

OSAC Technical Series 0001



Annual Report February 2016 – February 2017

Annual Report Working Group
Organization of Scientific Area Committees for Forensic Science (OSAC)

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Annual Report

February 2016 – February 2017

By
The Organization of Scientific Area Committees for Forensic Science (OSAC)
Forensic Science Standards Board (FSSB) and
The OSAC Editorial Board:
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Message from the Forensic Science Standards Board (FSSB)

The Organization of Scientific Area Committees for Forensic Science (OSAC) continues to make steady progress toward its goal of achieving technically sound, consensus-based standards and guidelines. OSAC committees are working on hundreds of discipline-specific and interdisciplinary forensic science standards projects, have posted hundreds of discipline-specific baseline documents to the OSAC website, and have recently identified 92 research and development needs.

Within the last year, the Forensics Science Standards Board (FSSB) has continued to focus on OSAC strategic efforts, and in particular has implemented numerous program changes based on feedback from OSAC members and stakeholders.

The FSSB thanks all OSAC volunteers for their time and input to the OSAC process, and also thanks all of the federal, state and local government agencies, academic institutions and criminal justice organizations that support the OSAC mission by allowing their staff to continue to participate.



Fig. 1. The FSSB members from top left (as of September 2017): Jose Almirall, William Thompson, Richard Vorder Bruegge, Jim Gates, George Herrin, Jeff Salyards, Melissa Gische, Ray Wickenheiser, Christopher Plourd, Lucy Davis, Mark Stolorow. Middle left: Sarah Kerrigan, JoAnn Buscaglia. Bottom left: Steven Johnson, Greg Davis, Karen Reczek, Jeremy Triplett, Laurel Farrell. (Absent are Mark Keisler, Roger Mitchell, David Fowler and Austin Hicklin.)

Message from the Director of OSAC Affairs

Dear Colleagues:

These are transformative times for forensic science. This period of transformation began with the publication of a National Academies of Science¹ report in 2009 that was highly critical of the practice of forensic science. That report called for research to strengthen the scientific foundation of forensic methods and for standards to be implemented in crime laboratories throughout the nation. OSAC is playing a leading role in this transformation of forensic science by helping to create high-quality forensic science standards that are fit-for-purpose, consensus-based and scientifically sound.

OSAC is uniquely qualified to undertake this mission because of the deep and varied expertise of its members. OSAC assembles more than 560 members and 260 affiliates representing key stakeholder groups, including practitioners, laboratory managers, academic researchers, metrologists, statisticians, human factors experts, accreditation and standards development experts, attorneys and judges. This diverse group represents federal, state and local agencies, academic institutions and private sector entities from all 50 states and more than a dozen nations.

Producing consistently high-quality standards is a demanding and complex process that requires great organizational and operational coordination. When done properly, the process is lengthy and can appear tedious. But the obligation to ensure that the innocent are exonerated and the guilty are properly convicted is worthy of our greatest efforts. As you will see in this 2016-2017 Annual Report, the work of OSAC is accelerating, but not at the cost of quality or due process.

In the past year, OSAC has:

- Increased focus on interdisciplinary forensic science topics that apply across Scientific Area Committees (SACs), including:
 - A lexicon of terminology for all five SACs
 - A range of conclusion statements common to multiple disciplines
- Made progress on 216 draft standards and guidelines
- Identified and published 95 forensic science research needs from all five SACs
- Posted 4 standards on the OSAC Registry.

But there can be no measurable benefits or positive impacts on the criminal justice system unless standards are adopted. Therefore, among its other duties, the FSSB has assembled a Standards Implementation Task Group under the direction of FSSB Chair Jeremy Triplett. This group will create a road map for successful implementation of OSAC standards throughout the forensic science community via the following implementation pathways:

- Self-Adoption: Crime laboratories incorporate OSAC standards into their standard operating procedures.

- Professional Associations: Issue policy statements encouraging adoption
- Statutory Requirements: Enactment of state legislation mandating the implementation of OSAC standards by all forensic science service providers in their jurisdiction
- Justice System: Attorneys begin demanding testing using OSAC standards
- Accrediting Bodies: ISO/IEC 17025/20 supplemental standards or checklists
- Funding Bodies (Carrot): Offer funding incentives to implement standards
- Funding Bodies (Stick): Require OSAC standards implementation to access funding
- Other Pathways (Including educational programs)

We look forward to the publication of this implementation road map.

I would personally like to thank the members of the OSAC Editorial Board for providing the support necessary to review and improve the quality of all OSAC documents. I would also like to thank all OSAC members for their hard work and dedication to strengthening the use of science and science-based standards in our nation's criminal justice system.

Sincerely,



Mark D. Stolorow
Director for OSAC Affairs at NIST



Fig. 2. OSAC Director Mark Stolorow

¹ National Research Council Report entitled *Strengthening Forensic Science in the United States - A Path Forward*, National Academies Press, August 2009.

Executive Summary

OSAC is an initiative of the National Institute of Standards and Technology (NIST) and the U.S. Department of Justice (DOJ). The purpose of OSAC is to strengthen the nation's use of forensic science by:

- Providing technical leadership that facilitates the development and promulgation of consensus-based documentary standards and guidelines for forensic science
- Promoting standards and guidelines that are fit-for-purpose and based on sound scientific principles
- Promoting the use of OSAC standards and guidelines by accreditation and certification bodies
- Establishing and maintaining working relationships with similar organizations

OSAC has made great strides as an organization. The FSSB has made several management improvements that allow for better functionality at all levels of OSAC. These include improved processes for reviewing and vetting standards, as well as documents destined to become standards, through standards developing organizations (SDOs). The FSSB has also welcomed additional members from the resource committees, leading to improved communication across all levels of OSAC. In addition, lessons learned are being shared across the organization with respect to operational performance and best practices for tackling challenging cross-disciplinary topics.

To list just a few examples of the organization's accomplishments, from February 2016 to February 2017, OSAC:

- Established interdisciplinary projects focused on terminology, training, statistics and conclusions
- Merged the *OSAC Registry of Approved Standards* and *OSAC Registry of Approved Guidelines* into a single OSAC Registry
- Developed roadmaps for select disciplines that outline gaps in standards and research, contributing to better prioritization of standards development
- Utilized the organization's academic scholars, legal professionals, practitioners and scientists to help identify research gaps relevant to forensic science standards
- Continued investment in developing and reviewing over 200 documents across 25 subject areas that will improve current and future standards

Improving forensic science standards requires input from beyond OSAC, and we welcome comments from all stakeholders and partners. If you have questions about this report or about OSAC, please contact us at forensics@nist.gov.

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1.0 Introduction

The Organization of Scientific Committees for Forensic Science (OSAC) is an initiative by the National Institute of Standards and Technology (NIST) and the Department of Justice (DOJ) focused on strengthening forensic science in the United States by:

- Providing technical leadership that facilitates the development and promulgation of consensus-based documentary standards and guidelines for forensic science
- Promoting standards and guidelines that are fit-for-purpose and based on sound scientific principles
- Promoting the use of OSAC standards by accreditation and certification bodies
- Establishing and maintaining working relationships with other similar organizations.

