

**Calendar No. 619**

113TH CONGRESS }  
2d Session }

SENATE

{ REPORT  
113-320

FORENSIC SCIENCE AND STANDARDS ACT OF 2014

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R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND  
TRANSPORTATION

ON

S. 2022



DECEMBER 12, 2014.—Ordered to be printed

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U.S. GOVERNMENT PUBLISHING OFFICE

49-010

WASHINGTON : 2014

SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED THIRTEENTH CONGRESS

SECOND SESSION

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FORENSIC SCIENCE AND STANDARDS ACT OF 2014

DECEMBER 12, 2014.—Ordered to be printed

Mr. ROCKEFELLER, from the Committee on Commerce, Science, and Transportation, submitted the following

R E P O R T

[To accompany S. 2022]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 2022) to establish scientific standards and protocols across forensic disciplines, and for other purposes, having considered the same, reports favorably thereon with an amendment (in the nature of a substitute) and recommends that the bill (as amended) do pass.

PURPOSE OF THE BILL

The purpose of S. 2022, the Forensic Science and Standards Act of 2014, is to strengthen forensic science by promoting scientific research, establishing science-based voluntary consensus standards and protocols across forensic science disciplines, and encouraging the adoption of these standards.

BACKGROUND AND NEEDS

**The case for action**

Modern forensic science is a powerful law enforcement tool. Significant advances in DNA testing, for example, have enabled law enforcement to identify suspects and solve crimes using only minute traces of biological evidence. In a number of other areas, however, forensic science methods require further testing to fully ascertain both their validity and accuracy.<sup>1</sup> While the consistency and certainty of DNA analysis is well established, forensic disciplines such as bite mark analysis lack a rigorous body of sup-

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<sup>1</sup>National Research Council, *Strengthening Forensic Science in the United States: A Path Forward* (Washington, DC: The National Academies Press, 2009).

porting scientific research.<sup>2</sup> Even fingerprint analysis, despite its longevity and general acceptance as an exact identification technique, has been found lacking in strong scientific validation.<sup>3, 4, 5</sup> Fundamental or basic scientific research and science-based standards can therefore help to establish or enhance the reliability of forensic techniques. Strengthening the science underpinning of the forensic disciplines and improving standards of practice will serve not only to identify and prosecute criminals but also to avoid wrongful convictions, which both imprison the innocent and leave dangerous criminals free.

### National Academies findings and recommendations

At the request of Congress,<sup>6</sup> the National Academy of Sciences (NAS) in 2006 formed a committee, including members of the legal, forensic science practitioner, and research communities, to assess the state of forensic science in the United States. The committee's in-depth work led to the 2009 report *Strengthening Forensic Science in the United States: A Path Forward*.<sup>7</sup> This report brought to light many concerns about the state of forensic science, including the need to establish or enhance the scientific foundation behind many forensic science disciplines, the lack of mandatory and enforceable standards in laboratory techniques and reporting, and the potential for bias and examiner error. The report's recommendations included providing resources to support fundamental research in forensic science; establishing better education and training programs for forensic science practitioners; adopting and enforcing best practices, quality controls, and proficiency testing; and establishing standard terminology to be used in reports and testimony for the courts. The report also noted that, while congressional action will not remedy all of the problems identified, Federal leadership is necessary to make meaningful advances. This bill would specifically address the need for increased scientific research and development of science-based standards in the forensic disciplines.

Some forensic methods evolved from laboratory sciences and are well rooted in the scientific process; however, other methods evolved to fulfill specific law enforcement needs without undergoing rigorous scientific analyses and therefore remain vulnerable to concerns about reliability.<sup>8</sup> The 2009 NAS report concluded that enhanced scientific scrutiny of non-laboratory disciplines, such as fingerprint and ballistic analyses, is required to establish the limits of reliability and accuracy of different disciplines. DNA analysis, for example, required years of research and scientific debate before achieving the broad acceptance it enjoys today. Although scientists discovered the structure of DNA in the 1950s, the first publicized use of DNA evidence to establish a positive identification in legal

<sup>2</sup> Ibid.

