OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Method Development for Bloodstain Pattern Classification

Describe the need:

SEE ALSO ATTACHED ADDENDUM for additional details.

A written method to determine the mechanism(s) by which a bloodstain pattern was created does not currently exist. Bloodstain pattern classification accuracy and reproducibility are expected to be limited without a validated written procedure for analysts to follow.

The referenced Bloodstain Pattern Classification Process Map is an attempt to codify the decision-making process for the conversion of observed characteristics into causal mechanisms. One research approach is to establish what definitions, observations and measurements are needed to make good decisions at each of the sequential binary choices in the process map. Research is necessary to improve and change the existing process map and lead to the development of a validated process. In support of method development, additional terminology to describe bloodstains in a non-mechanistic way need to be established. Additional descriptive terms would ensure classifications are based upon objective, physical characteristics, which would minimize subjectivity.

Another research approach is to explore alternatives to the sequential process map and seek methods with a lower error rate for bloodstain pattern classification.

See also the research need for white box studies for bloodstain pattern classification, which may also support method development.

Keyword(s):

bloodstain pattern analysis, classification, blood, method, terminology, process map

Submitting subcommittee(s): Bloodstain Pattern Analysis   **Date Approved:** March 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)

Standard in progress: Bloodstain Pattern Classification Standard

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)?

> Please refer to the Bloodstain Pattern Analysis Bibliography.

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)

> - Arthur RM et al. A novel, element-based approach for the objective classification of bloodstain patterns. For Sci Int 2015; **257:**220.
> - Bloodstain Pattern Classification Process Map at:
>   https://www.nist.gov/system/files/documents/2020/05/19/BPA%20Process%20Map_Dec2019.pdf
> - AAFS Standards Board, "ASB Technical Report 033 Terms and Definitions in Bloodstain Pattern Analysis" First Edition 2017.

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?

> Yes. "Objective and validated methods to classify spatter patterns by the mechanism of formation"

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

> This research will result in a method for the classification of bloodstain patterns based on physical characteristics of bloodstains. Ideally, this method will lead to an objective and consistent bloodstain pattern analysis, which may decrease error and increase reliability.

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

> This research will provide the field of bloodstain pattern analysts with a theoretical foundation for the classification of bloodstain patterns necessary for later research studies into the accuracy and reliability of analysts. This research will lead to a better understanding of the decision-making process. It will provide guidance to revise current methods and to better reflect the current scientific state. A list of quantifiable, measurable and objective physical characteristics resulting from this research will help the discipline to describe the basis for classifications.

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

> A non-mechanistic pattern classification method may lead to more reproducible and reliable outcomes amongst different bloodstain pattern analysts. Thus, helping the criminal justice system understand classification decision-making processes.

8. 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.