the President’s Council of Advisors on Science and Technology (Sept. 30, 2016), http://tinyurl.com/lwqdms.)

Six weeks later, NDAA submitted a letter to President Obama detailing its concerns about the report. (Letter from Michael A. Ramos, President, Nat’l Dist. Attorneys Ass’n, to President Obama (Nov. 16, 2016), http://tinyurl.com/hczkt3k.) NDAA argued that not all of the feature comparison disciplines will necessarily be subject to strict admissibility requirements of “science,” because some disciplines incorporate certain aspects of science but also constitute “technical” and “specialized knowledge” as described by Federal Rule of Evidence 702. Therefore, “technical” and “specialized knowledge” would not...
be fields of knowledge where Daubert requires scientific validity. 
(See Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579 (1993); 
Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999).) NDAA further concluded that Daubert does not require scientific validity 
technical or specialized evidence, even if that evidence 
corporates scientific aspects. 

NDAA also observed “that the same working group critics 
who have long argued that the feature comparison methods are not science now insist that they are in fact science.” (Letter 
from Michael A. Ramos to President Obama, supra, at 3.) 
NDAA suggested that this change of heart was calculated to 
impose the Daubert requirements of scientific validity, and 
therefore render the feature comparison methods scientifically 
invalid as determined by PCAST. Indeed, for years critics have 
claimed that feature comparison disciplines—other than DNA— 
are not real science because they were created or refined by 
nonscientists (“state police agencies, offices of the attorney 
general, departments of public safety and other law-enforcement- 
oriented bureaucracies”). (Radley Balko, When Obama Wouldn’t 
Fight for Science, WASH. POST, Jan. 4, 2017.) 

The USAG’s Office received PCAST’s recommendations in 
a similar fashion. USAG Loretta Lynch is reported to have made 
the following statement to the Wall Street Journal:

We remain confident that, when used properly, forensic 
science evidence helps juries identify the guilty and clear 
the innocent, and the department believes that the current 
legal standards regarding the admissibility of forensic 
evidence are based on sound science and sound legal 
reasoning. . . . While we appreciate their contribution to 
the field of scientific inquiry, the department will not be 
adopting the recommendations related to the admissibility 
of forensic science evidence.

(Gary Fields, White House Advisory Council Report Is Critical 
of Forensics Used in Criminal Trials, WALL ST. J., Sept. 20, 
2016.)

The FBI issued written comments in response to the PCAST 
Report, noting that it agreed with PCAST “that forensic science 
plays a critical role in the criminal justice system, and therefore 
needs to be held to high standards,” and that “significant 
funding is needed to develop stronger ties between the academic 
research community and the forensic science community.” (FBI 
Comments on PCAST Report, supra.) The FBI acknowledged 
that scientific knowledge evolves over time and research must 
continue to ensure that forensic science “meets the high standards 
necessary to be used in a court of law.” (Id.)

However, the FBI disagreed “with many of the scientific 
assertions and conclusions of the report,” including the report’s 
broad, unsupported assertions regarding science and forensic 
science practice” (e.g., “the report states that ‘the only way’ to 
establish ‘validity as applied’ is through proficiency testing, 
and requires a measurement of how often the examiner gets the 
correct answer, which is fundamentally at odds with a report 
of the National Academy of Sciences”). (Id.) The FBI further 
echoed criticism by the USAG:

The report also creates its own criteria for scientific 
validity and then proceeds to apply these tests to seven 
forensic science disciplines, failing to provide scientific 
support that these criteria are well accepted within the 
scientific community. In fact, PCAST defines their 
internally developed criteria as “scientific criteria” by 
which forensic feature-comparison methods must be 
supported by. However, PCAST does not apply its own 
criteria consistently or transparently. The PCAST criteria 
define “black box” studies as the benchmark to demonstrate 
foundational validity, but provide no clarification on 
how many studies are needed or why some studies that 
have been conducted do not meet their criteria. These 
criteria seem to be subjectively derived and are therefore 
 inconsistent and unreliable.

(1d.)

Conversely, the National Association of Criminal Defense 
Lawyers (NACDL) responded with highest praise for the PCAST 
Report, hailing it as a long-awaited call to reform. NACDL 
President Barry J. Pollack stated:

This critically important new report released today offers 
further evidence of the pervasive use of flawed analysis 
erroneously presented as grounded in science. . . . If the 
recommendations in this report are followed, we will have 
trials where testimony is based on actual science, ensuring 
that flawed science does not derail what is supposed to be 
an unbiased search for the truth.

(Press Release, Nat’l Ass’n of Criminal Def. Lawyers, President’s 
Council of Advisors on Science and Technology (PCAST) Issues 
Major Forensic Science Report; Calls for Stronger Scientific 
 Standards (Sept. 20, 2016), http://tinyurl.com/15k3f2.)