OSAC Core Principles:

All standards and guidelines approved for inclusion on the *OSAC Registry* must be developed by a process that follows these four core OSAC principles:

- Openness
- Balance
- Consensus
- Harmonization

OSAC operates as a multi-level organization consisting of five Scientific Area Committees (SACs) which report to the Forensic Science Standards Board (FSSB). Each of the five SACs oversees several discipline-specific subcommittees. In addition, three Resource Committees provide input and guidance to OSAC.

OSAC includes members and affiliates. Affiliates can participate in task groups and provide subject matter expertise, but do not have the same voting rights as members. As of February 2017, OSAC structure and membership includes:

- 565 members
- 266 affiliates
- 50 states represented
- 239 task groups
- 2470 applications to participate

OSAC Member Current Job Classification

- Attorney: 2%
- Educator: 10%
- Judge: 1%
- Other: 10%
- Practitioner: 56%
- QA Manager: 2%
- R&D Tech: 2%
- Researcher: 19%

Visit <https://www.nist.gov/topics/forensic-science/osac-organizational-structure>, and see Fig. 3, to learn more about the OSAC structure, the FSSB and the other committees.

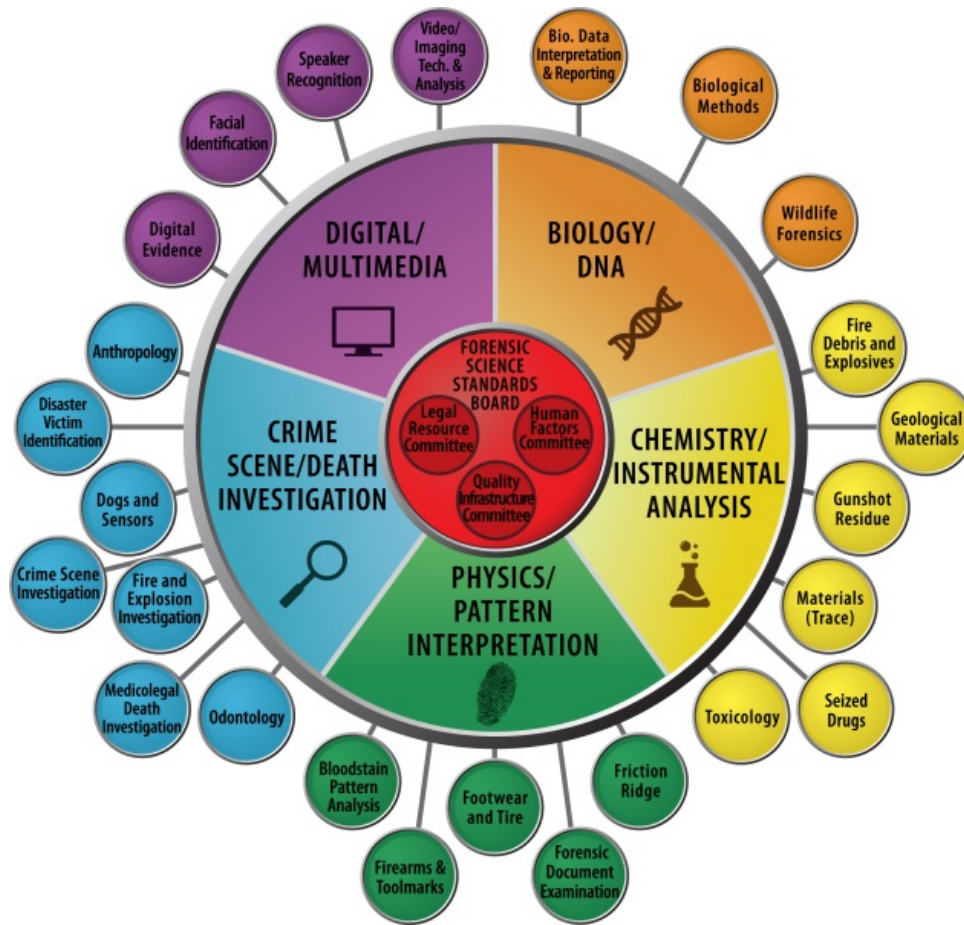


Fig. 3. OSAC is a multi-level organization consisting of 25 subcommittees, 5 SACs, 3 resource committees and the FSSB.

This report summarizes OSAC’s goals, activities and accomplishments from February 2016 to February 2017. OSAC strives to represent and address the needs of the entire stakeholder community. The audience for this report includes:

- OSAC members and affiliates
- Forensic science service providers
- Private sector manufacturers and service vendors supplying forensic science providers
- Accrediting bodies
- Certifying bodies
- Representatives of the criminal justice system
- Representatives of the legal system (judges, prosecution and defense)
- Professional forensic science organizations
- Other professional scientific organizations
- Existing and historical Scientific Working Groups (SWGs)
- International and national standards organizations
- Federal, state, and local government agencies (including thousands of state and local law enforcement agencies)
- Academia
- Non-governmental organizations (NGOs)
- The National Institute of Standards and Technology (NIST)

- The U.S. Department of Justice (DOJ)
- The public

2.0 OSAC: The Big Picture Goals and Accomplishments

OSAC has made great strides as an organization. The FSSB has made several management improvements that allow for better functionality at all levels of OSAC. These include improved processes for reviewing and vetting standards, as well as documents destined to become standards, through standards developing organizations (SDOs). The FSSB has also welcomed additional members from the resource committees, leading to improved communication across all levels of OSAC. In addition, lessons learned are being shared across the organization with respect to operational performance and best practices for tackling challenging cross-disciplinary topics.

Most notably, the FSSB held the OSAC Leadership Strategy Session (OLSS) on June 22, 2016, to share current program perspectives from each of the OSAC committees, collaborate on how to proceed in cases where perspectives may vary, and strive to reach a shared vision of success. The FSSB brought together representatives from all five SACs, three resource committees, statisticians and measurement scientists. The meeting resulted in 25 programmatic recommendations, many of which were implemented in the reporting year. These meetings will be routine and in the future will include subcommittee chairs.



Fig. 4. Biology/DNA SAC, Physics/Pattern SAC, and LRC Representatives at the OLSS Meeting.

Based on the feedback received from OSAC members at this strategy session, the following program improvements were implemented or are in process:

- Resource Committee chairs were appointed as ex-officio members of the FSSB to better facilitate inter-committee collaboration

- Resource Committee liaisons became ex-officio members on each of the SACs
- OSAC subcommittees posted discipline-specific baseline documents on each OSAC subcommittee web page
- *OSAC Registry of Approved Standards* and *OSAC Registry of Approved Guidelines* have been merged into a single OSAC Registry
- The FSSB instituted “pitch” meetings to increase dialogue between the various committees about specific standards
- The FSSB sought to add a measurement scientist or statistician to each OSAC committee
- The FSSB is working to develop a strategy to best achieve timeliness, relevance, consensus and quality in OSAC standards.

OSAC is one entity within a community working towards improved forensic science standards and guidelines. Fig. 5 and sections 2.1-2.3 describe how the OSAC program interacts with SDOs and other entities.



