OSAC Research Need Assessment

Development of an Integrated and Multidisciplinary Approach for the Advancement of Data Collection, Data Management and Data Analysis to Aid Interpretation of Trace Evidence.

Title of research need: see above **Date posted:** Jan.29.16

Keywords: Databases, statistics, computation, forensic science, interpretation, trace evidence, transfer.

Submitting subcommittee(s): Trace/ Materials subcommittee

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

Background information:

1. Description of research need:

See attached file.

2. Key bibliographic references relating to this research need:

See attached file.

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

The proposed research would help close gaps in knowledge/research that are fundamental to the advancement of the interpretation of trace evidence. The development of reliable, representative, up-to-date databases would assist current laboratories with evaluating trace evidence and providing conclusions, including strengths and limitations, that are firmly supported by science.

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

The proposed research would provide the scientific basis for a better assessment of the value of trace materials in forensic, investigative and intelligence operations. The overall approach would provide essential information on validation studies, error rates, population studies, information systems, databases, data mining and data management that can be used to support the validity of scientific conclusions.

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

The research would be fundamental in moving trace evidence analysis field towards a more efficient approach for assessing the value of evidence within the criminal justice system. The proposed research is anticipated to add informative value and validity to scientific examinations and interpretations, and provide consistency within the scientific community with regards to the interpretations and conclusions presented to the courts.

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

	Major gap in current knowledge	**Minor** gap in current knowledge
No current research is being conducted	**I**	**III**
Existing current research is being conducted	**II**	**IV**

Subcommittee Approval date: 01/28/16 (18 yes; 2 absent)

(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)

SAC

1. Does the SAC agree with the research need? Yes ◯ No ◯

2. Does the SAC agree with the priority assessment? Yes ◯ No ◯

If no, what is the priority assessment of the SAC:

Approval date:

(Approval is by majority vote of SAC. Once approved, forward to QIC for posting to KAVI.)

QIC

Date posted to KAVI:

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.

OSAC Research Need Assessment - Appendix

Title of research need: Development of an Integrated and Multidisciplinary Approach for the Advancement of Data Collection, Data Management and Data Analysis to Aid Interpretation of Trace Evidence.

Background information:

1. Description of research need:

There have been efforts to create collection/reference data sets in trace evidence materials (glass, automotive paint, duct tape, fiber, polymers and pigments). The most comprehensive database in use in trace evidence is the Paint Database Query (PDQ), that permits identifying the make, model and years of vehicles with paints consistent with the evidence. It also permits some assessment of the uniqueness of an association. However, the full potential of databases has received little attention in research and has not been explored beyond traditional investigative queries. As a result, databases are often underutilized in forensic and intelligence investigations.

The application of some interpretation models (i.e. likelihood-based approaches) is restricted in trace evidence due to several factors, including: a) few existing reference collections and databases that fuse multiple sensors for automated interpretation platforms, b) gaps of information/research regarding studies of transfer and persistence of trace materials, c) gaps on updated survey studies and evaluation of error rates, d) gaps of knowledge of forensic practitioners in fundamental and application statistics; d) gaps of knowledge of statisticians/ computer scientists in fundamental and practical scientific/forensic background.

As a result, an integrated and multidisciplinary approach is needed to incorporate: a) strategic collaborations and effective plans for cross-training trace examiners, computer specialists and statisticians, b) updated research efforts for transfer and persistence studies, survey/population studies, inter-laboratory validations and comparisons, c) strong proposals to bring together collaborative knowledge of examiners, researchers, statisticians, computer scientists and manufacturer's organizations to develop and/or update relevant databases, d) development of automated platforms that help the management of different layers of information to assist decision making, e) development of standard methods, dissemination and implementation strategies for the application of integrated solutions for data interpretation.

2. Key bibliographic references relating to this research need:

Note: the following references are provided as an example of relevant references but do not represent an all-inclusive bibliographic review in this field.

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