Defense counsel nationwide have already regularly, and 
understandably, touted the PCAST Report and will continue to 
use its findings to challenge admission of forensic evidence and 
doctor testifying experts for failure to comply with the 
report’s high standards.

The forensic science community issued responses through 
organizations focused on various specialties, some more 
conciliatory than others. The American Academy of Forensic 
Sciences’ statement recognized that there are areas of 
needed validation and improvement, calling the PCAST Report “an 
important start to the discussion of scientific validity” to be 
continued “with the larger community of forensic science 
practitioners.” (Am. Acad. of Forensic Sci., President’s Council 
of Advisors on Science and Technology (PCAST) Report 
(Oct. 5, 2016), http://tinyurl.com/k2mvpr.) The International 
Association for Identification (IAI) challenged PCAST’s findings 
and recommendations with respect to friction ridge, footwear, 
and tire track examinations, noting that the group did not involve 
forensic scientists in its work and that the studies considered were 
limited. (IAI Response to the Report to the President Forensic 
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All told, forensic organizations are in agreement that additional research will always be needed to further develop and refine the various disciplines, and that the community must diligently guard against cognitive bias and error introduced through subjective procedures. Moreover, the PCAST Report highlights the need for across-the-board increased funding for empirical research supporting all of the forensic sciences, and there is general agreement that major research funding is necessary to further evaluate and improve the validity and reliability of all the disciplines involved.

IMPLICATIONS FOR THE FUTURE
Despite initial claims of victory by the harshest critics of forensic science and gloomy claims of impending abolition by some of its proponents, it appears highly unlikely that the PCAST Report will result in removing forensic evidence from criminal trials in this country. But it is far too early to accurately predict the report’s impact on admissibility and the future reliance on the various forensic disciplines in the courtroom. The report is, however, a wake-up call for practitioners, judges, and the forensic science community as a whole that there is—and always will be—much work to be done.

As of this writing, judicial opinions rendered on the matter demonstrate a trend that courts will likely continue to give great weight to stare decisis, and that a defendant’s mere invocation of the PCAST Report and its criticisms will be insufficient to uproot years of acceptance of a particular feature comparison method. (See United States v. Chester, No. 13 CR 00774 (N.D. Ill. Oct. 7, 2016) (concluding that “the PCAST report does not undermine the general reliability of firearm toolmark analysis or require exclusion of the proffered opinions in this case,” but allowing cross-examination of experts with the report); State v. Patel, No. LLICR130143598S, 2016 WL 8135385 (Conn. Super. Ct. Dec. 28, 2016) (admitting footwear comparison evidence over PCAST objection). But see Motorola Inc. v. Murray, 147 A.3d 751, 760 (D.C. 2016) (adopting Federal Rule of Evidence 702 standards, concurring opinion citing PCAST report as measure for evaluating proffered forensic evidence.)

A number of resources have already surfaced encouraging and instructing defense counsel in how best to use both the 2009 NRC Report and PCAST Report to their clients’ advantage, including guidance on bringing new challenges to the admissibility of certain forensic science disciplines. In turn, prosecutors must be prepared to meet those challenges and be ready to defend the validity of the feature comparison method at issue as well as the reliability of the way in which it was applied in the case at hand.

In doing so, we must be mindful of a criticism rightly applied to the majority of prosecutors, defense attorneys, and judges—most have little to no scientific background and rely heavily on experts to educate not only juries, but also themselves. In the context of forensic science, that means everyone—but particularly the courtroom proponents—should understand the theory, development, reliability, and proper application of each discipline. Without that knowledge, the lawyer proponent is unlikely to challenge expert opinions offered by the scientific community, particularly when those opinions line up with other evidence to support a given theory in a case. The associated risks are not so great with defense counsel, whose duty to zealously represent their clients is generally consistent with undermining the state’s evidence whenever possible. But the dangers for prosecutors are much worse.

A prosecutor’s duty is to see that justice is done, which includes the obligation to always seek the truth and present truthful and reliable evidence. A prosecutor who lacks working knowledge of the “why” behind forensic evidence in a case cannot guard against confirmation bias—and runs the risk of unintentionally presenting faulty evidence consistent with the guilt of the accused but which is the product of pushing forensic science beyond its reliable limits. But equipped with appropriate knowledge, a prosecutor can pull back on the reins to ensure a fair trial even in situations where a forensic expert may be wrong or otherwise inclined to opine or testify beyond the scope of a particular discipline.