Fig. 5. Big Picture View of OSAC Efforts. OSAC is one entity within a community working towards improved forensic science standards and guidelines.

2.1 Short-Term Goal: OSAC Partners with SDOs for Further Development

OSAC partners with existing SDOs to develop voluntary consensus standards in forensic science. Oftentimes, its members participate in the SDO processes to further develop standards, which are ultimately published by the SDO. OSAC subcommittees have spent considerable time this past year developing new content to be submitted to SDOs for further development and publication.

2.1.1 OSAC Ongoing Standards Projects

OSAC members are now focusing on 218 different standards projects. See Appendix A for the entire list of active documents. These are currently moving through the two OSAC processes: the *OSAC Working with an SDO Process* and the *OSAC Registry Approval Process*. The first of these two processes entail OSAC committees or task groups submitting an idea, a partially drafted document, or a fully drafted document to an SDO for further modifications, balloting and publishing. The second process focuses on elevating selected standards or guidelines to the *OSAC Registry*.

Throughout the year, various OSAC subcommittees submitted documents or document concepts to SDOs for further development, including the Academy Standards Board (ASB), the American Dental Association (ADA) and ASTM International. Of the 23 documents or concept submissions produced by OSAC over this past year, one has been subsequently finalized and published: *ADA TR 1088 for Human Identification by Comparative Dental Analysis*. Four have been subsequently revised:

- *ASTM E1412-12: Standard Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration with Activated Charcoal*
- *ASTM E1386-15: Standard Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Solvent Extraction*
- *ASTM E2330 Standard Test Method ICP-MS for glass*
- *ASTM E2926 Standard Test Method XRF for glass.*

2.2 Mid-Term Goal: OSAC Registry

The *OSAC Registry* is intended to serve as a trusted repository of high-quality standards that address discipline-specific requirements in forensic science. Many of the documents being developed within OSAC, and in conjunction with SDOs, are intended for placement on the *OSAC Registry*. A standard or guideline that is posted on the *OSAC Registry* demonstrates that the methods it contains have been assessed to be valid by forensic practitioners, academic researchers, measurement scientists and statisticians through a consensus development process that allows participation and comment from all relevant stakeholders. Three standards were added to the *OSAC Registry* between February 2016 and February 2017:

- *NFPA 921: Guide for Fire and Explosion Investigations, 2014 Edition – Fire and Explosion Subcommittee. Added on September 20, 2016*
- *ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories – Interdisciplinary Virtual Subcommittee. Added on September 27, 2016*
- *NFPA 1033: Standard for Professional Qualifications for Fire Investigator, 2014 Edition – Fire and Explosion Investigation Subcommittee. Added on December 22, 2016*

Many existing standards are not included on the OSAC Registry. That does not necessarily mean that OSAC considers them invalid. The absence of a standard from the Registry may simply mean that the standard has not yet been recommended, or that it meets only some of OSAC's criteria for inclusion.

The *OSAC Registry* is available at: <https://www.nist.gov/topics/forensic-science/osac-approved-registry-documents>, and public documents associated with the Registry Approval Process can be found on the *OSAC Registry* Public Documents page: <https://www.nist.gov/topics/forensic-science/osac-registry-public-documents>.

2.3 Long-Term Goal: Implementation

OSAC's broadest impact will be made through the implementation of forensic science standards. Currently, the use of forensic science standards is not required by law, with the exception of forensic DNA laboratories that are held to the FBI Quality Assurance Standards (QAS), as required by the DNA Identification Act of 1994. Therefore, there are few discipline-specific documentary standards that can be used to audit laboratories. Individual laboratories such as the Kentucky State Police (KSP) and Georgia Bureau of Investigation have independently elected to adopt standards on the *OSAC Registry* by incorporating them into their standard operating procedures (SOPs). For example, the KSP Drug Chemistry section, following the ISO/IEC 17025 numbering scheme, has recently updated its SOPs to formally incorporate OSAC standards and guidelines.

As OSAC adds additional standards and guidelines to the *OSAC Registry*, individual crime laboratories, or sections within laboratories, should consider a similar approach. If you decide to incorporate OSAC standards and/or guidelines into your SOPs, please let OSAC know by emailing us at forensics@nist.gov.

2.3.1 FSSB Implementation Task Group

The FSSB Implementation Task Group has been very active in 2016/2017, and has analyzed and facilitated potential mechanisms for broader implementation of standards on the *OSAC Registry*. The draft OSAC Implementation Plan identifies many other approaches to encourage the adoption of the standards/guidelines on the *OSAC Registry*. Potential implementation pathways under discussion are shown in Fig. 6.



Fig. 6. Potential OSAC Implementation Pathways Under Consideration by the FSSB.

3.0 Additional OSAC Accomplishments February 2016 – February 2017

This section describes additional notable OSAC outputs and activities from February 2016 to February 2017.

3.1 Interdisciplinary Forensic Science Discussions and Projects

The wide spectrum of stakeholders and disciplines in OSAC offers an opportunity for interdisciplinary projects and dialogue.

For example, OSAC provides:

- More cross-discipline visibility and understanding of the commonalities and differences in the way forensic science practitioners perform their work
- Opportunities for forensic science disciplines to leverage each other's scientific successes
- Routine access to insights and perspectives from all stakeholders (from both within and outside the forensic science community)
- The ability to develop and promote enforceable standards through a unified effort in the forensic science field, and to broaden the potential impact of those standards.

Several interdisciplinary OSAC projects are underway. These are led by “virtual subcommittees and task groups” that consist of members from multiple disciplines and committees. These interdisciplinary projects include:

- *The Training, Continuing Education and Professional Development Virtual Subcommittee* focuses on a new potential standard, guideline, or other publication.
- *The Conclusions Virtual Subcommittee* defines standard terminology and usage for forensic examiners expressing source conclusions for publishing as a potential standard, guideline, or other publication.
- *The Statistics Task Group* consists of statisticians who sit on the various OSAC committees, and who collaborate on specific statistics challenges related to the OSAC.
- *The ACE Virtual Subcommittee* focuses on developing discipline-specific methodologies for applying the method known as ACE-V (an acronym for the Analysis, Comparison, Evaluation and Verification methodology used by forensic practitioners primarily when conducting feature comparisons).
- *The 29 Word Terminology Task Group* works to refine definitions for the terms that the Legal Resource Committee has identified as being most challenging.

In addition to specific task groups that are coordinating the development or promotion of interdisciplinary standards, other interdisciplinary discussions held throughout the year included:

- At the Summer 2016 meetings, Christopher J. Plourd, Superior Court Judge, State of California, LRC Committee Chair and Ronald S. Reinstein, Judge and Judicial Consultant of the Arizona Supreme Court, provided a briefing on a judge’s responsibility in the courtroom.
- Also at the Summer 2016 meetings, James Curran offered the statistics task group’s assessment of some standards routing through the OSAC process.



Fig. 7. OSAC Interdisciplinary Discussions. Left: Judge’s Responsibility in the Courtroom Briefing at the Summer 2016 Meetings. Right: OSAC Members and Affiliates offer the task group’s statistical insights.