<sup>3</sup> Koehler, J.J., "Fingerprint Error Rates and Proficiency Tests: What They Are and Why They Matter," *Hastings Law Journal* 59 (2008), p. 1077–1100.

<sup>4</sup> Haber, L. and Haber, R.N., "Scientific Validation of Fingerprint Evidence under Daubert," *Law Probability and Risk* 7 (2008), p. 87–109.

<sup>5</sup> Mnookin, J.L., "The Validity of Latent Fingerprint Identification: Confessions of a Fingerprinting Moderate," *Law, Probability and Risk* 7 (2008), p. 127–141.

<sup>6</sup> U.S. Congress, Conference Committee, *Making Appropriations for Science, the Departments of State, Justice, and Commerce, and Related Agencies for the Fiscal Year ending September 30, 2006, and for Other Purposes*, H. Rept. 109–272 (2005).

<sup>7</sup> National Research Council, *Strengthening Forensic Science in the United States: A Path Forward* (Washington, DC: The National Academies Press, 2009).

<sup>8</sup> Ibid.

proceedings in the United States did not occur until 1987.<sup>9</sup> Other forensic methods may or may not hold up to scientific scrutiny, and may only prove useful in certain contexts, or may be discredited. Comparative bullet lead analysis, for example, was once a popular forensic technique for linking bullets found at a crime scene to bullets in the possession of suspects. However, after a 2004 NAS study found that the analysis method used could be “unreliable and potentially misleading,”<sup>10</sup> the FBI voluntarily stopped providing the analysis to law enforcement.<sup>11</sup>

Compliance with a well-defined set of standards reduces the risk of bias, improves the consistency of a given test, and makes it possible to replicate and empirically test procedures.<sup>12</sup> While many forensic science disciplines have standards developed by standards-setting organizations, there are variations in those standards and their use is often voluntary. Because of the inconsistent application of standards and lack of uniformity in the standards-setting community, the 2009 NAS report identified a role for the National Institute of Standards and Technology (NIST), working in conjunction with stakeholders, to develop “tools for advancing measurement, validation, reliability, information sharing, and proficiency testing in forensic science and to establish protocols for forensic examinations, methods, and practices.”<sup>13</sup> However, as NIST is a non-regulatory agency, this approach would require the involvement of another agency, such as the Department of Justice (DOJ), for standards dissemination and implementation.

#### SUMMARY OF PROVISIONS

S. 2022 would support research by:

- establishing a National Forensic Science Research Initiative (NFSRI)—to include a coordinating office, an interagency committee, and a Federal research strategy—to improve, expand, and coordinate Federal research in the forensic sciences;
- directing the NSF to award merit-based research grants to improve the foundation of forensic science and to establish multidisciplinary forensic science research centers; and
- encouraging all Federal agencies with equities in forensic science to use prizes and challenges to stimulate innovative and creative solutions to satisfy the research needs identified in the national strategy.

The bill would direct the development and promotion of uniform standards by:

- requiring NIST to coordinate the development of voluntary consensus forensic science standards in consultation with standards development organizations and stakeholders, including the DOJ and State and local practitioners;
- directing NIST to establish a forensic science Center of Excellence;

<sup>9</sup>U.S. Congress, Office of Technology Assessment, *Genetic Witness: Forensic Uses of DNA Tests*, OTA-BA-438 (Washington, DC: U.S. Government Printing Office, 1990).

<sup>10</sup>National Research Council, *Forensic Analysis: Weighing Bullet Lead Analysis* (Washington, DC: The National Academies Press, 2004).

<sup>11</sup>John Solomon, “FBI’s Forensic Test Full of Holes,” *Washington Post*, November 18, 2007, at [www.washingtonpost.com/wp-dyn/content/article/2007/11/17/AR2007111701681.html](http://www.washingtonpost.com/wp-dyn/content/article/2007/11/17/AR2007111701681.html).

<sup>12</sup>National Research Council, *Strengthening Forensic Science*.

<sup>13</sup>*Ibid* at 214.