Science is precise and words have meaning, especially in the context of these feature comparison methods. The PCAST Report instructs judges to be careful to keep expert testimony within acceptable limits:

\[J\]udges, when permitting an expert to testify about a foundationally valid feature-comparison method, should ensure that testimony about the accuracy of the method and the probative value of proposed identifications is scientifically valid in that it is limited to what the empirical evidence supports. Statements suggesting or implying greater certainty are not scientifically valid and should not be permitted. In particular, courts should never permit scientifically indefensible claims such as: “zero,” “vanishingly small,” “essentially zero,” “negligible,” “minimal,” or “microscopic” error rates; “100 percent certainty” or proof “to a reasonable degree of scientific

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Standards in a more user-friendly manner.

I am proud of the Section and all the people who make it such a special place. I am particularly proud of the ethic that exists in the Section leadership and staff to care about the membership and strive to offer first-rate products and services to our members. We look to offer exceptional career development opportunities to our members. If members have an interest in committee work and policy development, that opportunity is readily available. I can’t imagine a more open and friendly group of people. Finally, I am most proud of the Section for always looking for new ways to improve both itself and the system of criminal justice as a whole.

This is my last column as chair, and it affords me the opportunity to thank members and staff. I have developed many good friendships because of my involvement in the Section. It has been a great privilege to work with, and for, all of you. Thank you, all. ■

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Certainty;” identification “to the exclusion of all other sources;” or a chance of error so remote as to be a “practical impossibility.”

(PCAST REPORT, supra, at 19.)

Likewise, prosecutors must not only be mindful to limit proffered testimony but also refrain from phrasing questions in such a way as to elicit no other possible response but one that goes beyond the science. Just as testimony must be precise, so also must closing argument. Trial summation is just that—providing a persuasive summary of the evidence presented in a way that jurors can easily understand and logically deliberate. Prosecutors must resist any tendency to summarize forensic testimony with broad or sweeping language and must instead take care not to use terms that push that testimony too far.

So how do all of the stakeholders in this discussion—scientists, judges, prosecutors, and defense counsel—move forward? The adversarial nature of many of these relationships does not often facilitate calm and reasoned discussions for improvement. Indeed, many of the initial extreme reactions following release of the PCAST Report left little room to collaboratively plot a path forward. With some calling for complete abolition of forensic science evidence and others calling for complete dismissal of PCAST and its findings, it is inevitable that lines would be drawn with faint hope for compromise.

At the risk of appearing Texocentric, I suggest that the approach taken in my home state of Texas by the Texas Forensic Science Commission (FSC) is a good example of one way to make progress while still taking all interests into account. The Texas legislature created the FSC in May 2005, charging it with investigating allegations of professional negligence or misconduct that would substantially affect the integrity of the results of a forensic analysis conducted by an accredited laboratory. The FSC was also required to develop and implement a reporting system through which accredited laboratories could report professional negligence or misconduct. The FSC is also authorized to investigate complaints involving forensic disciplines that are not subject to accreditation under Texas law. And, the FSC was recently tasked with overseeing the accreditation of Texas’s crime laboratories and licensing all of its forensic analysts. The FSC is comprised of nine members appointed by the governor to staggered terms—seven scientists, one defense attorney, and one prosecutor.

In recent years, the FSC demonstrated how to successfully bring together scientific experts and members of the judiciary, defense bar, and prosecution to problem-solve a number of issues. Notably, the FSC has empaneled working groups over the last four years to investigate potential problems and propose solutions in the fields of hair microscopy, DNA mixture interpretation, and bitemark analysis. These groups—comprised of experts and various stakeholder representatives—work together to develop a review process, examine individual cases to identify errors (or the lack thereof), and coordinate notification efforts to potentially affected defendants, their counsel, and prosecutors. The working groups operate under the direction and authority of the FSC; they ultimately make recommendations to the FSC, which acts in response to those recommendations and issues reports of the results.

One key to the success of the Texas approach is the collaborative nature of the work. Notably, scientists, prosecutors, defense attorneys, and judges—often adversaries to varying degrees in our system—have been able to engage in frank and challenging debate without derailing the process on ideological grounds. But this approach can be a minefield of potential conflict when it comes to deciding which stakeholders to invite to the table. In efforts to drive reform, many a well-intentioned working group has been torpedoed by the inclusion of just one bomb-thrower. These working groups are no place for agenda-driven grandstanding, and the presence of that kind of poison will quickly dispatch any hope of real progress.

As the dust settles around the impact site, it appears that the PCAST Report will not spell the end of forensic science in American courtrooms. It has, however, added fuel to the already burning discussions surrounding forensic science—the need for additional resources for research and development and training of forensic science professionals, the need for increased education and training among members of the legal community, and the seemingly unlimited potential for responsible advancement of forensic technology to assist in solving crimes and holding offenders accountable. From this prosecutor’s perspective, it is better to receive the criticism, make the immediate adjustments we believe are consistent with seeing that justice is done, and determine how best to move forward, working collaboratively to advance both science and the law. ■