OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Validation of the Suitability of Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials

Keyword(s): Trace evidence, interpretation, validation, report writing, expert opinion

Submitting subcommittee(s): Materials/Trace Date Approved: 9/24/18

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

Background Information:

1. Description of research need:

In trace evidence comparisons, the forensic examiner analyzes the evidence and resulting data, forms an opinion, and summarizes the findings in a written report. The examiner shall also interpret and report the overall meaning of those findings. This information can assist in the early investigative stages as well as during the legal management of a case. As a result, the meaning of the findings should be clearly communicated to crime scene investigators, law enforcement officers, lawyers, jury, and judges.

A three-step process may be used in forming the expert opinion. Step one involves a binary decision to determine whether the compared samples can be discriminated based on the comparison of the measured data. Step two is the evaluation of the results on a source level to determine and explain the significance of finding no differences between the samples being compared (i.e., how discriminating and rare the material’s characteristics are). Finally, step three is the evaluation of these results on an activity level to determine and explain the relevance of the findings under given circumstances (i.e., evaluation of the evidence considering competing propositions of alleged activities, and factors such as transfer mechanisms and persistence). These steps can be conducted sequentially or simultaneously, depending on the methods used for the description and evaluation of the qualitative and/or quantitative data.

A vast majority of trace evidence comparisons cannot definitively establish that the items originated from the same source, but instead can lead to associations with class characteristics and also eliminations. Unless the examiner’s opinions are accompanied by an assessment by the level of support for the conclusion that the items originated from the same source as opposed to the conclusion they originated from different sources, the meaning and value of the association can lead to subjective interpretations.

To date, there is no standard forensic practice for the interpretation and report writing in forensic comparison of trace materials. Thus, there is a critical need to develop and validate an interpretation standard to ensure proper assessment of the significance of comparative conclusions. In the absence of such standard practices, objectivity and agreement among examiners to arrive at conclusions and to communicate their meaning will likely remain difficult.

In response to this need, the OSAC Trace/Materials Subcommittee created the Interpretation Task Group at its 2015 kickoff meeting with the primary goal of developing a standardized practice for interpretation and report writing in forensic comparisons of trace materials. The central hypothesis is that the use of this interpretation document will help forensic examiners to standardize criteria used during the interpretation process and consistency of the language used for communicating their conclusions.

The proposed practice 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, and c) existing knowledge of discriminating power 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.,
At this moment, it is essential to design interlaboratory studies to validate the suitability of the proposed interpretation guide to measure how much examiners vary from each other when they consider the same case, and how much examiners diverge from consensus conclusions. The data derived from the research will provide a better understanding of the effectiveness of the interpretation document and will help identify areas for improvement.

2. Key bibliographic references relating to this research need:


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

To date, there is no standard forensic practice for the interpretation and report writing in forensic comparison of trace materials. Further, members of the Materials Subcommittee regularly get questions from the trace evidence community regarding the progress on the Interpretation document, as they are awaiting OSAC guidance before improving their report writing practices. Thus, the development and validation of an interpretation standard is anticipated to assist crime laboratories to ensure proper assessment of the significance of the expert opinions and forensic reports.

Research that can support the validity of an interpretation standard practice can enhance objectivity and agreement among...
3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

At the subcommittee level, these type of research would provide valuable support to the interpretation and report writing guidelines that are being developed for trace materials, particularly if we can integrate early in the process the feedback from practitioners, statisticians, the legal community and human resource experts. This research will also help different stakeholders within the OSAC to assess the utility and validity of the proposed guide.

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

Harmonization of scientific language and interpretation of findings is anticipated to assist criminal justice with the assessment of the significance of the evidence. The data derived from the research will provide a better understanding of the effectiveness of the interpretation document and will help identify areas for improvement.

4. Status assessment (I, II, III, or IV):

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<th>Major gap in current knowledge</th>
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<td><strong>No or limited</strong> current research is being conducted</td>
<td><strong>I</strong></td>
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<td><strong>Existing</strong> current research is being conducted</td>
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This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.

Approvals:

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<th>Subcommittee</th>
<th>Approval date: 9/24/18</th>
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(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)

<p>| SAC | 1. Does the SAC agree with the research need? | Yes ❌ | No ❌ |</p>
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<td>2. Does the SAC agree with the status assessment?</td>
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<td>If no, what is the status assessment of the SAC:</td>
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(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)