- establishing a National Commission on Forensic Science to make recommendations to the Attorney General, NIST Director, and others on standards development and adoption; and
- directing the Attorney General to require the adoption of standards in laboratories under DOJ, as appropriate, and to encourage their use in other Federal forensic science laboratories.

#### LEGISLATIVE HISTORY

On June 26, 2013, the Committee held a hearing entitled, “From the Lab Bench to the Courtroom: Advancing the Science and Standards of Forensics.” The Committee examined the science of forensic disciplines, the need for scientific research and enforceable national standards, other challenges faced by the forensic science community, and the role of the Federal Government in facilitating the validation and standardization in forensic disciplines. A key conclusion of this hearing was that Federal leadership and funding are required to improve standards setting, as well as to support basic research and applied research. Witnesses agreed that scientific research was critical to advancing and validating the forensic sciences and supported a Federal role in promoting consistent forensic standards, with some witnesses emphasizing the need for sufficient input from State and local forensic science practitioners in standards development and implementation.

On February 12, 2014, Senator Rockefeller introduced S. 2022 and the measure was referred to the Committee on Commerce, Science, and Transportation. Senator Blumenthal cosponsored the bill. Representative Eddie Bernice Johnson introduced a similar bill, H.R. 3064, on September 9, 2013.

On March 27, 2014, Senators Leahy and Cornyn of the Committee on the Judiciary of the Senate introduced the Criminal Justice and Forensic Science Reform Act (S. 2177). S. 2177 would address forensic science research, standards, accreditation, certification, and training. S. 2177 would make certification and accreditation a requirement for the receipt of Federal funds by a forensic science laboratory and permit existing grant programs to fund accreditation and certification activities. No new funding, however, would be authorized for this purpose. Also, whereas S. 2022 reflects current developments, such as the Administration establishing the newly appointed National Commission on Forensic Science and the Organization of Scientific Area Committees, S. 2177 would require a different approach to the Federal role.

On April 9, 2014, the Committee on Commerce, Science, and Transportation met in open Executive Session and, by voice vote, ordered S. 2022 to be reported favorably with an amendment (in the nature of a substitute).

#### ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

*S. 2022—Forensic Science and Standards Act of 2014*

Summary: S. 2022 would establish the Forensic Science Research Initiative to improve, expand, and coordinate federal research in the forensic sciences. Under the initiative, selected agencies would be directed to undertake activities designed to improve the validity and reliability of forensic science (FS) practices. (FS encompasses both basic and applied research and its application to recognize, evaluate, and analyze evidence for use in investigations and legal proceedings.)

CBO estimates that implementing S. 2022 would cost \$101 million over the 2015–2019 period, assuming appropriation of the necessary amounts. Pay-as-you-go procedures do not apply to this legislation because it would not affect direct spending or revenues.

S. 2022 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA).

Estimated cost to the Federal Government: The estimated budgetary effect of S. 2022 is shown in the following table. The costs of this legislation fall within budget function 370 (commerce and housing credit).

	By fiscal year, in millions of dollars—					
	2015	2016	2017	2018	2019	2015–2019
CHANGES IN SPENDING SUBJECT TO APPROPRIATION						
Estimated Authorization Level .....	28	31	15	15	16	104
Estimated Outlays .....	22	29	18	15	16	101

Note: Components may not sum to totals because of rounding.

Basis of estimate: S. 2022 would establish the Forensic Science Research Initiative to improve, expand, and coordinate federal research in FS and to develop a strategy that directs research efforts to improve the validity and reliability of FS practices.

The bill would create a coordinating office to develop the research strategy, a national commission to provide advice to federal agencies implementing the new research strategy, a center of excellence to improve standards of practice in the forensic sciences, and new research centers to conduct basic research and encourage efforts to apply the research to practical use in the forensic sciences.

S. 2022 would authorize the appropriation of \$28 million over fiscal years 2015 and 2016 for the National Institute of Standards and Technology (NIST) to coordinate the development of new voluntary standards for FS and to test and validate existing standards, measurements, and methods.

