OSAC- Trace Materials Subcommittee Update (as of September 2018)

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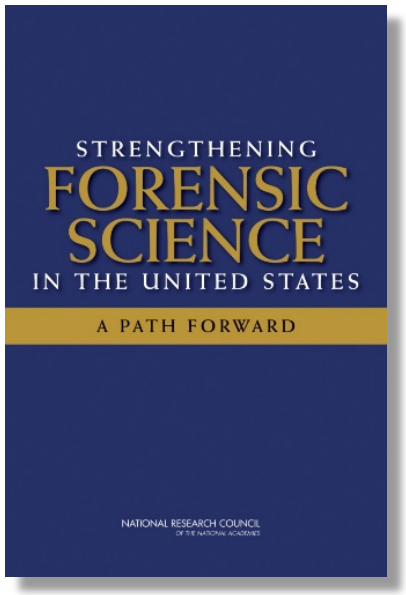
ENFSI 24th EPG Annual Meeting, Pontoise, France
Steering Committee Meeting,
September 17th, 2018

Agenda

- Background & Origin of OSAC
- OSAC Objective & Registry
- Materials/Trace Subcommittee Overview

2009 NAS Report



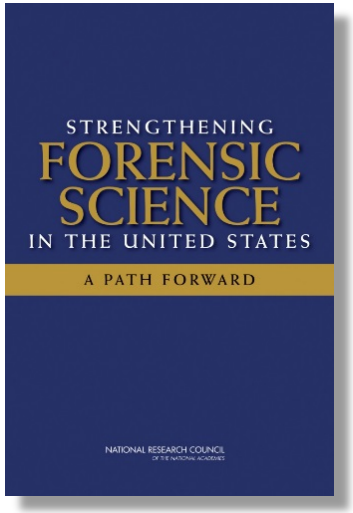
"The forensic science disciplines . . . [t]oo often have inadequate educational programs, and they **typically lack mandatory and enforceable standards**, founded on rigorous research and testing, certification requirements, and accreditation programs." (p.14)

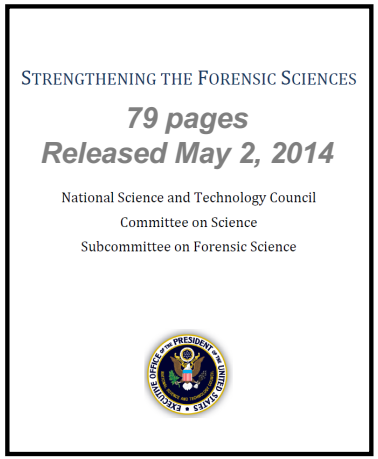
Forensic Science Realignment

- NAS report – Feb 2009

- White House Subcommittee on Forensic Science (SoFS) – July 2009 to Dec 2012

- **DOJ/NIST Partnership**
  - **NCFS** (National Commission on Forensic Science)
  - **OSAC** (Organization of Scientific Area Committees)





http://www.whitehouse.gov/sites/default/files/microsites/ostp/NSTC/strengthening_the_forensic_sciences_may_-_2014.pdf

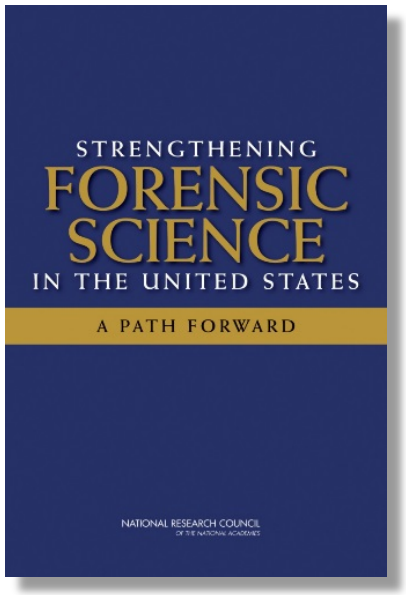
National Institute of Standards and Technology (NIST)

***Unique Mission within the Federal Government* ...**

to promote U.S. innovation and industrial competitiveness by advancing **measurement science, standards, and technology** in ways that enhance economic security and improve our quality of life.

- **Deep research expertise underpins technological innovation** – e.g., new materials, advanced clinical diagnostics and therapies, advanced communications, **forensic science** etc.
- **Non-regulatory status** enables an important role as a convener that facilitates collaboration between agencies of the Federal Government, industry, private organizations, and state and local governments

