OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need:	Intra and Interlaboratory Studies to Provide Information Regarding Performance Across Evidentiary Circumstances
Keywords:	Firearms and toolmarks, white box study

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

A significant number of "black box" studies have been published, and the Firearms/Toolmarks community believes there is now greater value in studies focused on evidence-based (e.g.., make, model, ammunition, manufacturing) factors that influence an examiner's (and/or instrumental) accuracy as well as their repeatability and reproducibility. Additional insight into these factors can help guide laboratories and the subcommittee with regard to examination methodology, verification, training, and case review requirements.

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

- 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.
- Monson KL, Smith ED, Peters EM. The influence of perceived difficulty, availability of marks, and examination time on the conclusions of firearms examiners. J Forensic Sci. 2025 May;70(3):964-979. doi: 10.1111/1556-4029.70004. Epub 2025 Feb 14. PMID: 39950572.
- 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, Lund S, Iyer H, Butler J, Soons J, Thompson R, Desiderio V, Jones JP, Ramotowski R. Inconclusive decisions and error rates in forensic science. Forensic Sci Int Synerg. 2024 May 4;8:100472. doi: 10.1016/j.fsisyn.2024.100472. PMID: 38737990; PMCID: PMC11087963.

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