OSAC Research Needs Assessment Form

Title of research need: Assessing the Sufficiency and Strength of Friction Ridge Features

Keywords: Features, Minutiae, Quantification, Mark-Up, Sufficiency

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:

(1) Develop additional or refine existing models that provide an assessment of the discriminating strength of features (friction ridge skin structures) used during examination. (2) Assess the weight given to friction ridge skin damage such as cuts, abrasions, scars, creases, warts and blisters in friction ridge examination. (3) Research quantification of sufficiency that must be measured in order to support examination decisions, including simultaneity. (4) Develop tools to assist the examiner measuring localized quality of friction ridge features during the analysis stage. (5) Develop mechanisms to interpret and assign weights to discrepancies observed during the comparison process. Research in this area should study the distortion of the friction ridge skin when applied with various forces and movements on substrates both qualitatively and quantitatively.

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?

Better understanding of the weight of different features during the examination process will improve the confidence, error rates, and overall effectiveness of examiners.

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

Currently there is not a reliable assessment of the discriminating strength of specific friction ridge feature types. Standardization of the mark-up of friction ridge evidence is currently being studied. However, even if the mark-up of features in the "Analysis" phase of ACE-V were completely standardized, not knowing the weight of each feature type prohibits comprehensive standards for friction ridge evaluation decisions.

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

Services will be improved to the criminal justice system by increased reliability of examination decisions.

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

	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.

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"

Cabanyes Cordero, D. E., "Annexo: Cálculo De Las Frecuencias De Los Tipos Dactilares", *Ciencia policial,* vol. 101 pp. 61-69, 2010.

Champod, C., "Reconnaissance automatique et analyse statistique des minuties sur les empreintes digitales", PhD in forensic science, Institut de Police Scientifique et de Criminologie, Université de Lausanne, Lausanne, Suisse, 1996. Gómez Marín, J., Ramón Ramón, M. Á., Gonzáles Arrieta, A., and García Sánchez, L. J., "Estudio De Las Frecuencias Fenotípicas De Los Puntos Característicos En Dactilogramas", *Ciencia policial,* vol. 101 pp. 5-60, 2010.

Gutiérrez, Esperanza, Virginia Galera, Jose Manuel Martínez, and Concepción Alonso. "Biological Variability of the Minutiae in the Fingerprints of a Sample of the Spanish Population." Forensic Science International 172, no. 2-3 (2007): 98-105.

Gutièrrez-Redomero, E., Alonso-RodrÌguez, C., Hernandez-Hurtado, L. E., and RodrÌguez-Villalba, J. L., "Distribution of the Minutiae in the Fingerprints of a Sample of the Spanish Population", Forensic Science International, vol. 208 (1-3), pp. 79-90, 2011.

Gutiérrez-Redomero, Esperanza, Noemi Rivalderia, Concepcion Alonso-Rodriguez, Luis M. Martin, José E. Dipierri, Miguel A. Fernàndez-Peire, and Ricardo Morillo. "Are There Population Differences in Minutiae Frequencies? A Comparative Study of Two Argentinian Population Samples and One Spanish Sample." Forensic Science International 222, no. 1-3 (2012): 266-76.

Koristka, C., N. Nürnberger, and G. Georgi. "Zur Auftretenshäufigkeit Von Minuzien Nach Form und Lage Im Fingerbeerenbereich." Kriminalistik und forensische Wissenchaften 35 (1979): 21-30.

Su, C. and Srihari, S., "Probability of Random Correspondence for Fingerprints", in Computational Forensics: Third International Workshop, IWCF 2009. LNCS 5718, Z.J. M. H. Geradts, K. Y. Franke and C. J. Veenman, Eds. Berlin-Heidelberg: Springer Verlag, 2009, pp. 55-66

Seweryn, Paulina. "Frequency of Minutiae on Left and Right Hand Index Fingers." Problemy Kryminalistyki, no. 247 (2005): 40-46.