2009 NAS Report

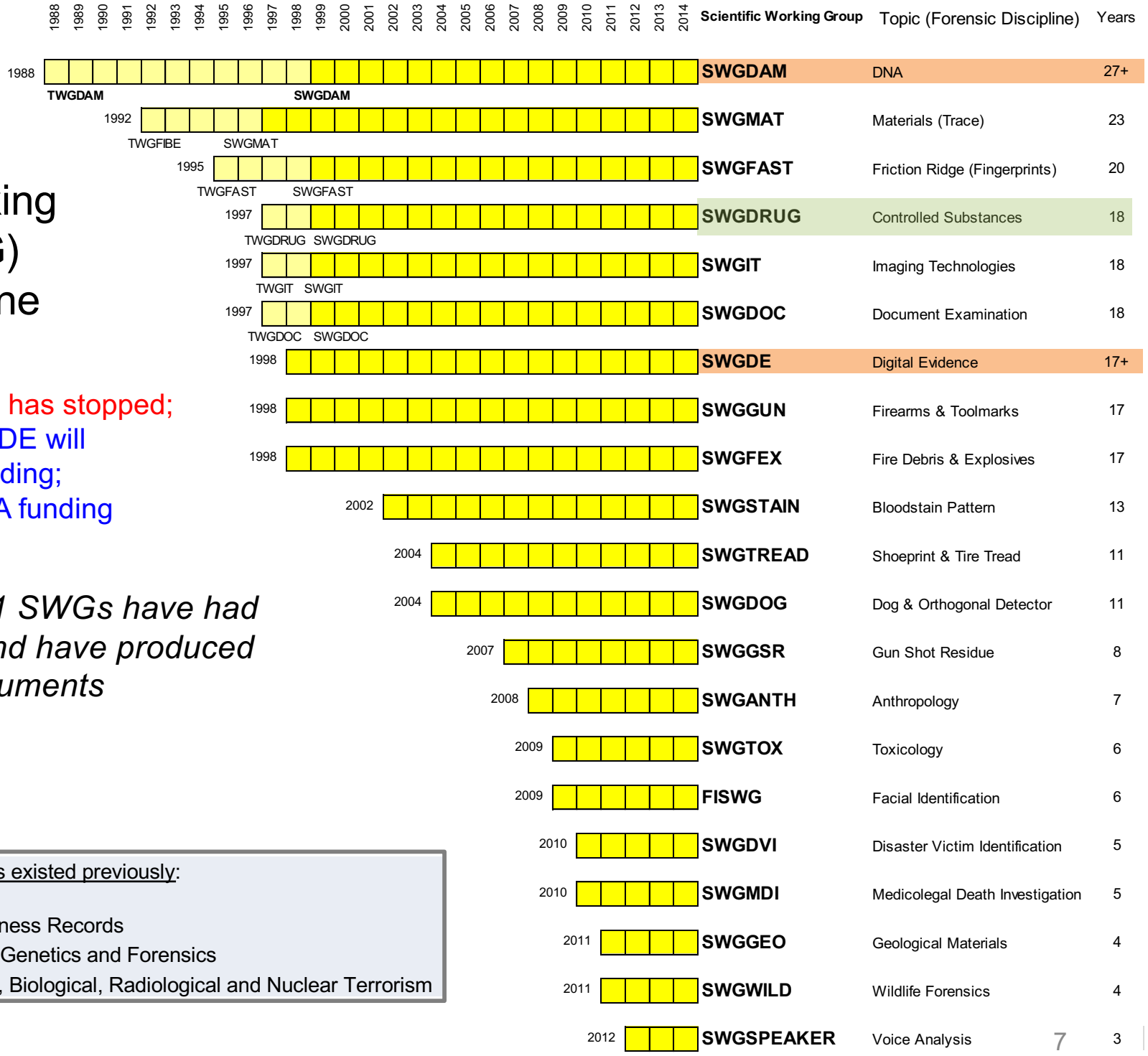


"The forensic science enterprise also is hindered by its **extreme disaggregation**—marked by multiple types of practitioners with different levels of education and training **and different professional cultures and standards for performance** and a reliance on apprentice-type training and a guild-like structure of disciplines, which work against the goal of a single forensic science profession." (p.15)

Scientific Working Group (SWG) History Timeline

NIJ funding of SWGs has stopped;
SWGDAM and SWGDE will continue with FBI funding;
SWGDRUG with DEA funding

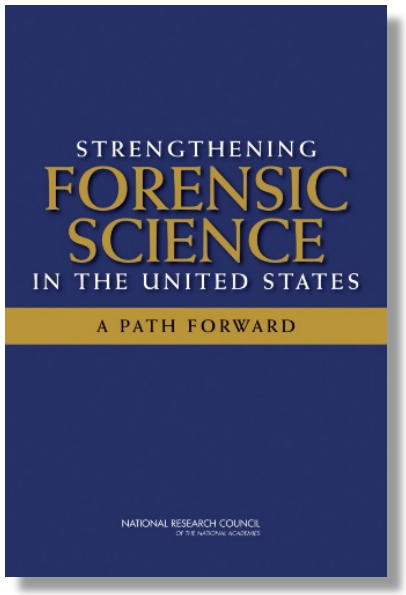
Collectively these 21 SWGs have had >750 participants and have produced >250 documents



At least three other SWGs existed previously:

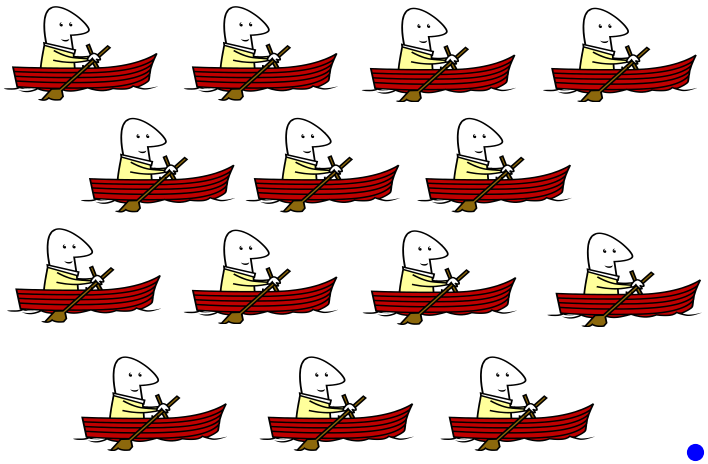
SWGIBRA	Illicit Business Records
SWGMGF	Microbial Genetics and Forensics
SWGCBRN	Chemical, Biological, Radiological and Nuclear Terrorism

2009 NAS Report



"The efforts of these groups are laudable. However, . . . it is not clear how [they] interact or the extent to which they share requirements, standards, or policies. Thus, there is a need for more consistent and harmonized requirements." (p.16)