Another example of interdisciplinary discussions that yielded broader understanding on a specific topic is provided in this testimonial, “The Hidden Power of the OSAC”, from Jose Almirall, Ph.D., Chair of the Chemistry SAC and FSSB Member:

If I had known that my email to the legal resource committee (LRC) chair would end up quoted, verbatim, in a Harvard Law Review article I might have taken a few extra minutes to word it better. The power of the OSAC structure is that any of the 560+ OSAC members (plus the 250+ affiliates) have access to a unique assemblage of experts ranging from discipline-specific forensic science practitioners (and researchers in the state-of-the-art of each of the disciplines) to measurement scientists, statisticians, behavioral scientists and legal experts. Most of the OSAC membership is devoted to pursuing the primary aim: to develop and promote consensus documentary standards that ensure the use of the best science and the best practice of science in forensic casework. Much progress is being made towards the achievement of these goals, even if it is slow-going.

OSAC also provides access to communication channels that were not previously available. Several examples of the awesome power of direct communications have resulted in positive outcomes for the forensic science community, but not all necessarily translate into a consensus documentary standard as the product of the OSAC efforts.

The one example I will share is an email that I sent to the LRC chair (in my then capacity as a member of the Chemistry SAC) requesting clarification on a legal/statistical question that arose as a result of a negative vote on a standard from one of the Chemistry SAC members. The reasoning for the negative vote argued that a legal requirement had to be met by the measurement standard but this argument did not convince some of us on the SAC. The LRC issued an opinion that was later expanded into a commentary published in the Harvard Law Review [1].

I was asked permission by the author of the HLR paper, Prof. David Kaye, to use the original wording in my email, and I agreed. This opinion clarified the question at the heart of the discussion, and the Chemistry SAC was able to move on with their deliberations. The SAC approved the standard, which then moved on to the next steps in the OSAC process. There are many other examples of the power that the community of devoted and passionate members of the OSAC brings to bear on addressing the needs of the forensic science disciplines.

1. D. H Kaye, Hypothesis Testing in Law and Forensic Science: A Memorandum, Forensic Commentary Series, Harvard Law Review, March 10, 2017, 130 Harv. L. Rev. F. 127.

<https://harvardlawreview.org/2017/03/hypothesis-testing-in-law-and-forensic-science-a-memorandum/>

3.2 Standards Roadmaps, Discipline-Specific Process Maps, and Standards Analyses

A number of subcommittees such as the Friction Ridge Subcommittee and the Fire Debris & Explosives Subcommittee have developed strategic standards roadmaps that outline some or all of the following: research gaps, technical standards gaps, quality standards gaps, and other state-of-the-discipline information. It enabled the subcommittees to better prioritize their approach to standards development and promotion.

Other disciplines, such as the Bloodstain Pattern Analysis Subcommittee and the Speaker Recognition Subcommittee, analyzed and documented the technical process steps undertaken by that discipline, in order to better conceptualize and chronologically order the content in standards (see Fig. 8). These process maps will eventually be published on the subcommittee's Web pages.

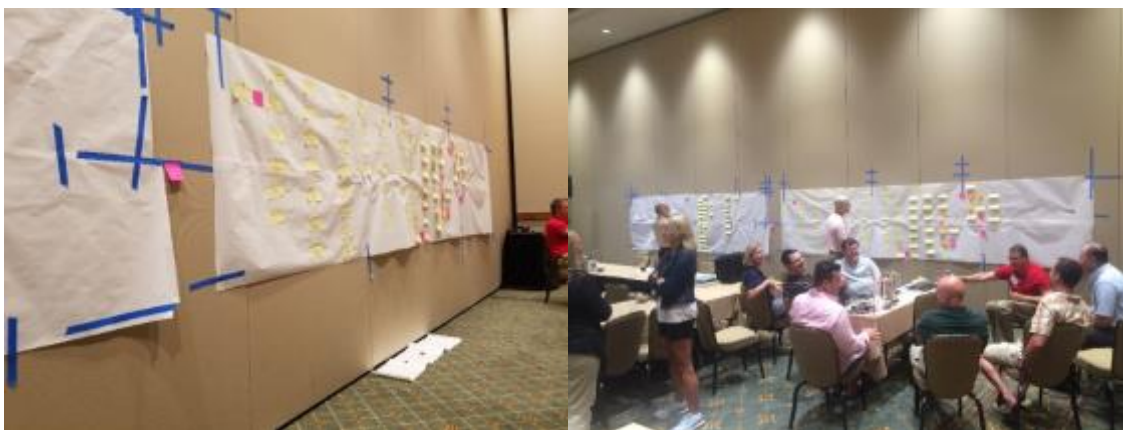


Fig. 8. OSAC members and affiliates analyze the earliest drafts of the Bloodstain Pattern Analysis Subcommittee process map during the Summer 2016 OSAC meetings.

The Toxicology Subcommittee developed an overarching OSAC process roadmap. OSAC documents currently move through the two OSAC processes: the *OSAC Working with an SDO Process* and the *OSAC Registry Approval Process of Published Standards and Guidelines*. There are also other steps that committees take while performing OSAC work. See Figure 9 for a pictorial view of the stages of review that an OSAC document goes through, as well as the anticipated timeframe a document might spend in each step.

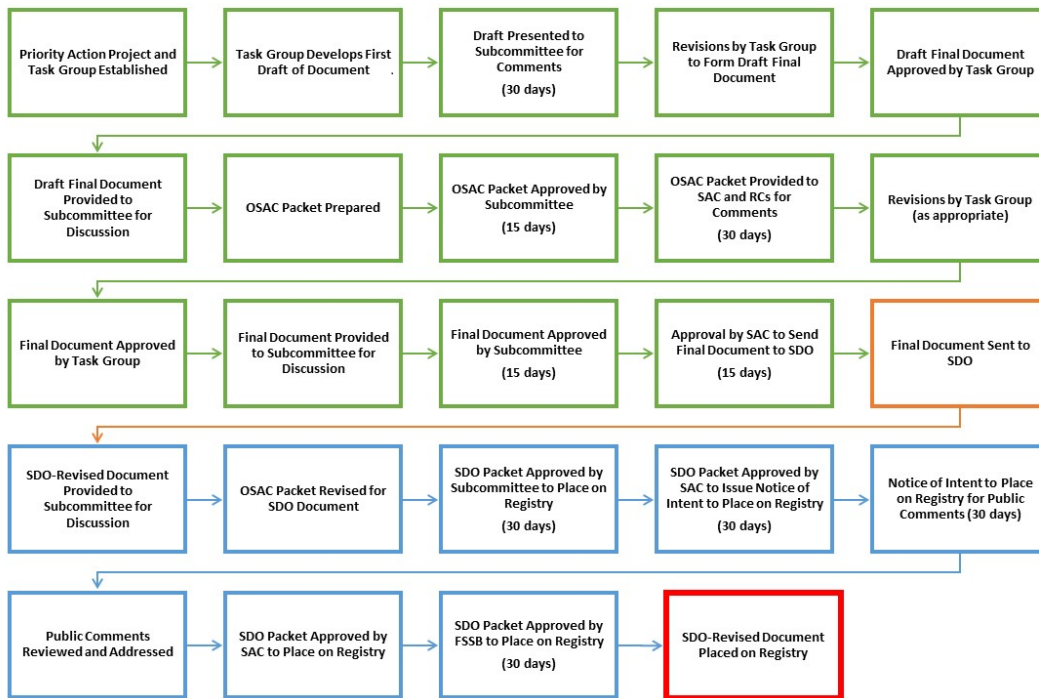


Fig. 9. The Toxicology Subcommittee developed a roadmap of the various OSAC process steps, and made the roadmap available for use by other committees.