Based on information from the agencies that would be affected by the legislation, including NIST, the National Science Foundation (NSF), the Office of Science and Technology Policy (OSTP) and the Department of Justice (DOJ), CBO estimates that implementing S. 2022 would cost \$101 million over the 2015–2019 period, assuming appropriation of the specified and necessary amounts. Much of that amount, about \$68 million, would be spent by NIST to develop new standards and test existing standards in the forensic sciences, to establish a new center of excellence, and to undertake efforts to improve the practice of forensic science in the United States. The balance of the costs would be borne by OSTP, NSF, and DOJ to sup-

port the coordinating office and research centers, and to fund research and other efforts to improve FS practices.

Pay-As-You-Go Considerations: None.

Intergovernmental and private-sector impact: S. 2022 contains no intergovernmental or private-sector mandates as defined in UMRA and would impose no costs on state, local, or tribal governments.

Estimate prepared by: Federal costs: Susan Willie, Matthew Pickford, and Martin von Gnechten; Impact on state, local, and tribal governments: J'nell L. Blanco; Impact on the private sector: Amy Petz.

Estimate approved by: Theresa Gullo, Deputy Assistant Director for Budget Analysis.

#### REGULATORY IMPACT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

##### NUMBER OF PERSONS COVERED

The bill would require the establishment of the NFSRI—to include a coordinating office, an interagency committee, and a Federal research strategy—to improve, expand, and coordinate Federal research in the forensic sciences. The bill would also require NIST to identify and coordinate the development of forensic science standards that would be adopted, as appropriate, by laboratories under DOJ. These laboratories are already subject to DOJ rules and regulations, and therefore the number of persons covered should be consistent with the current levels of individuals impacted under the provisions that are addressed in the bill.

##### ECONOMIC IMPACT

The bill would authorize \$8 million in fiscal year (FY) 2014, \$12 million in FY 2015, and \$16 million in FY 2016 out of otherwise available appropriations to NIST. These funding levels are not expected to have an inflationary impact on the Nation's economy.

##### PRIVACY

S. 2022 is not expected to have an adverse impact on the personal privacy of individuals. Forensic data sets that could be shared for the purpose of carrying out a prize or challenge under section 6 of the bill would be provided in a way that ensures the privacy rights of individuals are protected.

##### PAPERWORK

S. 2022 would not increase the paperwork requirements for private individuals or businesses, unless an individual applied and participated on the National Commission on Forensic Science or the Scientific Area Committees, or a company was part of a submission for a grant award under a solicitation issued pursuant to this bill. The legislation would require several reports from the Federal Government, including a Federal research strategy, implementation plan, and a biennial evaluation of the progress of the NFSRI.

## CONGRESSIONALLY DIRECTED SPENDING

In compliance with paragraph 4(b) of rule XLIV of the Standing Rules of the Senate, the Committee provides that no provisions contained in the bill, as reported, meet the definition of congressionally directed spending items under the rule.

## SECTION-BY-SECTION ANALYSIS

*Section 1. Short title; table of contents*

This section would provide that the legislation be cited as the “Forensic Science and Standards Act of 2014.”

*Section 2. Findings*

This section would provide relevant findings from the NAS report *Strengthening Forensic Science in the United States: A Path Forward* that highlight the need for research and continued standards development in forensic disciplines.

*Section 3. Definitions*

This section would define six terms used in the bill. The definition of “forensic science” in S. 2022 would include pattern, analytical, and digital techniques. Given the increasing dependence on digital sources of information and the rapid evolution of technology, the Committee acknowledges the particular need for research in the area of digital forensics.

The Committee also acknowledges the strong need for *both* basic and applied research in forensic science. Basic (or fundamental) research advances scientific understanding and fuels technological innovation. Basic research on DNA, for example, led to a powerful forensic tool. However, when James Watson and Francis Crick published their 1953 paper on the structure of DNA, its utility in revolutionizing medicine and the criminal justice system was unknown. Further, since innovation occurs in an iterative progression, new applications, needs, processes, and products often inspire new basic research.