Individual Standards Development Effort vs. Organized Effort



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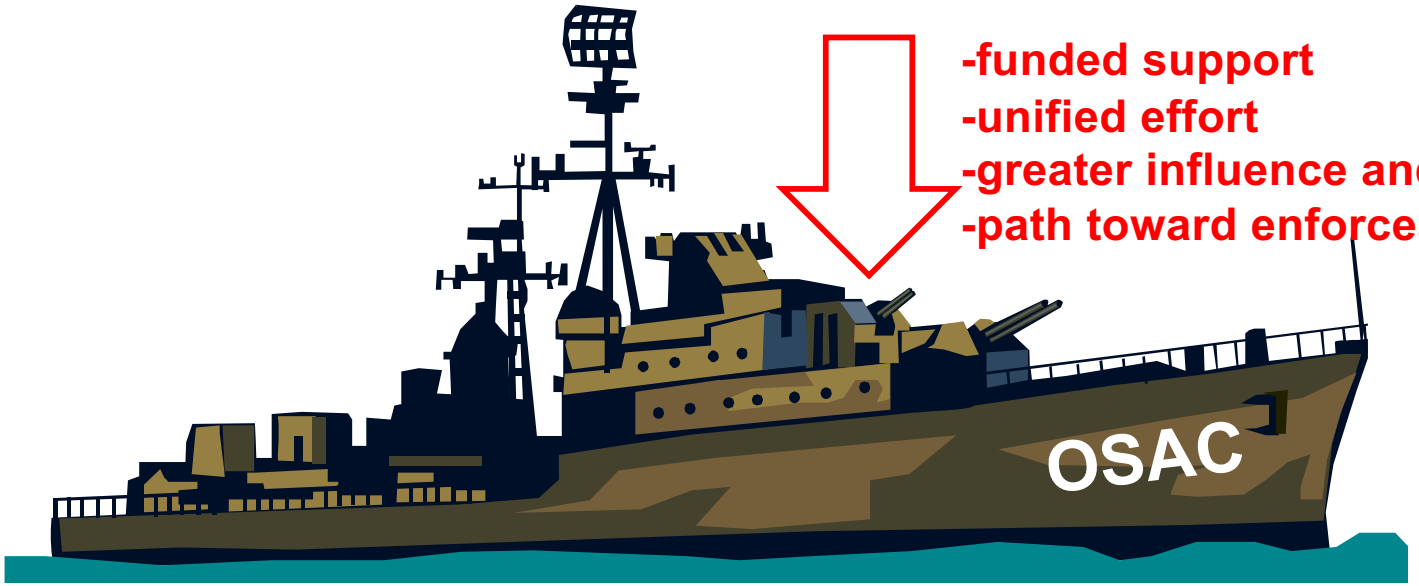
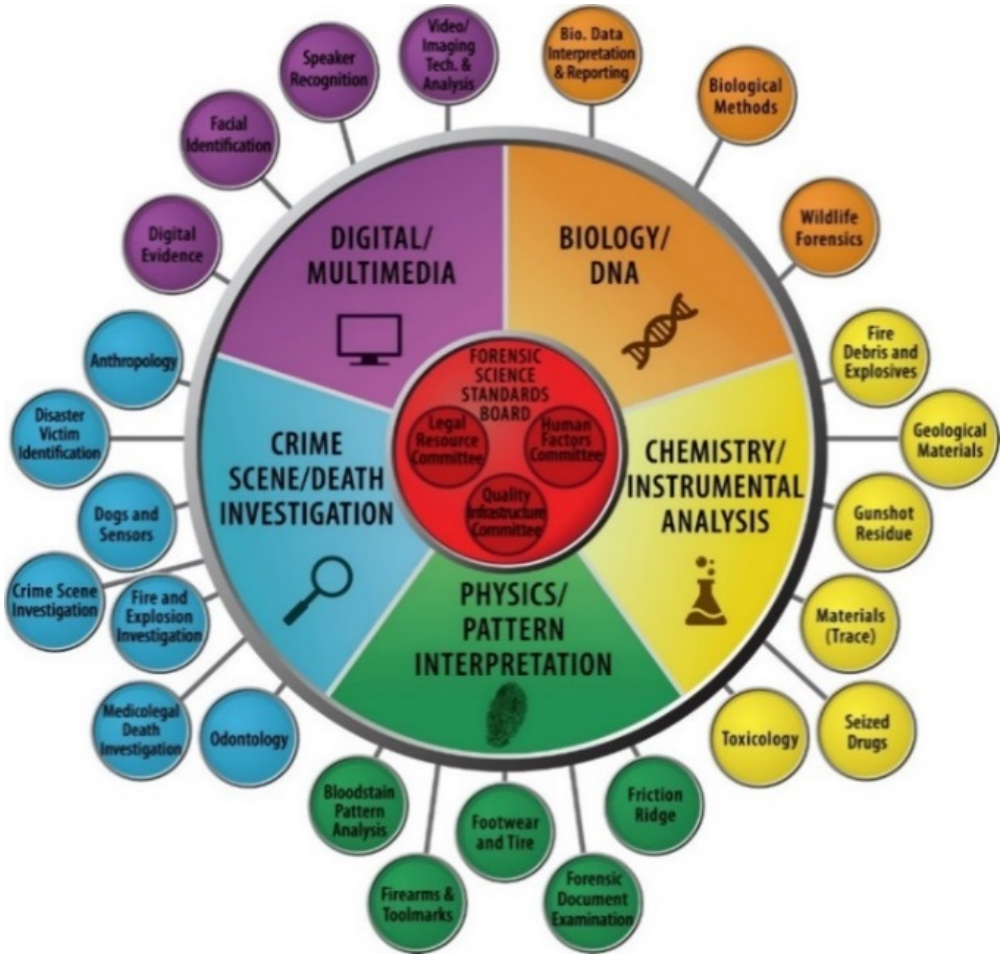


-funded support
-unified effort
-greater influence and impact
-path toward enforceable standards

OSAC Objective and Structure

To create a sustainable organizational infrastructure dedicated to identifying and fostering the development of technically sound, **consensus-based documentary standards and guidelines** for widespread adoption throughout the forensic science community

NIST devised a multi-level organization, the OSAC, consisting of five Scientific Area Committees (SACs) and 25 Subcommittees which report to a Forensic Science Standards Board (FSSB).



OSAC Membership

OSAC's **560+ members** and **266+ affiliates** consist of forensic science practitioners, researchers, educators, Q&A managers, attorneys, and judges; and are employed by Federal, state, and local governments as well as industry and academia.

OSAC Snapshot

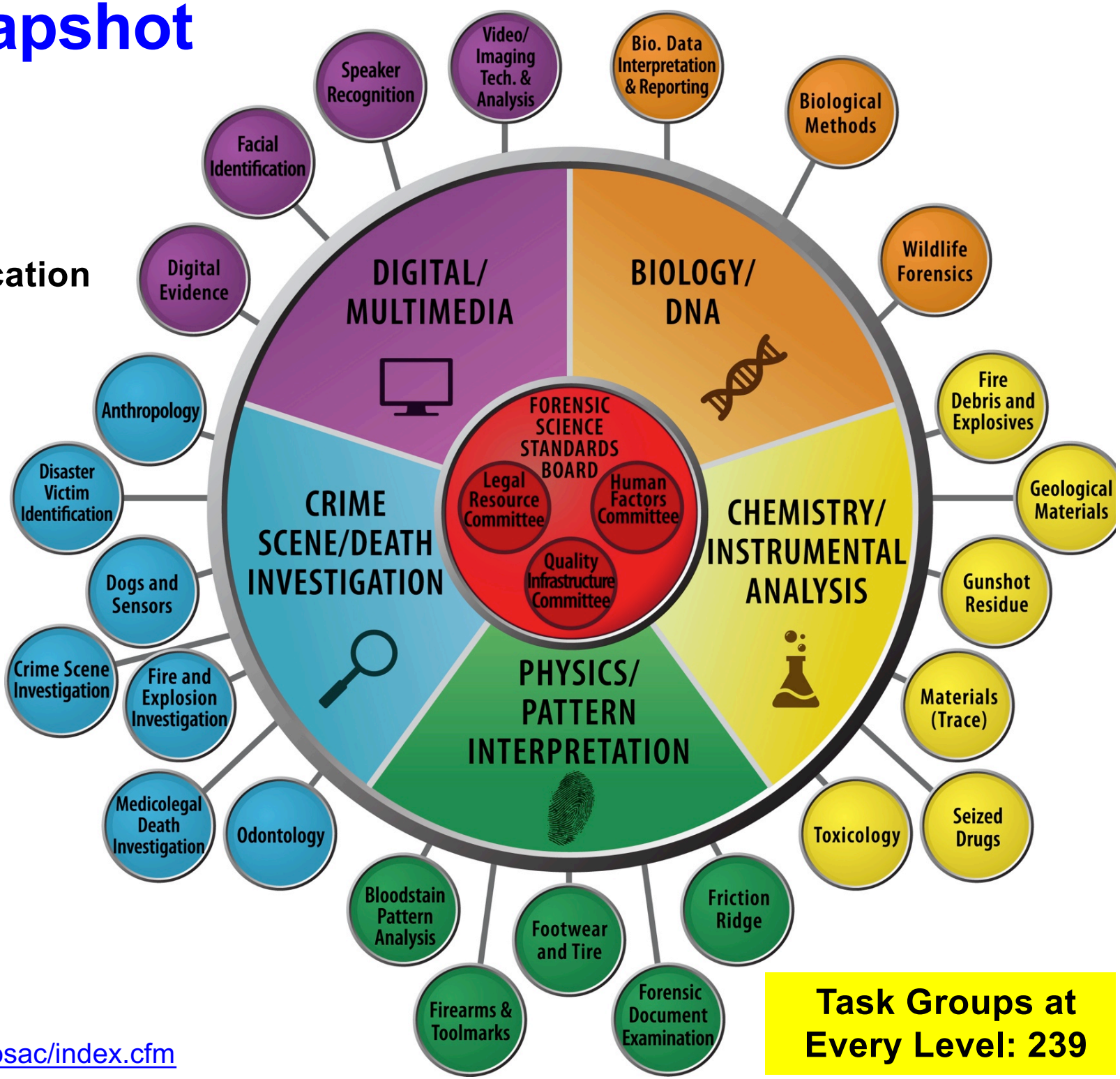
1/10/2017 Status:
565 Members
266+ Affiliates
2431 Applications