In Fall 2016, the Geological Materials Subcommittee held a workshop on the Identification, Collection and Preservation of Soil Evidence at Crime Scenes. The workshop was held during the Joint California Association of Criminalistics (CAC)/The American Society of Trace Evidence Examiners meeting in Palm Springs, CA. The goal of the workshop was to determine whether a document that OSAC was working on was fit for its intended purpose.

The workshop was taught by members of the Geological Materials Subcommittee. Participants were provided the draft version of the subcommittee’s guideline on field collection of soils for forensic applications to read in advance of the workshop. The workshop participants received classroom training related to the guideline in the morning, and in the afternoon, they processed mock crime scenes based on the direction provided in the guideline. After the workshop, the participants provided feedback on the guideline, and changes were made to the document to address the feedback that was received.



Fig. 10. The Geological Materials Subcommittee held a workshop on the Identification, Collection and Preservation of Soil Evidence at Crime Scenes to assess the suitability of the approach. Photo Credit: CAC News.

3.3 Identifying Research and Development Needs

OSAC also recognizes that it is well-positioned to inform the community of R&D needs that are identified during standards and guidelines development and promotion. In order to share these identified research needs with the public, OSAC regularly publishes a list of recommended R&D needs that include inputs from all of the 25 subcommittees and five SACs.

These recommendations may be considered by other agencies and organizations as they develop their own priorities and solicit funding for forensic science research. In addition, funding agencies may find these recommendations to be useful as they develop new solicitations.

The process of coordinating these identified research needs was implemented in October 2015. The current list of research needs is located on the OSAC website: <https://www.nist.gov/topics/forensic-science/osac-research-development-needs>.

3.4 OSAC Posts Discipline-Specific Baseline Documents to Committee Web Pages

In December 2016, the FSSB provided the opportunity for OSAC subcommittees to identify baseline documents and reference materials that best reflect the current state of the practice within their respective disciplines. These documents contain practical information regarding these disciplines that can help forensic scientists, judges, lawyers, researchers, other interested parties and the general public to better understand the nature, scope and foundations of the individual disciplines as they are currently practiced.

The purpose of this activity is to collect and consolidate existing documents that are relevant to the forensic science community while OSAC standards and guidelines are still under development. The baseline documents are intended to represent procedures that are currently being used, and to identify a baseline from which OSAC can move forward. It is important to note that the identification of these documents in this venue does not represent an endorsement by OSAC or NIST. All copyrights for these documents are reserved by their owners. Only the listing of documents on the *OSAC Registry* constitutes an OSAC endorsement.

Additionally, OSAC posts draft documents that have been sent to SDOs and advertises when these documents become available for public review at the SDOs. OSAC also posts relevant information from resource committees.

To view these documents, visit: <https://www.nist.gov/topics/forensic-science/osac-organizational-structure>, and click on the relevant subcommittee page.

3.5 Language for Updated QAS

Under the DNA Identification Act of 1994, adherence to the FBI Quality Assurance Standards (QAS) is required for forensic DNA laboratories connected to the National DNA Index System (NDIS). Updates to the QAS are periodically made by the Scientific Working Group on DNA Analysis Methods (SWGDM).

Because there are several people on both SWGDAM and OSAC, progress in each organization can be shared across both groups. The latest revision of the QAS under consideration includes a new section on validating software (Standard 8.7). Much of the information from this new proposed QAS standard was taken from a draft OSAC document, “Best Practice Recommendations for Validation of Forensic DNA Software.” While this OSAC document is not yet released in a final form, OSAC efforts have indirectly benefited SWGDAM and the forthcoming QAS update.

4.0 OSAC Public Meetings, Public Relations, and Engagement

OSAC reports its activities to the public annually. In the February 2017 OSAC public meeting in New Orleans, LA, committees discussed the standards on the *OSAC Registry*, the 23 work items handed over to the SDOs during the previous year, and an overview of the other draft standards in progress. Some of the event’s discussion points echoed last year’s important themes (such as the need to continually place focus on technical merit, and the need to consider the influence of bias on stated opinions and conclusions), but some new discussion topics and nuances also emerged:

- Subcommittee chairs reported on the various ways they intend to address error and error management in standards. For example, the Digital Evidence Subcommittee noted that they are focusing on training and yearly proficiency exams, as well as tested and validated tools and processes, to reduce examiner error.

- Subcommittees reported continued efforts to address cognitive bias. For example, the Disaster and Victim Identification Subcommittee noted that one of the R&D needs they posted was seeking more information related to cognitive bias, particularly to assess whether/where it exists in disaster victim identification, and to solicit specific ideas for mitigation strategies in this space.
- Additional OSAC subcommittees including Dogs and Sensors, Medicolegal Death Investigation, Materials/Trace, and Footwear and Tire, reported that they plan to submit another 12 new work items to SDOs in the near term.
- International guests from a variety of countries including Australia, Canada, France, Germany, the Netherlands, South Africa, and the United Kingdom have contributed to OSAC over the past year. Their contributions and perspectives are greatly appreciated by all.



Fig. 11. Chairs Andy Smith (Firearms & Toolmarks) and Kenneth Furton (Dogs & Sensors) provide public updates at the AAFS Meeting, New Orleans, LA, February 2017.

The SACs provide public updates at other conferences relevant to their disciplines. For example:

- OSAC held public meetings at the International Association for Identification (IAI) conferences.
- OSAC representatives have published web and journal articles related to the program to create awareness and share progress.

Finally, in adherence with the OSAC charter, OSAC efforts are reported annually, most recently at the February 13-14, 2017 American Academy of Forensic Sciences (AAFS) Annual Meeting. Video recordings and slide decks of OSAC Subcommittee Priority Action Reports are available online at: <https://www.nist.gov/news-events/events/2017/02/osac-scientific-area-committees-public-status-reports-open-discussions>.

5.0 OSAC Focus in 2017/2018

OSAC will continue to improve standards across all forensic science disciplines. The organization aims to improve its processes, management and ways to work alongside the SDOs. More specifically, OSAC will work on the 218 standards and guidelines projects already underway. This section describes some other efforts that OSAC will focus on in 2017/2018.

5.1 The Forensic Science Lexicon

In 2016, the FSSB directed all SACs and subcommittees to commence a terminology review exercise for their disciplines. The purpose of this exercise was to help identify discrepancies or dual meanings for particular terms.