*Section 4. National Forensic Science Research Initiative*

This section would establish the NFSRI to improve, expand, and coordinate Federal research in the forensic sciences, with participation from NSF, NIST, DOJ, and other Federal departments, agencies, and offices contributing to research in forensic science. A coordinating office and interagency committee would be established to oversee the development and implementation of a Federal research strategy. Both the Director of the Coordinating Office and the co-chair of the interagency committee would be required to have expertise relevant to forensic science, which could include research experience in forensic disciplines or related fields such as genetics, statistics, chemistry, biology, etc. The NSF Director, in consultation with the Director of the Coordinating Office, would contract with an external, independent science entity to develop a report that would identify critical forensic science research needs. Further, this section would require the development, in consultation with State and local stakeholders, of a triennially-updated, unified Federal research strategy and implementation roadmap in

forensic science. The roadmap would consider both the basic and applied research needs in forensic science.

Although the legislation does not specifically identify participating entities at DOJ, the Committee expects that the National Institute of Justice would play a significant role in the NFSRI, particularly in collaboration with NSF. While NSF would be likely to have a primary role in expanding basic research in forensic science, many other Federal agencies—from the Centers for Disease Control and Prevention to the U.S. Postal Inspection Service—could be involved in the research initiative. The National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service, and the U.S. Environmental Protection Agency, for example, would likely have an interest in strengthening the field of conservation forensics, which is critical for supporting Federal efforts to combat illegal wildlife trafficking. The U.S. Department of Defense, as another example, operates a number of forensic science laboratories—including the U.S. Army Criminal Investigation Laboratory, the Armed Forces DNA Identification Laboratory, and the Defense Computer Forensic Laboratory—and conducts applied research to develop “smaller, faster, lighter” and automated technologies to reduce the need for forward deployment of forensic scientists.

#### *Section 5. Implementation of forensic science research recommendations*

This section would direct the Federal entities participating in the NFSRI to improve the foundation and practice of forensic science through research and collaboration, consistent with the unified Federal research strategy. Agencies would also be required to build relationships between forensic science practitioners and the research community and to broadly disseminate the results of research conducted under the NFSRI. All external grants awarded by any entity pursuant to this section would be required to be consistent with the merit review criteria approved by the National Science Board and described by NSF’s Proposal and Award Policies and Procedures Guide. Research findings would be considered for submission to peer-reviewed journals.

NSF would be directed to establish at least one multidisciplinary research center to conduct basic and translational research relevant to forensic science. NIST would be directed to establish and operate a Center of Excellence focusing on measurement science, technology, and standards development in the forensic sciences.

#### *Section 6. Forensic science research challenges*

This section would highlight the use of Federal entities’ existing prize and challenge authority to advance forensic science research needs and priorities. It would also provide possible examples of how prizes and challenges could be applied to forensic science research. The direction for making forensic data sets available for research would be consistent with the Administration’s open data policies and the Committee expects that an individual’s privacy rights would be protected in making data available for this purpose.

*Section 7. Forensic science standards*

This section would provide direction to NIST to identify and coordinate the development of voluntary consensus forensic science standards and to develop measurement standards and standard reference materials to support forensic science disciplines. To inform NIST's work, the NIST Director and the Attorney General would establish scientific area committees to identify gaps in and opportunities for forensic science standards development. A majority of the scientific area committees would be required to have a minimum representation of 50 percent from forensic science practitioners to the extent practicable. The NIST Director, in administering the scientific area committees, would be required to ensure the forensic community has an opportunity for public review and comment on the proposed standards. For the purposes of carrying out this section, appropriations out of otherwise available funds would be authorized for NIST in the amounts of \$8 million for FY 2014, \$12 million for FY 2015, and \$16 million for FY 2016.

*Section 8. National Commission on Forensic Science*

This section would authorize the NIST Director and the Attorney General, in consultation with the NSF Director, to establish a National Commission on Forensic Science. The Commission would provide advice to the Federal departments, agencies, and offices participating in the unified Federal research strategy and standards development in forensic science. While the Attorney General would provide administrative support for this Commission, the direction is not meant to exclude other agencies from providing staff. Rather, the Committee expects that NIST and other relevant Federal agencies, as appropriate, would assist with the staffing needs of the Commission.