Employer Classification

Academic: 18%
Federal: 24%
FFRDC: 1%
Local: 19%
Private: 16%
State: 21%

Job Classification

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



Task Groups at Every Level: 239

http://nist.gov/forensics/osac/index.cfm

What OSAC Really Does

- OSAC evaluates existing standards published by SDOs for placement on the OSAC Registry

AND

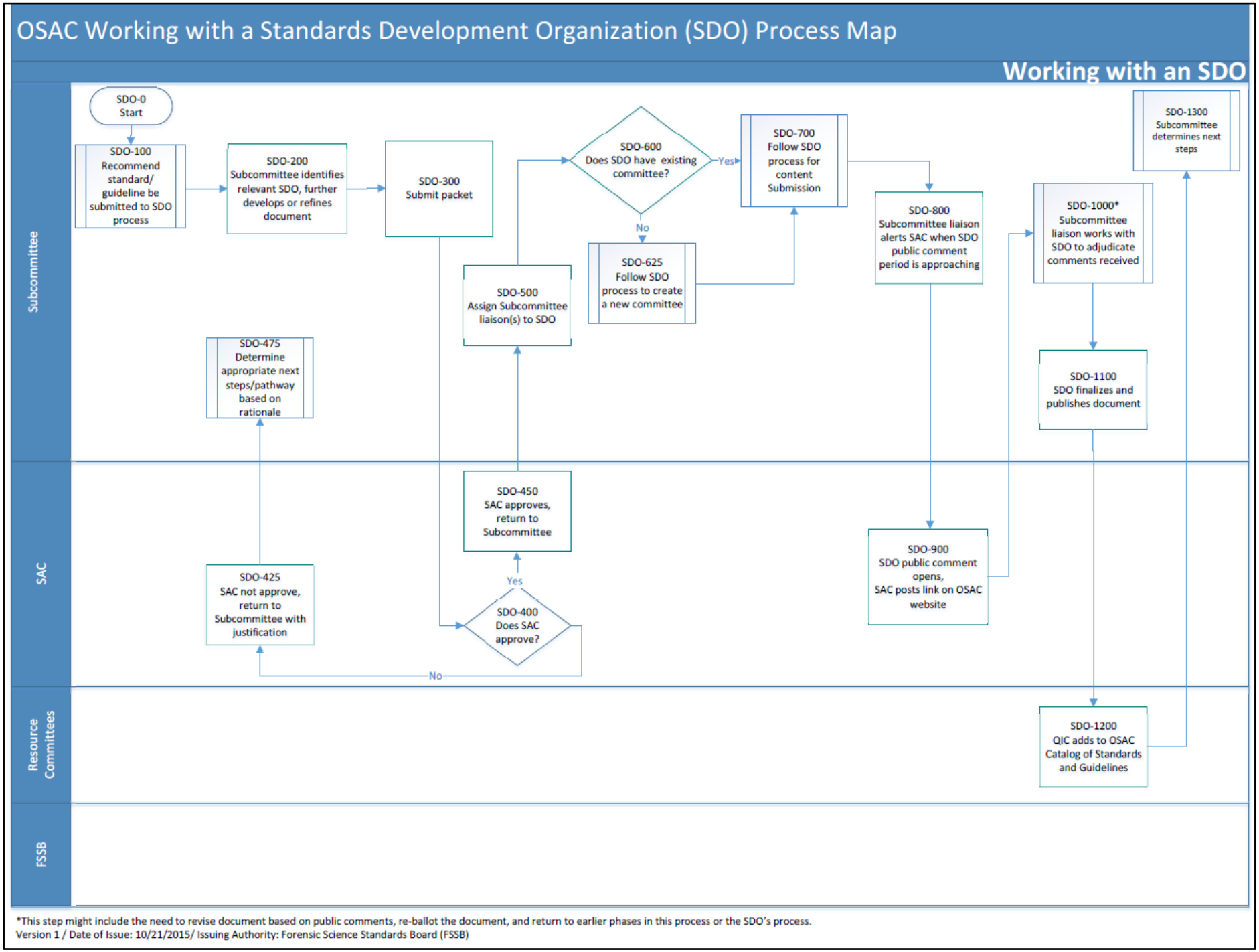
- OSAC introduces draft documents into existing SDOs for formal development – drafts go through SDO's consensus process
- SDO publishes the new or revised standard
- OSAC evaluates if standard meets OSAC technical & process requirements
- OSAC approves standard for placement on the OSAC Registry

NOTE: OSAC does **not** publish standards

Where Public Impacts the Process: OSAC

- OSAC Mandatory Public Comment Process
  - OSAC Standards/Guidelines – once a Scientific Area Committee (SAC) determines a standard/guideline has technical merit and has followed a reasonable standards development process – they vote to post a "*Notice of Intent*" to add the document to an OSAC Registry.
  - 30 day public comment period opens (**Submit your comment**)
  - Subcommittee will adjudicate public comments
  - Also an appeals process

