# INTER-LABORATORY VARIATION IN INTERPRETATION OF DNA MIXTURES

Austin Hicklin[1], Jon Davoren[2], Robert Bever[2], Nicole Richetelli[1], Mitch Holland[1]
[1]Noblis,
[2]Bode Technology

The purpose of the presentation is to present and discuss the design of the ongoing study *Inter-laboratory Variation in Interpretation of DNA Mixtures* (NIJ Grant 2020-R2-CX-0049). The study is being conducted to evaluate the current state of the practice of DNA mixture casework and is not restricted tospecific products or statistical approaches.

Between 1995 and 2018 the mixture interpretation process has been continually improved through numerous research and development efforts. Within the past 5 years the use of probabilistic genotyping has become common in laboratories as it significantly advances the mixture interpretation process. As the mixture interpretation methodology has been improved a few inter-laboratory studies have been conducted to assess effectiveness and to determine how similar the results are between laboratories.

Almost all inter-laboratory studies reported to date were conducted prior to the advent of probabilistic genotyping software. This study will evaluate the current state of the practice in interpretation of DNA mixtures utilizing either binary or probabilistic genotyping protocols. The scope will be limited to variability in interpretation and analysis of electropherograms; thereby eliminating variability due to laboratory processing of physical samples. The project will expand on the results and lessons learned from DNA mixture interlaboratory studies conducted to date, most notably the National Institute of Standards and Technology (NIST) MIX13 study and the President's Council of Advisors on Science and Technology (PCAST) Report on Forensic Science in Criminal Courts (2016).

The study is composed of four phases conducted to assess the sources of variability in analyzing DNAmixtures:

1. Policies and Procedures (P&P) Questionnaire — Online questionnaire to assess laboratory policies and procedures relevant to DNA mixture interpretation (notably systems, types of statistics reported, and parameter settings used).
2. Casework Scenario Questionnaire — Assess analysis procedures or decisions that may vary depending upon the case scenario and the nature of mixture casework conducted by the laboratory.
3. Number of Contributors (NoC) Subtest — Assessment of suitability and number ofcontributors, given electropherogram data for 14 DNA mixtures.
4. Interpretation, Comparison, and Statistical Analysis (ICSA) Subtest — Interpretations, comparisons, and statistical analyses for 7 DNA mixtures provided with DNA profiles of potentialcontributors