For example, as part of this exercise, committees identified multiple ways that the term “bias” is used, including:

- Bias: The difference between the mean of several measurements under identical conditions, to a known “true” value. It is often reported as a percent difference. (Source: Scientific Working Group for Forensic Toxicology (SWGTOX) Standard Practices for Method Validation in Forensic Toxicology)
- Bias: Preconception; prejudice; taint; partiality. Since most persons have biases, the issue is whether the bias is such that impartiality cannot be achieved and a fair outcome cannot occur. Any predisposition that a judge or arbitrator may have may be grounds for recusal. Any predisposition that a witness may have may be grounds for impeachment by cross-examination. Any predisposition that a juror may have may be grounds for excusal determined through a process known as *voir dire*. (Source: Barron's Legal Guides, Law Dictionary, Fifth Edition, Gifis, S. H.2003)
- Bias: The difference between the expectation of the test results and an accepted reference value. (Source: SWGDRUG Glossary of Terms and Definitions)
- Bias: The quantitative characterization of systematic error. (Source: Vosk, T. (2013). Measurement Uncertainty. Kirkland, WA: Elsevier Ltd.)

SACs and subcommittees sourced over 3900 terms from existing documentary standards, guidelines, textbooks, and other reference documents and sources. Some definitions were created by the OSAC subcommittees.

Work is now underway to make the full lexicon available to the public. It is OSAC’s hope that the first edition of the lexicon will help stakeholders determine which terms could use further clarification, both within and between disciplines. OSAC will update the lexicon quarterly, with the ultimate goal of encouraging a common vocabulary across forensic science, where possible, and to clearly identify differences where necessary.

5.2 “Foundations” Task Group Report

The FSSB is developing a foundational exercise for OSAC that will help capture the current state of each forensic science discipline to include considerations such as method validation, measurements, traceability, reporting, potential for bias, error rate calculations, and other considerations. The report is currently a draft, undergoing internal OSAC review.

6.0 Final Words

OSAC has made great strides to help achieve and develop technically valid and consensus-based standards and guidelines, spanning 25 forensic disciplines. With over 800 members and affiliates, representing key stakeholder groups, including practitioners, laboratory managers, academic researchers, measurement scientists, statisticians, human factors experts, accreditation and standards development experts, attorneys and judges, the organization will continue to find ways to improve its operations and to be transparent to the entire forensic science community.



Fig. 12. Clockwise from top left: Robyn Ragsdale leads an OSAC meeting; Mark Stolorow and Jeremy Triplett at the resource committee meeting; Kim Murga provides a public update; the Bloodstain Pattern Analysis Subcommittee conducts process mapping, Sandra Rodriguez-Cruz leads a subcommittee meeting.

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7.0 Appendix: OSAC Projects List

Within the tables in this section, an abbreviation of “**SDO**” means a standard or guideline has reached a stage in the *OSAC Working with an SDO Process*, and an “**RA**” means a standard or guideline is routing through the *OSAC Registry Approval Process of Published Standards and Guidelines*.

Subcommittee	Document Title	OSAC Process Step
Anthropology	Best Practice Recommendation for Facial Approximation in Forensic Anthropology	SDO
	Standard for Age Estimation in Forensic Anthropology	SDO
	Standard for Methods Selection and Validation in Forensic Anthropology	SDO
	Standard for Sex Estimation in Forensic Anthropology	SDO
	Standard for Stature Estimation from Human Remains	SDO
	Standard Guide for Archaeology/Anthropology Scene Detection and Processing	SDO
	Technical Report: Glossary for Forensic Anthropology	SDO
	Training and Competency in Forensic Anthropology	SDO

Subcommittee	Document Title	OSAC Process Step
Biological Data Interpretation & Reporting	Formulating Propositions for Likelihood Ratios	SDO
	Interpretation Protocol Self-Evaluation	SDO
	Standards for Determining Analytical and Stochastic Thresholds	SDO
	Standards for Forensic DNA Interpretation and Comparison Protocols	SDO
	Standards for Reporting DNA Conclusions	SDO
	Standards for Reporting DNA Results Containing a Contaminant or Associated with a Failed Control	SDO
	Statistical Interpretation	SDO
	Training Standards for DNA Data Interpretation (autosomal and Y; includes testimony and CODIS training)	SDO

Subcommittee	Document Title	OSAC Process Step
Biological Methods	Best Practices for Assessing Educational Requirements for Forensic DNA Analysts	SDO
	Standard for Forensic DNA Analysis Training Programs	SDO
	Standard for Training of Forensic DNA Isolation and Purification Methods	SDO
	Standards for Internal Validation of DNA Analysis Methods	SDO
	Standards for the Validation of Serological Methods	SDO
	Training Standard for Forensic Human mtDNA Analysis and Interpretation	SDO

Subcommittee	Document Title	OSAC Process Step
Bloodstain Pattern Analysis	Bloodstain Pattern Analysis Terminology	SDO
	Development of Bloodstain Pattern Analysis Taxonomy	SDO
	Development of Conclusion Statements for Bloodstain Pattern Identifications	SDO
	Development of Conclusion Statements for Bloodstain Pattern Reconstructions	SDO
	Guidelines for a Bloodstain Pattern Analysis Certification Program	SDO
	Guidelines for a Quality Assurance Program in Bloodstain Pattern Analysis	SDO
	Guidelines for Developing Standard Operating Procedures for Bloodstain Pattern Analysis	SDO
	Guidelines for Proficiency Testing in Bloodstain Pattern Analysis	SDO
	Guidelines for Report Writing in Bloodstain Pattern Analysis	SDO
	Guidelines for the Minimum Education and Training Requirements For Bloodstain Pattern Analysts	SDO
Guidelines for the Validation of New Procedures in Bloodstain Pattern Analysis	SDO	

Subcommittee	Document Title	OSAC Process Step
Digital Evidence	ASTM 3016-15: Establishing Confidence in Digital Forensics Results by Error Mitigation Analysis	Registry Approval
	ASTM E2678-09: Standard Guide for Education and Training in Computer Forensics	Registry Approval
	Best Practices for Preservation, Isolation, Acquisition of Mobile and other Embedded Systems	SDO
	Forensic Audio Examination	SDO
	Forensic Audio Retrieval	SDO
	Forensic Audio Workflow	SDO
	Framework of a Quality Management System for Digital and Multimedia Evidence Forensic Science Service Practitioners	SDO

Subcommittee	Document Title	OSAC Process Step
Disaster Victim Identification	Forensic Anthropology in Disaster Victim Identification: Standard Practices for the Medicolegal Authority (DVI Anthropology)	SDO
	Human Identification by Comparative Dental Analysis in Disaster Victim Identification	SDO
	Mass Fatality Incident Data Management: Standard Practices for the Medicolegal Authority (DVI Data)	SDO
	Mass Fatality Incident Scene Processing: Standard Practices for the Medicolegal Authority (DVI Scene)	SDO
	Postmortem Impression Submission Strategy for Comprehensive Searches of Essential Automated Fingerprint Identification System Databases (DVI Print)	SDO
	Standard Practices for DNA Analysis for Human Identification in Mass Fatality Incidents (DVI DNA)	SDO
	Standard Practices for Mass Fatality Incident Management	SDO
	Standard Practices for the Forensic Pathologist in the Disaster Victim Identification Context (DVI Pathology)	SDO