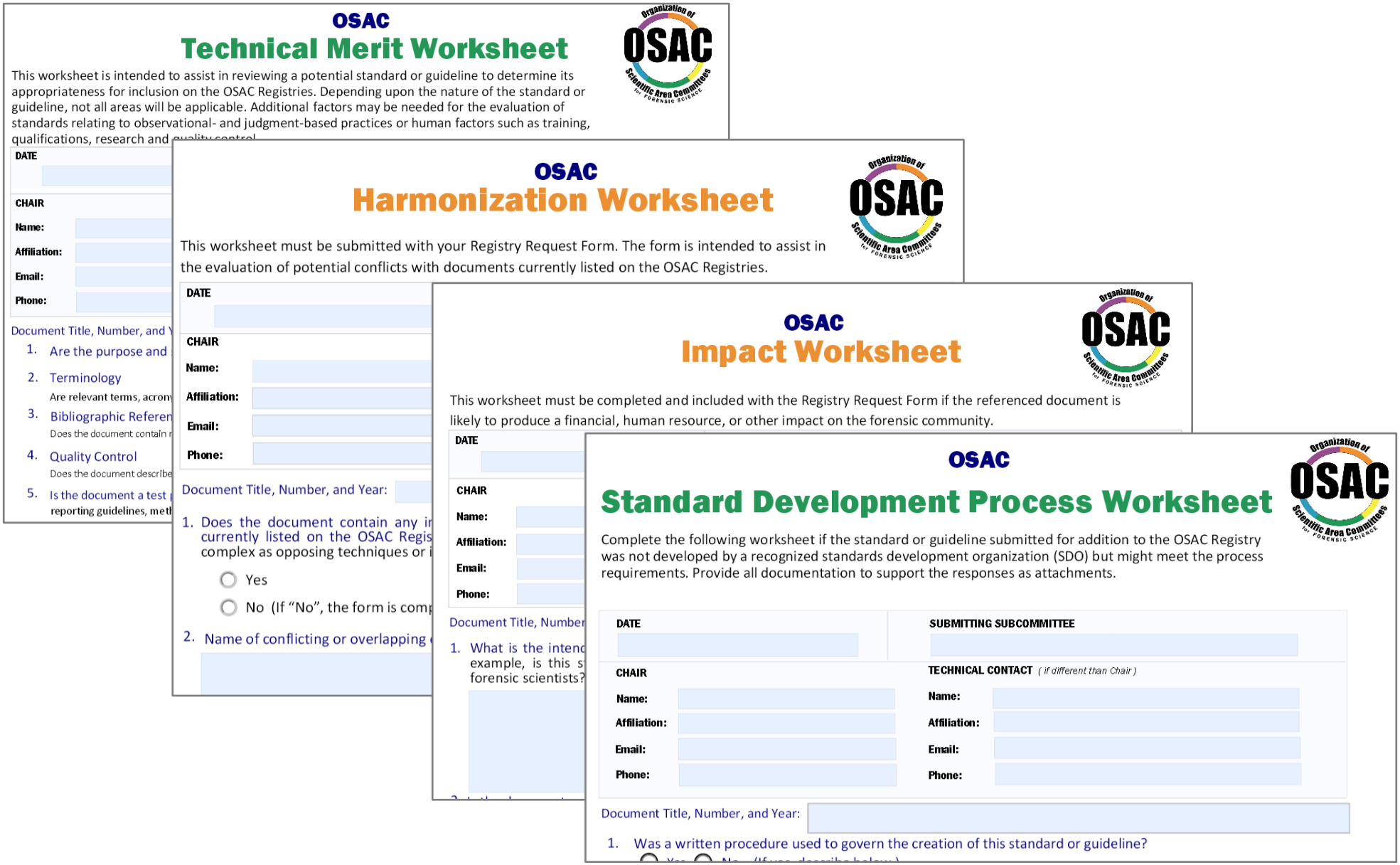
OSAC's Working with an SDO Process



*This step might include the need to revise document based on public comments, re-ballot the document, and return to earlier phases in this process or the SDO's process.

Version 1 / Date of Issue: 10/21/2015/ Issuing Authority: Forensic Science Standards Board (FSSB)

OSAC Evaluation Templates for Registry Approval Process



OSAC

Technical Merit Worksheet

This worksheet is intended to assist in reviewing a potential standard or guideline to determine its appropriateness for inclusion on the OSAC Registries. Depending upon the nature of the standard or guideline, not all areas will be applicable. Additional factors may be needed for the evaluation of standards relating to observational- and judgment-based practices or human factors such as training, qualifications, research and quality control.

DATE

CHAIR

Name:

Affiliation:

Email:

Phone:

Document Title, Number, and Y

1. Are the purpose and
2. Terminology
   Are relevant terms, acron
3. Bibliographic Referen
   Does the document contain r
4. Quality Control
   Does the document describe
5. Is the document a test
   reporting guidelines, meth

OSAC

Harmonization Worksheet

This worksheet must be submitted with your Registry Request Form. The form is intended to assist in the evaluation of potential conflicts with documents currently listed on the OSAC Registries.

DATE

CHAIR

Name:

Affiliation:

Email:

Phone:

Document Title, Number, and Year:

1. Does the document contain any i
   currently listed on the OSAC Regis
   complex as opposing techniques or i
   - Yes
   - No (If "No", the form is comp
2. Name of conflicting or overlapping

OSAC

Impact Worksheet

This worksheet must be completed and included with the Registry Request Form if the referenced document is likely to produce a financial, human resource, or other impact on the forensic community.

DATE

CHAIR

Name:

Affiliation:

Email:

Phone:

Document Title, Number

1. What is the intenc
   example, is this s
   forensic scientists?

OSAC

Standard Development Process Worksheet

Complete the following worksheet if the standard or guideline submitted for addition to the OSAC Registry was not developed by a recognized standards development organization (SDO) but might meet the process requirements. Provide all documentation to support the responses as attachments.

DATE

SUBMITTING SUBCOMMITTEE

CHAIR

Name:

Affiliation:

Email:

Phone:

TECHNICAL CONTACT *(if different than Chair)*

Name:

Affiliation:

Email:

Phone:

Document Title, Number, and Year:

1. Was a written procedure used to govern the creation of this standard or guideline?


Materials
(Trace)

Materials (Trace)

Task groups: Glass, Paint, Tape, Fiber, Hairs, Outreach, Research, Interpretation

- **Diana Wright, Ph.D.**, Subcommittee Chair, U.S. Federal Bureau of Investigation Laboratory
- **Chantelle Taylor**, Subcommittee Vice Chair, Arkansas State Crime Laboratory
- **Kathleen Boone**, Subcommittee Executive Secretary, Indiana State Police Laboratory

Main Challenges- Logistic/Administrative

- Communication barriers across disciplines
- Differences in language & interpretation
  - Scientists (practitioners, academics, industry)
  - Legal and Human Resource Committees
  - Statisticians and Mathematicians

Process improvement

- More feedback at early stages of document development
- Informative sessions across disciplines
- Incorporation of statisticians at subcommittee level
- Learning about expectations across groups
- Streamline process

Materials / Trace: Registry Approved

OSAC Registry Approved Documents

ASTM E1610-18: Standard Guide for Forensic Paint Analysis and Comparison (June 13, 2018)

ASTM E2926-17: Standard Test Method for Forensic Comparison of Glass Using Micro X-ray Fluorescence (μ-XRF) Spectrometry (July 19, 2017)

ASTM E2927-16: Standard Test Method for Determination of Trace Elements in Soda-Lime Glass Samples Using Laser Ablation Inductively Coupled Plasma Mass Spectrometry for Forensic Comparisons (May 31, 2018)

ASTM E2937-18: Standard Guide for Using Infrared Spectroscopy in Forensic Paint Examinations (June 18, 2018)

ASTM E3085-17: Standard Guide for Fourier Transform Infrared Spectroscopy in Forensic Tape Examinations (Materials Trace Subcommittee, September 11, 2018)

OSAC REGISTRY

Standards approved for the OSAC Registry meet the OSAC criteria (See OSAC Standards Approval Process.) Any suggestions for improvements for future revisions of the standards are maintained and disseminated back to the Standards Developing Organization (SDO) for consideration in their consensus process for the next revision. The standards development process is an iterative process; standards undergo continuous improvement with each revision. Although many SDOs require that all standards be reviewed within a five-year time frame, a new work item to revise a standard can be initiated at any time.