*Section 9. Adoption, accreditation, and certification*

This section would direct the Attorney General to encourage the broad adoption of forensic science standards and to require laboratories under DOJ to adopt these standards, as appropriate. The Attorney General would also promote accreditation and certification based on forensic science standards and advance recommendations made by the National Commission on Forensic Science.

*Section 10. National Institute of Standards and Technology functions*

This section would amend the National Institute of Standards and Technology Act (15 U.S.C. 271 et seq.) by directing to NIST "to identify and coordinate the development of voluntary consensus forensic science standards to enhance the validity and reliability of forensic science activities."

*Section 11. Effect on other laws*

This section would clarify that this bill does not impact the support and technical assistance for State and local laboratories under part BB of title I of the Omnibus Crime Control and Safe Streets Act of 1968 (42 U.S.C. 3797j et seq.).

## CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in italic, existing law in which no change is proposed is shown in roman):

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY  
ACT

**SEC. 2. ESTABLISHMENT, FUNCTIONS, AND ACTIVITIES.**

[15 U.S.C. 272]

(a) ESTABLISHMENT OF NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.—There is established within the Department of Commerce a science, engineering, technology, and measurement laboratory to be known as the National Institute of Standards and Technology (hereafter in this Act referred to as the “Institute”).

(b) FUNCTIONS OF SECRETARY AND INSTITUTE.—The Secretary of Commerce (hereafter in this Act referred to as the “Secretary”) acting through the Director of the Institute (hereafter in this Act referred to as the “Director”) is authorized to take all actions necessary and appropriate to accomplish the purposes of this Act, including the following functions of the Institute—

(1) to assist industry in the development of technology and procedures needed to improve quality, to modernize manufacturing processes, to ensure product reliability, manufacturability, functionality, and cost-effectiveness, and to facilitate the more rapid commercialization, especially by small- and medium-sized companies throughout the United States, of products based on new scientific discoveries in fields such as automation, electronics, advanced materials, biotechnology, and optical technologies;

(2) to develop, maintain, and retain custody of the national standards of measurement, and provide the means and methods for making measurements consistent with those standards;

(3) to compare standards used in scientific investigations, engineering, manufacturing, commerce, industry, and educational institutions with the standards adopted or recognized by the Federal Government and to coordinate the use by Federal agencies of private sector standards, emphasizing where possible the use of standards developed by private, consensus organizations;

(4) to enter into contracts, including cooperative research and development arrangements, and grants and cooperative agreements, in furtherance of the purposes of this Act;

(5) to provide United States industry, Government, and educational institutions with a national clearinghouse of current information, techniques, and advice for the achievement of higher quality and productivity based on current domestic and international scientific and technical development;

(6) to assist industry in the development of measurements, measurement methods, and basic measurement technology;

(7) to determine, compile, evaluate, and disseminate physical constants and the properties and performance of conventional and advanced materials when they are important to science,

engineering, manufacturing, education, commerce, and industry and are not available with sufficient accuracy elsewhere;

(8) to develop a fundamental basis and methods for testing materials, mechanisms, structures, equipment, and systems, including those used by the Federal Government;

(9) to assure the compatibility of United States national measurement standards with those of other nations;

(10) to cooperate with other departments and agencies of the Federal Government, with industry, with State and local governments, with the governments of other nations and international organizations, and with private organizations in establishing standard practices, codes, specifications, and voluntary consensus standards;

(11) to advise government and industry on scientific and technical problems;

(12) to invent, develop, and (when appropriate) promote transfer to the private sector of measurement devices to serve special national needs; **[and]**

(13) to coordinate Federal, State, and local technical standards activities and conformity assessment activities, with private sector technical standards activities and conformity assessment activities, with the goal of eliminating unnecessary duplication and complexity in the development and promulgation of conformity assessment requirements and measures~~...~~; *and*

*(14) to identify and coordinate the development of voluntary consensus forensic science standards to enhance the validity and reliability of forensic science activities.*

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