Subcommittee	Document Title	OSAC Process Step
Dogs and Sensors	General Guidelines	SDO
	Pre-Scented Aged Trails	SDO
	Pre-Scented Location Checks	SDO
	Selection of Handlers/Career Field Progression	SDO
	Terminology	SDO
	Tracking/Trailing People Based on Last Known Position	SDO

Subcommittee	Document Title	OSAC Process Step
Facial Identification	Capture and Equipment Assessment For Face Recognition Systems	SDO
	Facial Image Comparison Feature List for Morphological Analysis	SDO
	Facial Recognition System Bulk Data Transfer	SDO
	Facial Recognition System Methods and Techniques	SDO
	Factors Affecting Visualization of Facial Images	SDO
	Factors To Consider in Facial Image Assessment	SDO
	Guidelines for Facial Comparison Methods & Facial Comparison Overview	SDO
	Guidelines for Postmortem Facial Image Capture	SDO
	Guidelines for Training Program in Facial Comparison	SDO
	Image Processing to Improve Facial Recognition Searches	SDO
	Metadata Usage	SDO
	Post Capture Factors Affecting Facial Image	SDO
	Reporting and Presenting Facial Identification Results	SDO

Subcommittee	Document Title	OSAC Process Step
Fire & Explosion Investigation	NFPA 921: Guide for Fire and Explosion Investigations, 2014 Edition	On Registry
	NFPA 1033: Standard for Professional Qualifications for Fire Investigator, 2014 Edition	On Registry
	Standard for Fire and Explosion Investigation Units	SDO

Subcommittee Fire Debris & Explosives	Document Title	OSAC Process Step
	ASTM E1386-15: Standard Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Solvent Extraction	SDO-Published
	ASTM E1388-12: Standard Practice for Sampling of Headspace Vapors from Fire Debris Samples	SDO
	ASTM E1412-12: Standard Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration With Activated Charcoal	SDO-Published
	ASTM E1413-13: Standard Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Dynamic Headspace Concentration	SDO
	ASTM E1618-14: Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry	SDO
	ASTM E2451-13: Standard Practice for Preserving Ignitable Liquids and Ignitable Liquid Residue Extracts from Fire Debris Samples	Registry Approval
	ASTM E2881-13e: Standard Test Method for Extraction and Derivatization of Vegetable Oils and Fats from Fire Debris and Liquid Samples with Analysis by Gas Chromatography-Mass Spectrometry	Registry Approval
	Case File Review	SDO
	Method Validation	SDO
	Standard Guide for a Systematic Approach to the Analysis and Identification of Ignitable Liquids in Fire-Related Samples	SDO
	Standard Guide for the Forensic Examination and Identification of Intact Explosives	SDO
	Standard Practice for Quality Assurance of Laboratories Performing Analysis of Ignitable Liquids and Ignitable Liquid Residues	SDO
	Standard Practice for Reporting Results and Opinions of Explosives Analysis	SDO
	Standard Practice for Reporting Results and Opinions of Fire Debris Analysis	SDO
	Standard Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Active Headspace Concentration onto an Adsorbent Tube	SDO
	Standard Terminology Relating to the Examination of Explosives	SDO
	Standard Terminology Relating to the Examination of Fire Debris	SDO

Subcommittee	Document Title	OSAC Process Step
Firearms and Toolmarks	3D Measurement Hardware and Measurement Quality Control	SDO
	Criteria for Elimination	SDO
	Evaluation of Subclass Characteristics	SDO
	Examination Documentation	SDO
	Guidelines for Barrel and Overall Length Measurements for Firearms	SDO
	Implementation of 3D Technologies in Forensic Laboratories	SDO
	Minimum Qualifications for Firearm and Toolmark Examiner	SDO
	Minimum Qualifications for Firearm and Toolmark Examiner Trainee	SDO
	Required Material/Modules of Instruction for Firearm and Toolmark Examiner in Training	SDO
	Standard for Criteria for Identification	SDO
	Standard Guideline/Best Practice for the Safe Handling of Firearms and Ammunition	SDO
	Standard Test Method for Function/Operability Testing of Firearms	SDO
	Standard Test Method for Measuring Barrel and Overall Length of Firearms	SDO
	Standard Test Method for Measuring Trigger Pull of Firearms	SDO
	Standard Test Method for the Physical Examination and Classification of Firearms	SDO
	Topography Analysis and Comparison Software for Toolmarks	SDO
	Uncertainty for B/OL Measurement	SDO
	Verification of ID & Elimination	SDO

Subcommittee	Document Title	OSAC Process Step
Footwear and Tire	Chemical Enhancements of Footwear and Tire Impressions	SDO
	Forensic Documentation and Photography of Footwear and Tire Impressions at the Crime Scene	SDO
	Guideline for the Preparation of Test Impressions from Footwear and Tires	SDO
	Scope of Work and Minimum Qualifications and Training for Footwear and Tire Examiner	SDO
	Terminology for Footwear and Tire Impressions	SDO

Subcommittee	Document Title	OSAC Process Step
Forensic Document Examination	Scope of Expertise in Forensic Document Examination	SDO
	Standard for Examination of Alterations and Obliterations	SDO
	Standard for Examination of Handwritten Items	SDO
	Standard for Examination of Indented Writing	SDO
	Standard Guide for Minimum Training Requirements for Forensic Document Examiners	Registry Approval
	Standard Terminology Relating to The Examination of Questioned Documents	SDO

Subcommittee	Document Title	OSAC Process Step
Friction Ridge	ACE-V Process Map	SDO
	Best practices for maximizing the use of AFIS and automated comparison workflows	SDO
	Guideline for the Articulation of the Decision-Making Process Leading to an Expert Opinion of Source Identification in Friction Ridge Examinations	SDO
	Standard for reporting qualitative source conclusions	SDO
	Standard for the examination of friction ridge evidence	SDO
	Standard for training to competency to perform friction ridge examination	SDO
	Terminology related to friction ridge examination	SDO

Subcommittee	Document Title	OSAC Process Step
Geological Materials	Standard Guide for Elemental Analysis of Soil Evidence	SDO
	Standard Guide for Microscopy of Soil Evidence	SDO
	Standard Guide for the Collection of Soils and Other Geological Evidence for Forensic Applications	SDO
	Standard Guide for the Color Determination of Soil Evidence	SDO
	Standard Guide for the Forensic Analysis of Soil	SDO
	Standard Guide for the Fractionation of Soil Evidence	SDO
	Standard Guide for X-Ray Diffraction Analysis of Soil Evidence	SDO

Subcommittee	Document Title	OSAC Process Step
Gunshot Residue	ASTM E620-17: Standard Practice for Reporting Opinions of Scientific or Technical Experts	Registry Approval
	ASTM E1588-16(b): Standard Guide for Gunshot Residue Analysis by Scanning Electron Microscopy/Energy Dispersive X-Ray Spectrometry	SDO
	Gunshot Residue Testimony	SDO
	Gunshot Residue Training Guide	SDO
	Methodology, Research, and Literature Review	SDO
	Organic Gunshot Residue Methodology, Instrumentation and Acceptability	SDO
	Report Writing, Qualifying Statements and Interpretation	SDO
	Task-Irrelevant Information when Considering Cognitive and Contextual Bias in GSR Analysis	SDO