- ANSI/NIST ITL-1: 2011 (Update 2013) Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information (Interdisciplinary Virtual Subcommittee, July 13, 2017)
- ASTM E1610-18: Standard Guide for Forensic Paint Analysis and Comparison (Materials Trace Subcommittee, June 26, 2018)
- ASTM E2329-17: Standard Practice for Identification of Seized Drugs (Seized Drugs Subcommittee, August 7, 2018)
- ASTM E2548-11e1: Standard Guide for Sampling Seized Drugs for Qualitative and Quantitative Analysis (Seized Drugs Subcommittee, April 3, 2017)
- ASTM E2926-17: Standard Test Method for Forensic Comparison of Glass Using Micro X-ray Fluorescence (μ-XRF) Spectrometry (Materials Trace Subcommittee, July 31, 2017)
- ASTM E2927-16e1: Standard Test Method for Determination of Trace Elements in Soda-Lime Glass Samples Using Laser Ablation Inductively Coupled Plasma Mass Spectrometry for Forensic Comparisons (Materials Trace Subcommittee, June 5, 2018)
- ASTM E2937-18: Standard Guide for Using Infrared Spectroscopy in Forensic Paint Examinations (Materials Trace Subcommittee, June 26, 2018)
- ASTM E3085-17: Standard Guide for Fourier Transform Infrared Spectroscopy in Forensic Tape Examinations (Materials Trace Subcommittee, September 11, 2018)
- ISO/IEC 17020:2012: Conformity Assessment—Requirements for the Operation of Various Types of Bodies Performing Inspection (Interdisciplinary Virtual Subcommittee, April 18, 2017)
- ISO/IEC 17025:2005: General Requirements for the Competence of Testing and Calibration Laboratories (Interdisciplinary Virtual Subcommittee, September 27, 2016)
    - [In Revision: ISO/IEC CD 17025]
- NFPA 921:2017 Guide for Fire and Explosion Investigations (Fire and Explosion Investigation Subcommittee, November 1, 2017)
- NFPA 1033:2014 Standard for Professional Qualifications for Fire Investigator (Fire and Explosion Investigation Subcommittee, December 22, 2016)

MATERIALS SUBCOMMITTEE

GLASS
Road Map of Documents

Glass training
Standard Practice for a Forensic Glass Analysis Training Program
OSAC revising SWGMAT document

General glass guideline ✓
Standard Guide for Forensic Glass Analysis and Comparison
OSAC revising SWGMAT document

Physical characteristics
General Guide for physical characteristics of glass
SWGMAT document

RI ✓
Standard Test Method for the Automated Determination of RI of Glass Samples using Oil Immersion Method and Phase Contrast Microscope
ASTM E1967 – ASTM revisions

ICP-MS ✓
Standard Test Method for Determination of Concentrations of Elements in Glass Samples using ICP-MS for Forensic Comparisons
ASTM E2330 – ASTM revisions

XRF ✓ **R**
Standard Test Method for Forensic Comparison of Glass Using Micro X-ray Fluorescence Spectrometry
ASTM E2926 – on OSAC Registry

LAICPMS ✓
Standard Test Method for Determination of Trace Elements in Soda-Lime Glass using LA-ICP-MS for Forensic Comparisons
ASTM E2927 – on OSAC Registry

Interpretations/Report Writing ✓ **R**
Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials
OSAC document in progress

✓ = Some work completed
R = Needs further research

MATERIALS SUBCOMMITTEE

PAINT
Road Map of Documents

Paint training ✓
Standard Practice for a Forensic Paint Analysis Training Program
Draft awaiting submission to ASTM

General Paint Guideline ✓
Standard Guide for Forensic Paint Analysis and Comparison
ASTM E1610 – on OSAC Registry

Microscopy of Paint

FTIR ✓
Standard Guide for Using Infrared Spectroscopy in Forensic Paint Examinations
E2937 – on OSAC Registry

MSP ✓
Standard Guide for Microspectrophotometry in Forensic Paint Analysis
E2808 – submitted to ASTM

SEM-EDS ✓
Standard Guide for Using Scanning Electron Microscopy/X-ray Spectrometry in Forensic Polymer Examinations
E2809 – being revised at the subcommittee level

PGC-MS ✓
Standard Guide for Using PGC-MS in Forensic Polymer Examinations
OSAC revising SWGMAT document

XRD

XRF

Raman

Interpretations/Report Writing ✓ **R**
Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials
OSAC document in progress

✓ = Some work completed

R = Needs further research

MATERIALS SUBCOMMITTEE

TAPE
Road Map of Documents

Tape training ✓
Standard Practice for a Forensic Tape Analysis Training Program
Draft awaiting submission to ASTM

General tape guideline ✓
Standard Guide for Forensic Tape Analysis and Comparison
OSAC revising SWGMAT document

Physical characteristics
Standard Guide for Assessing Physical Characteristics in Forensic Tape Examinations
SWGMAT document

Light Microscopy
Standard Guide for Using Light Microscopy in Forensic Tape Examinations
SWGMAT document

FTIR ✓
Standard Guide for Using FTIR in Forensic Tape Examinations
E3085 – on OSAC Registry

PGCMS ✓
Standard Guide for Using PGC/MS in Forensic Polymer Examinations
OSAC draft written

SEM/EDS ✓
Standard Guide for Using Scanning Electron Microscopy/X-ray Spectrometry in Forensic Polymer Examinations
Being incorporated into E2809

Interpretations/Report Writing ✓ **R**
Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials
OSAC document in progress

✓ = Some work completed
R = Needs further research

MATERIALS SUBCOMMITTEE

FIBERS
Road Map of Documents

Fibers training ✓
Standard Practice for a Forensic Fiber Analysis Training Program
OSAC revising SWGMAT document

General Fiber Guideline ✓
Standard Guide for Forensic Fiber Analysis and Comparison
OSAC revising SWGMAT document

Fabric ✓
Standard Guide for Forensic Examination of Fabrics and Cordage
ASTM E2225 – ASTM revisions

Microscopy ✓
Standard Guide for Microscopic Examination of Textile Fibers
ASTM E2228 – ASTM revisions

