



## OSAC Research Needs Assessment Form

**Title of research need:**

Friction Ridge Statistical Modeling

**Keywords:**

Statistics, Friction Ridge, Statistical Models, Likelihood Ratios, Stats

**Submitting subcommittee(s):**

Friction Ridge

**Date Approved:**

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

### Background information:

#### 1. Description of research need:

Expanded research on different statistical models that can be used in association with a friction ridge comparison. (1) Approaches for quantification of evidence that are fit for purpose. (2) Evaluation of candidate model approaches in terms of their theoretical validity, potential for misuse or misinterpretation, and generality of application. (3) Identification of types of databases that will be needed to support proposed approaches. (4) How to best communicate the results to the courts.

#### 2. Key bibliographic references relating to this research need:

Please see Appendix "A" for a normative bibliography related to this research topic.

For a comprehensive and informative bibliography related to friction ridge examination please see Appendix "B": The 2011 SWGFAST response to the Research, Development, Testing & Evaluation Inter-Agency Working Group of the National Science and Technology Council, Committee on Science, Subcommittee on Forensic Science.

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

Latent prints that are currently not utilized due to lack of sufficiency will now provide some value, even if limited, in bench work. This type of technique will improve examiner awareness of the quantitative value of the evidence they are analyzing, as well as increasing efficiency by focusing examiner resources on the appropriate evidence. These types of models will also assist the examiner by supporting and adding weight to current examination techniques and conclusions.

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

Statistical modeling has made significant progress in the last ten or so years by improving our understanding of overall match probabilities. However, there are still questions regarding the reliability of these models in specific cases. Without general acceptance, the Friction Ridge Subcommittee will have difficulty establishing standards on the use of statistics during friction ridge examination.

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

Improved statistical modeling will increase confidence that the criminal justice system has in fingerprint evidence. New models will improve the overall value of friction ridge evidence by making it more comprehensible to the judicial system.

4. 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	<b>I</b>	<b>III</b>
Existing current research is being conducted	<b>II</b>	<b>IV</b>

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

Subcommittee

Approval date: 01/29/2016

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

SA

1. Does the SAC agree with the research need? Yes

2. Does the SAC agree with the status assessment? Yes

*If no, what is the status assessment of the SAC:*

Approval date: 17-Mar-2016

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

## APPENDIX "A"

Abraham, Joshua, Christophe Champod, Chris Lennard, and Claude Roux. "Modern Statistical Models for Forensic Fingerprint Examinations: A Critical Review." *Forensic Science International* 232, no. 1-3 (2013): 131-50.

Neumann, C., Evett, I. W., and Skerrett, J., "Quantifying the Weight of Evidence from a Forensic Fingerprint Comparison: A New Paradigm", *Journal of the Royal Statistical Society*, vol. 175 (Part 2), pp. 1-26, 2012.

Neumann, Cédric. "Statistics and Probabilities as a Means to Support Fingerprint Examination." In Lee and Gaensslen's *Advances in Fingerprint Technology*, edited by Robert S. Ramotowski, 407-52. Boca Raton: CRC Press, 2012.

Neumann, Cedric, Christophe Champod, Mina Yoo, Thibault Genessay, and Glenn Langenburg. "Quantifying the Weight of Fingerprint Evidence through the Spatial Relationship, Directions and Types of Minutiae Observed on Fingermarks." *Forensic Science International* 248, no. 0 (3// 2015): 154-71.

Stoney, David A. "Measurement of Fingerprint Individuality." In *Advances in Fingerprint Technology*, edited by Henry C. Lee and Robert E. Gaensslen. *Crc Series in Forensic and Police Science*, 327-87. Boca Raton: CRC Press, 2001.