Subcommittee	Document Title	OSAC Process Step
Materials/Trace	ASTM E1610: Standard Guide for Forensic Paint Analysis and Comparison	Registry Approval
	ASTM E1967: Standard Test Method for the Automated Determination of RI of Glass Samples	Registry Approval
	ASTM E2224: Standard Guide for Forensic Analysis of Fibers by IR Spectroscopy	Registry Approval
	ASTM E2225: Standard Guide for Forensic Examination of Fabrics and Cordage	Registry Approval
	ASTM E2227: Standard Guide for the Forensic Examination of Non-Reactive Dyes in Textile Fibers by Thin-Layer Chromatography	Registry Approval
	ASTM E2228: Standard Guide for Microscopic Examination of Textile Fibers	Registry Approval
	ASTM E2330: Standard Test Method ICP-MS for glass	Registry Approval
	ASTM E2808: Standard Guideline for using MSP for forensic paint examinations	Registry Approval
	ASTM E2809: Standard Guideline for Using SEM/EDS in Forensic Paint Examinations	Registry Approval
	ASTM E2926: Standard Test Method XRF for glass	Registry Approval
	ASTM E2927: Standard Test Method LA-ICP-MS for glass	Registry Approval
	ASTM E2937: Standard Guide for using Infrared Spectroscopy in Forensic Paint Examinations	Registry Approval
	ASTM E3085: Standard Guide for using Infrared Spectroscopy in Tape Examinations	Registry Approval
	Forensic Human Hair Examination Guidelines	SDO
	Paint Training Document	SDO
	Standard Practice for Forensic Human Hair Examination Training	Registry Approval
	Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials	SDO
	Tape General Guide	SDO
Tape Training Document	SDO	

Subcommittee	Document Title	OSAC Process Step
Medicolegal Death Investigation	A Guide to Death Scene Investigation	Registry Approval
	Competent Medicolegal Death Investigation	SDO
	Forensic Autopsy Performance Standards	Registry Approval
	Guidelines for Communication with Next of Kin During Medicolegal Death Investigation	Registry Approval
	Standards for Interactions Between Medical Examiner/Coroner Offices and Organ and Tissue Procurement Organizations and Eye Banks	Registry Approval
	Sudden, Unexplained Infant Death Investigation: Guidelines for the Scene Investigator	Registry Approval
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Subcommittee	Document Title	OSAC Process Step
Odontology	ADA Technical Report No. 1077: Human Chronological Age Range Estimation by Comparative Tooth Development Analysis	SDO
	ADA Technical Report No. 1088: Human Identification by Comparative Dental Analysis	SDO-Published
	ANSI/ADA Standard No. 1058: Forensic Dental Data Set	SDO
	Bitemark Standards and Guidelines	SDO
	Human Abuse Oral/Peri-oral Injury	SDO
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Subcommittee	Document Title	OSAC Process Step
Seized Drugs	ASTM E1968-11: Standard Guide for Microcrystal Testing in Forensic Analysis of Cocaine	SDO
	ASTM E1969-11: Standard Guide for Microcrystal Testing in Forensic Analysis of Methamphetamine and Amphetamine	SDO
	ASTM E2125-11: Standard Guide for Microcrystal Testing in Forensic Analysis of Phencyclidine and Its Analogues	SDO
	ASTM E2326-14: Standard Practice for Education and Training of Seized-Drug Analysts	Registry Approval
	ASTM E2327-15: Standard Practice for Quality Assurance of Laboratories Performing Seized-Drug Analysis	Registry Approval
	ASTM E2548-11: Standard Guide for Sampling Seized Drugs for Qualitative and Quantitative Analysis	On Registry
	ASTM E2764-11: Standard Practice for Uncertainty Assessment in the Context of Seized-Drug Analysis	SDO
	ASTM E2882-12: Standard Guide for Analysis of Clandestine Drug Laboratory Evidence	Registry Approval
	Standard Guide for the Interpretation of GC-MS Data of Seized Drugs	SDO

Subcommittee	Document Title	OSAC Process Step
Speaker Recognition	Forensic Speaker Recognition Should-Be Process Map	SDO
	Guidelines for Electronic Transmission of Speech Files	Registry Approval
	Speech Collection Guideline for Speaker Recognition: Audio Collection at a Temporary Location	Registry Approval
Subcommittee	Document Title	OSAC Process Step
Toxicology	Guideline for Specimen Collection and Storage in Forensic Toxicology	SDO
	Guidelines for Accrediting Bodies of Forensic Toxicology Laboratories	SDO
	Guidelines for Education and Training in Forensic Toxicology Laboratories	SDO
	Guidelines for Opinions and Testimony in Forensic Toxicology	SDO
	Standard for Blood Alcohol Calculations	SDO
	Standard for Breath Alcohol Instrumentation Specifications	SDO
	Standard for Breath Alcohol Measuring Instrument Calibration	SDO
	Standard for Content of Forensic Toxicology Standard Operating Procedures	SDO
	Standard for Identification Criteria for Analytes in Forensic Toxicology	SDO
	Standard for Mass Spectral Data in Forensic Toxicology	SDO
	Standard for Minimum Testing Requirements in Forensic Toxicology	SDO
	Standard for Proficiency Testing in Forensic Toxicology	SDO
	Standard for Report Content in Forensic Toxicology	SDO
	Standard for Uncertainty of Measurement in Forensic Toxicology	SDO
	Standard Practices for a Quality Control Program in Forensic Toxicology Laboratories	SDO
Standard Practices for Measurement Traceability in Forensic Toxicology	SDO	
Standard Practices for Method Validation in Forensic Toxicology	SDO	

Subcommittee	Document Title	OSAC Process Step
Video/Imaging Technology & Analysis	ASTM E2825-12: Standard Guide for Forensic Digital Image Processing	Registry Approval
	Guidelines for Data Retrieval from Digital Video Recorders (DVR)	SDO
	Guidelines for the Forensic Use of Photogrammetry	SDO
	Guidelines of Video Analysis	SDO
	Latent Print Evidence Photography	SDO
	Standards for Image Authentication	SDO
	Training Guidelines for Video Analysis, Image Analysis and Photography	SDO

Subcommittee	Document Title	OSAC Process Step
Virtual Subcommittee	ACE Process Map	SDO
	ANSI/NIST-ITL 1-2011 Standard	On Registry
	ISO 17020: Conformity Assessment - Requirements for the Operation of Various Types of Bodies Performing Inspection	On Registry
	ISO 17025: General Requirements for the Competence of Testing and Calibration Laboratories	On Registry
	Presenting Evidence in Court	SDO
	Reporting Findings	SDO
	Standard for Expressing Source Conclusions	Technical Pub
	Standard Terminology for Digital and Multimedia Evidence Examination	Registry Approval
	Training, Continuing Education & Professional Development	SDO
Subcommittee	Document Title	OSAC Process Step
Wildlife	Wildlife Forensics DNA Standards	SDO
	Wildlife Forensics Methods – Sampling of Reference Samples	SDO
	Wildlife Forensics Validation Standards – Sequencing	SDO
	Wildlife Forensics Validation Standards – STR Analysis	SDO