FTIR ✓
Standard Guide for Forensic Analysis of Fibers by IR
ASTM E2224 – ASTM revisions

TLC ✓
Standard Guide for Forensic Examination of Non-reactive Dyes in Textile Fibers by TLC
ASTM E2227 – needs 5-year review

MSP ✓
Standard Guide for Forensic Analysis of Fibers by MSP
OSAC revising SWGMAT document

PGCMS ✓
Standard Guide for Using PGC/MS in Forensic Polymer Examinations
OSAC revising SWGMAT document

Interpretations/Report Writing ✓ R
Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials
OSAC document in progress

✓ = Some work completed
R = Needs further research

MATERIALS SUBCOMMITTEE

HAIR
Road Map of Documents

Hair training ✓

Standard Practice for a Forensic Hair Analysis Training Program

Submitted to ASTM

General Hair guideline ✓ R

Standard Guide for Forensic Human Hair analysis and Comparison

OSAC revising SWGMAT document

Interpretations/Report Writing ✓ R

"Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials"

OSAC document in progress

✓ = Some work completed

R = Needs further research

MATERIALS SUBCOMMITTEE

Physical Match Road Map of Documents

R

Standard Practice for Physical Match training for Forensic Comparisons of Trace Materials

R

Standard Guide for Forensic Examinations of Physical Match of Trace Materials

Interpretations/Report Writing ✓ **R**

Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials

OSAC document in progress

✓ = Some work completed

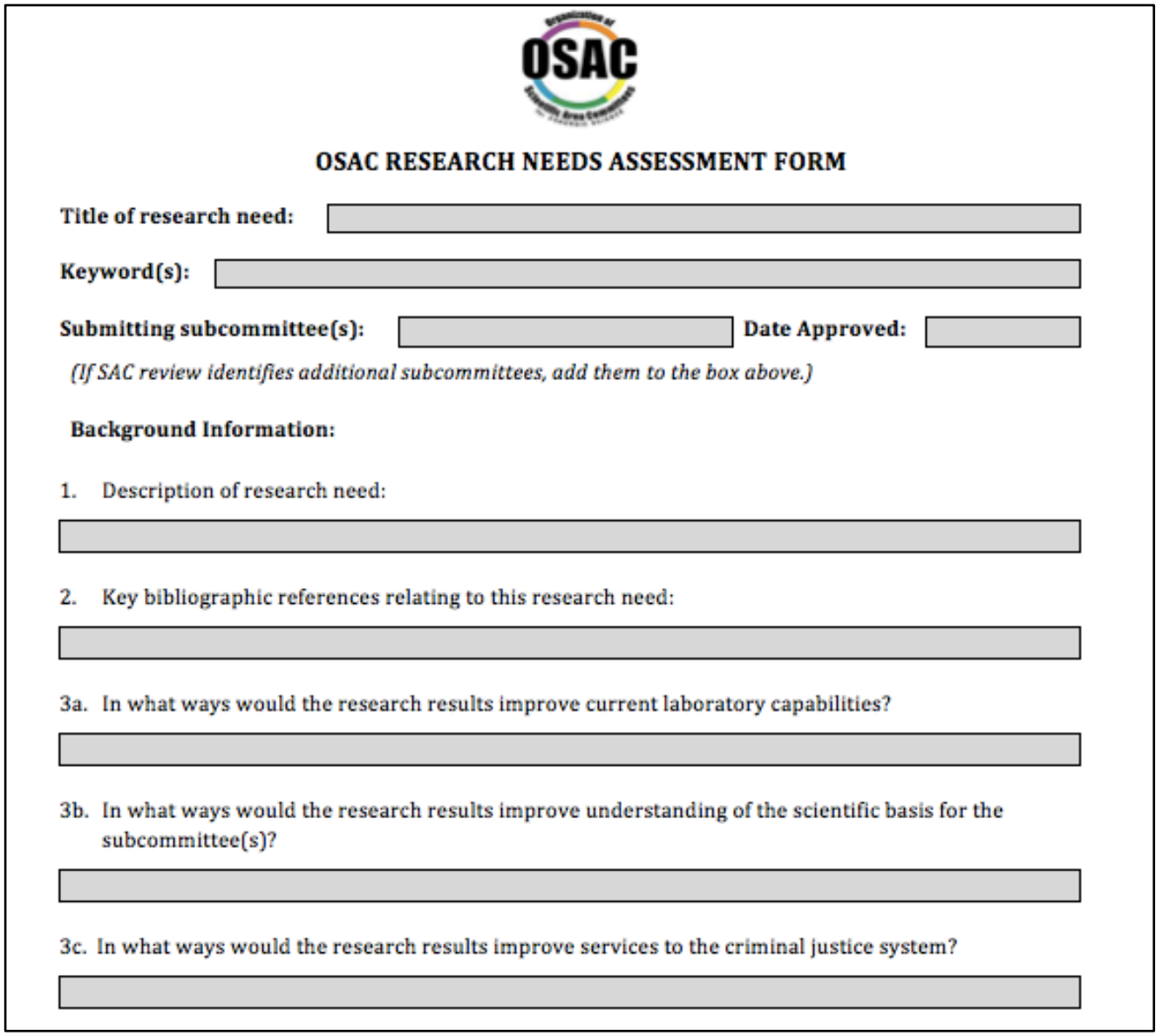
R = Needs further research

Main Challenges- Technical

- **INTERPRETATION**
  - Meaningful/significant differences
  - Probabilistic assessments of our data
  - Develop, maintain, share and use databases
  - Fracture match validity

>90 OSAC "Research Needs" Posted

- Subcommittee research needs documented
- Posted publicly for consideration by funding agencies & research institutions
- Incorporated into NIJ R&D Solicitation



OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need:

Keyword(s):

Submitting subcommittee(s): **Date Approved:**

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Description of research need:

2. Key bibliographic references relating to this research need:

3a. In what ways would the research results improve current laboratory capabilities?

3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

3c. In what ways would the research results improve services to the criminal justice system?

OSAC "Research Needs" Examples

- **Materials (Trace) Subcommittee:**
  - Development of an integrated and multidisciplinary approach to incorporate research in forensic science, computation and statistics for the advancement of data collection, data management and data analysis to aid interpretation of trace evidence.
  - Evaluation of Combined Information Value of Microscopic Comparisons and Mitochondrial DNA Analysis for Hair Examinations

OSAC "Research Needs" Examples

- **Materials (Trace) Subcommittee (pending approval) :**
  - Assessment of Criteria of Meaningful Differences in Trace Materials Comparative Data
  - Development of Quantitative Assessment and Evaluation of Error Rates in Physical Fit Determinations of Trace Materials
  - Cross-validation of current and new micro-XRF technology for the forensic analysis of modern glass
  - Assessment of the value of activity level factors during investigative processes and interpretation of glass evidence (e.g., mechanisms of transfer and persistence of glass, random occurrence of glass in a random population)
  - Validation of the Suitability of Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials

Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials

Uses a qualitative approach to communicate the significance of an association or exclusion, based on

a) the foundational validity of the scientific methods used for the comparison of the items;

b) discrimination capabilities of the analytical protocol,

c) existing knowledge of how discriminating the compared characteristics are based on survey studies, reference collections and/or databases.

