OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Blind Verifications Assessment

Keywords: blind verification, firearms, toolmarks, forensic science, algorithm review

R&D Need Rank: Low, Medium, High	**High**	**SAC Approved Date:**	9/3/2025

Submitting subcommittee(s): Firearms & Toolmarks

Research Need Summary:

The purpose of these research needs is to build a stronger scientific foundation for forensic science standards. The information provided herein will help to evaluate and strengthen existing standards, and/or fill any standards related gaps. In the space below, please provide a brief narrative of the need to be addressed. This should include:

- The identity of any specific standards that would be affected/improved/evaluated
- A discussion on gaps that exist within the standards or standards related gaps that need to be filled
- How this work would fill those gaps
- An overview of any current or past research efforts that may be relevant to this effort
- A discussion regarding how this research might improve current laboratory capabilities and/or forensic services within the criminal justice system
- Any relevant references

The concept of "blind" verification is not new, and some laboratories have undertaken steps to implement some form of verification that incorporates the concept of blind verification. However, most of these attempts at a blind verification are not 100% blind. We feel it would be of interest to study the concepts around the overall topic of blind verifications. To what extent does a verification need to be "blind," and if so, what are practical methods for setting this up?

We would also like to highlight the implementation of 3D technology and its potential use in quality control. Could technology, such as comparison algorithms and virtual comparisons, be used in a blind verification analysis scheme? As an example, in radiology, there is the concept of computer-aided detection as a "second read" (e.g., see Benedikt et al. below).

References (not intended to be a comprehensive list on this topic):

- Benedikt R et al. "Concurrent Computer-Aided Detection Improves Reading Time of Digital Breast Tomosynthesis and Maintains Interpretation Performance in a Multireader Multicase Study" American Journal of Roentgenology 210 (3) https://doi.org/10.2214/AJR.17.1818
- Chapnick C, Weller TJ, Duez P, Meschke E, Marshall J, Lilien R. Results of the 3D Virtual Comparison Microscopy Error Rate (VCMER) Study for firearm forensics. J Forensic Sci. 2021 Mar;66(2):557-570. doi: 10.1111/1556-4029.14602. Epub 2020 Oct 26. PMID: 33104255.
- Hicklin RA, Parks CL, Dunagan KM, Emerick BL, Richetelli N, Chapman WJ, Taylor M, Thompson RM. Accuracy and reproducibility of bullet comparison decisions by forensic examiners. Forensic Sci Int. 2024 Dec;365:112287. doi: 10.1016/j.forsciint.2024.112287. Epub 2024 Nov 4. PMID: 39547116.
- Knowles L, Hockey D, Marshall J. The validation of 3D virtual comparison microscopy (VCM) in the comparison of expended cartridge cases. J Forensic Sci. 2022 Mar;67(2):516-523. doi: 10.1111/1556-4029.14942. Epub 2021 Nov 22. PMID: 34806779.

- Monson KL, Smith ED, Peters EM. Repeatability and reproducibility of comparison decisions by firearms examiners. J Forensic Sci. 2023 Sep;68(5):1721-1740. doi: 10.1111/1556-4029.15318. Epub 2023 Jul 2. PMID: 37393551.
- Swofford H, Champod C. Implementation of algorithms in pattern & impression evidence: A responsible and practical roadmap. Forensic Sci Int Synerg. 2021 Feb 18;3:100142. doi: 10.1016/j.fsisyn.2021.100142. PMID: 33718855; PMCID: PMC7933265.

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