OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Close Non-Match Assessment

Describe the need: (1) Using large AFIS databases, conduct a study that measures the likelihood of finding close non-matches based upon the location within friction ridge impressions and specificity of these features and their arrangements (unit relationships). (2) Assess the ability of the examiner to discriminate these close non-matches with true mates. (3) Creation of a sanitized close non-match dataset for research and training.

Keyword(s): Close Non-Match, AFIS, Likelihood, Sufficiency, Suitability

Submitting subcommittee(s): Friction Ridge **Date Approved:** 2/1/2021

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

Background Information:

1. Does this research need address a gap(s) in a current or planned standard? (ex.: Field identification system for on scene opioid detection and confirmation)

Yes. This information will be useful in the Examination series of documents because it will help to identify thresholds and situations in which the risk of a close non-match may be higher and thresholds for suitability or sufficiency may need to be adjusted.

2. Are you aware of any ongoing research that may address this research need that has not yet been published (e.g., research presented in conference proceedings, studies that you or a colleague have participated in but have yet to be published)?

Yes. Champod and Eldridge (in progress), NIJ award 2018-DU-BX-0227 -- the goal of the research is to create an International Close Non-Match Library (ICNML), which will address point (3) above. This project includes a research component that will touch upon (but not fully address) point (2) above.

3. Key bibliographic references relating to this research need: (ex.: Toll, L., Standifer, K. M., Massotte, D., eds. (2019). Current Topics in Opioid Research. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88963-180-3)

Koehler, J. and Liu, S. (2021). Fingerprint error rate on close non-matches. J For. Sci., DOI: 10.1111/1556-4029.14580.

4. Review the annual operational/research needs published by the National Institute of Justice (NIJ) at https://nij.ojp.gov/topics/articles/forensic-science-research-and-development-technology-working-group-operational#latest? Is your research need identified by NIJ?

Indirectly -- this research impacts "Determination of accuracy and reliability of forensic analyses and conclusions, including potential sources of error" and "Scientific foundations for expert conclusions of forensic evidence".

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

This type of research will provide examiners with empirical evidence of the risk associated with searching low minutiae count images against large AFIS databases. It will also provide data supporting potential thresholds of the minimum amount of features that should be used in AFIS searches as well as the ACE-V process (sufficiency).

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

Research in this area will produce metrics and datasets valuable for sufficiency determination, examiner cognition study, and statistical modeling research.

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

Research will provide data to reduce AFIS erroneous decisions. The Brandon Mayfield error exposed the danger of close non-matches found in AFIS. To date there is little scientific data that quantifies the overall risk of close non-matches in AFIS databases. It is difficult to create standards regarding sufficiency for examination or AFIS search searching without this type of research.

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

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

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