If error rates and formal statistical methods are available to provide a quantitative approach (e.g., likelihood ratio, Bayesian framework), they may be used to supplement the qualitative approach described in this practice.

Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials

Aims

a) To provide guidance to forensic examiners to standardize the interpretation of comparative examinations of trace evidence

b) To describe those items that shall be included in the report to aid the reader of the report in interpreting the reported results

Scope: focuses primarily on fibers, glass, hairs, paint and tape but may be applied to other trace materials.

Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials

Structure:

- Terminology
- Scale rationale
- Specific examples for each scale/subdiscipline to help harmonization
- Specific report writing examples
- Scientific support/references

Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials

- The following interpretation scale is an example for use in comparative examinations.
- **Physical/Fracture Fit**
- **Associations of Evidence with Class Characteristics:**
  - **Association with Highly Discriminating Characteristics**
  - **Association with Discriminating Characteristics**
  - **Association with Limitations**
- **Inconclusive**
- **Exclusion with Limitations**
- **Elimination**

OSAC Newsletter

- Monthly Release – 12,000 list
- Public Comment Period
- R&D Needs
- OSAC Vacancies
- OSAC Meetings
- Feature Articles

Sign Up for Newsletter

www.nist.gov/osac

Organization of Scientific Area Committees for Forensic Science

August 2015 | Vol. 1, Issue 1

OSAC Newsletter

Inside this issue

Feature Article:

OSAC Publishes the Standards/Guidelines Registry Approval Process

One aim of the OSAC is to identify and promote existing technically sound, consensus-based, and fit-for-purpose documentary standards that are based on sound scientific principles. This is achieved through the *OSAC Registry of Approved Standards* and the *OSAC Registry of Approved Guideline*. A standard or guidelines that is posted on the registry demonstrates that the methods it contains have been judged by forensic practitioners, academic researchers, measurement scientists, and statisticians, to be valid.

Once populated, forensic scientists and practitioners will be able to refer to the *OSAC Registry of Approved Standards* and the *OSAC Registry of Approved Guidelines* for a uniform set of high quality standards on how to produce scientifically sound and statistically valid test results, laboratory results, and courtroom testimony. These standards should help to increase confidence in the criminal justice system and the testimony put forth by practitioners.

The OSAC has recently developed and launched the *OSAC Registry Approval Process of Published Standards and Guidelines*, which is a rigorous process that includes checklist criteria against which existing standards and guidelines are to be analyzed before they are posted to the registries. This includes an analysis of technical merit, the openness of the development process (to ensure balanced interests are represented), consensus,

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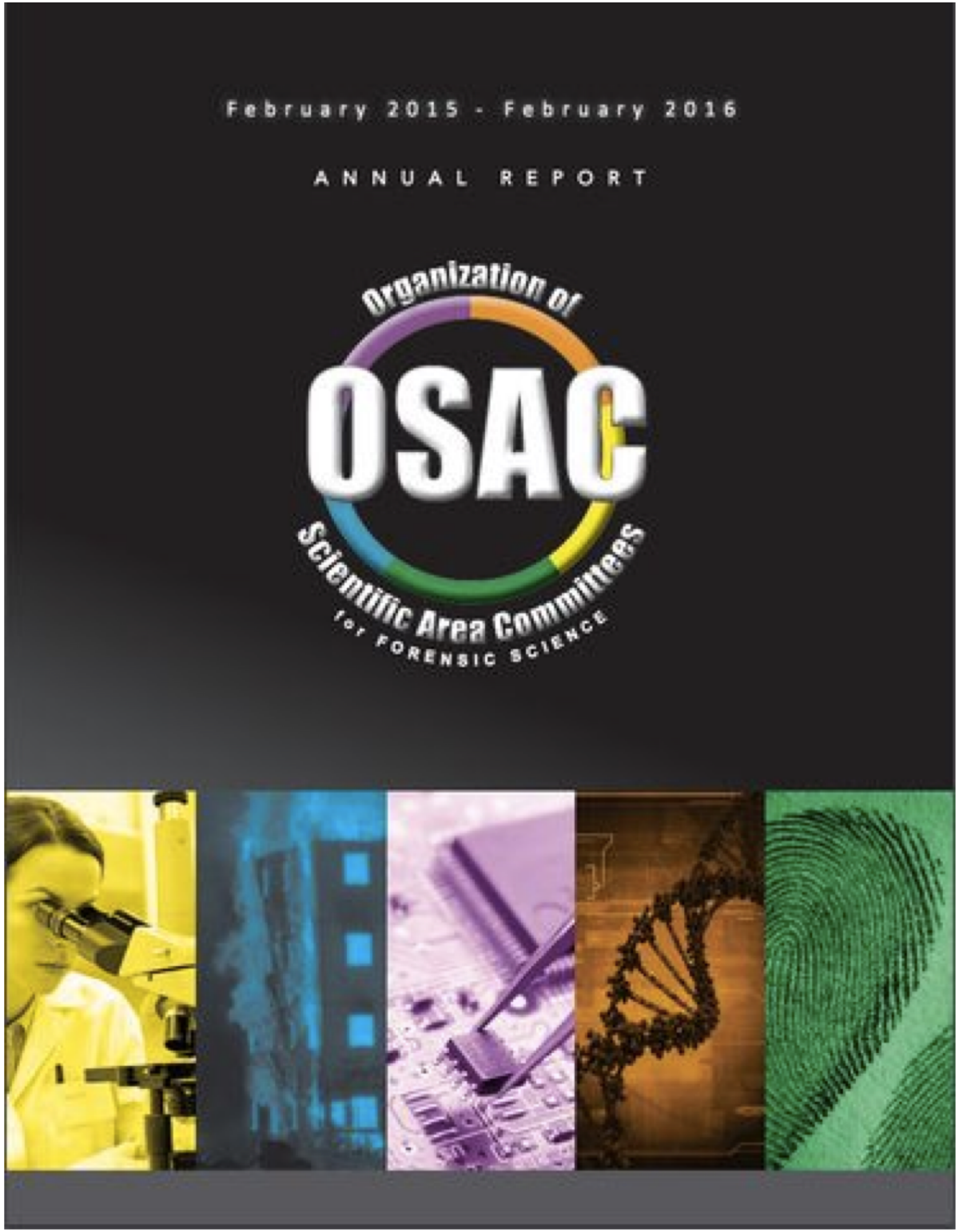
OSAC website: http://www.nist.gov/forensics/osac/

OSAC Annual Report



Thank you !
Questions?