This webinar was funded by the European Union's Internal Security Fund — Police

Dear Colleagues,

2nd AFORE WP3:2 webinar on The Validation of Analytical Methods in Forensic Science
1-2 December 2021

On behalf of members of AFORE Work Package 3:2, we would like to invite you to participate in a webinar, which aims to train forensic Quality Managers and forensic experts in the validation of instrumental, human-based, and "black boxes" methods used in forensic sciences. The webinar will be organised on 1st and 2nd December 2021 using the ENFSI Cisco Webex platform (enfsi.webex.com) as a part of the ENFSI Monopoly project called "AFORE – Accreditation of Forensic Laboratories in Europe". A link to the event will be sent to all registered participanst shortly before the webinar.

The programme will include lectures (up to 45 minutes) followed by discussion sessions, concerning the validation of instrumental methods, human-based methods/procedures and the challenges on validating "black boxes" technology. Please see the attached programme and abstracts for details. All times in the programme are referring to CET.

The webinar is **free of charge**. If you are interested in participation then please fulfill an attached registration form, and send it to Ms. Iga Główczyk (iglowczyk@ies.gov.pl) **until 22nd November 2021**.

We look forward to seeing you and your colleagues at the workshop,

Grzegorz Zadora – leader of AFORE Work Package 3:2
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Christina Bertler Edlund – leader of AFORE Work Package 3
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AFORE 2021 – webinar no. 2 – programme

1st December 2021

8:50 – 9:00 **Opening of webinar**

9:00 – 10:00 *Some directions for the competence assessment of examiners and validation of human-based methods in forensic science*

Didier Meuwly
1) The Netherlands Forensic Institute, Haag, The Netherlands
2) Forensic Biometric, University of Twente, The Netherlands

Abstract: An ENFSI guideline for the validation of instrumental and human-based methods for analysis in Forensic Science has been published. This lecture will concentrate on the methodology for the validation human-based forensic analysis methods and make parallel with the approach used for instrumental methods.
Quality assurance focuses both on the competence of the examiner and on the validation of the method:
• The competence of the practitioner is constituted of his/her theoretical knowledge (know), practical skills (know-how), professional attitude (know-how-to-be) and controlled experience.
• The validation of a human based method relies on requirements for the analysis, the comparison and the verification, that are three steps of a four-step protocol for the inference of identity of the source in forensic science: Analysis, Comparison, Evaluation and Verification (ACE-V).
The requirements for the evaluation step are described in another guideline: the "ENFSI standard for the formulation of evaluative reports in forensic science".

10:00 – 11:00 *Consensus on validation of forensic-comparison systems in the context of casework*

Geoffrey Stewart Morrison
1) Forensic Data Science Laboratory, Aston University, Birmingham, UK
2) Forensic Evaluation Ltd, Birmingham, UK

Abstract: Over a series of rounds of drafting and meetings in 2019–2020, a group of authors developed a consensus on validation of forensic voice comparison. Group members included individuals who had knowledge and experience of validating forensic-voice-comparison systems in research and/or casework contexts, and individuals who had actually presented validation results to courts. They also included individuals who could bring a legal perspective on these matters, and individuals with knowledge and experience of validation in forensic science more broadly. Although the scope was forensic voice comparison, with minor wording changes the resulting statement of consensus would be applicable to validating source-comparison systems in any branch of forensic science. The scope was validation for the purpose of demonstrating whether, in the context of specific cases, forensic-comparison systems that output likelihood ratios are (or are not) good enough for their output to be used in court. In this presentation, I provide an overview of

the statement of consensus and underlying concepts. I also discuss my reflections on broader issues related to validation and standards/guidelines.

Reference:
Morrison G.S., Enzinger E., Hughes V., Jessen M., Meuwly D., Neumann C., Planting S., Thompson W.C., van der Vloed D., Ypma R.J.F., Zhang C., Anonymous A., Anonymous B. (2021). Consensus on validation of forensic voice comparison. Science & Justice, 61, 229–309. https://doi.org/10.1016/j.scijus.2021.02.002

11:00 – 11:30 **Break**

11:30 – 12:30 *Validity and reliability of forensic firearm examiners and a computer-based method*

Erwin J.A.T. Mattijssen
1) Netherlands Forensic Institute, Haag, The Netherlands
2) Radboud University, Nijmegen, The Netherlands

Abstract: Forensic firearm examiners provide judgments about the source of bullets and cartridge
cases. Courts of law rely on their judgments to decide about a person's innocence or guilt. These examiner judgments are increasingly challenged [1,2] because of the lack of empirical research.

We studied the validity and reliability of the source judgments and degree-of-support judgments of 77 firearm examiners and compared these judgments to the outcomes of a computer-based method. Our study showed that the validity and reliability of the source judgments were quite high, but that examiners are not infallible. The examiners seem to be slightly less proficient at identifying same-source comparisons correctly, while they outperform the used computer-based method at identifying different-source comparisons. The degree of support judgments were not well-calibrated and showed signs of overconfidence – as is also seen in other expert populations [3].

Future studies could focus on the comparison of the judgments of experienced examiners to those of novices to study if the examiners' performance and overconfidence is a result of acquired experience and on the merits of performance feedback to calibrate their judgments.

References:
1. Committee on Identifying the Needs of the Forensic Sciences Community: National Research Council. (2009). Strengthening Forensic Science in the United States: A Path Forward, The National Academies Press, Washington, DC, USA.
2. Executive Office of the President's Council of Advisors on Science and Technology (PCAST). (2016). Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods.
3. O'Hagan, A., Buck, C.E., Daneshkah, A., Eiser, J.R., Garthwaite, P.H., Jenkinson, D.J., Oakley, J.E., Rakow, T. (2006). Uncertain Judgements: Eliciting Experts' Probabilities, Chichester, UK, John Wiley & Sons, Ltd.

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12:30 – 13:30 *Bias in forensic peer review*

Erwin J.A.T. Mattijssen
1) Netherlands Forensic Institute, Haag, The Netherlands
2) Radboud University, Nijmegen, The Netherlands

Abstract: Most forensic feature comparison disciplines rely heavily on judgements of examiners. To ensure the quality of examinations, peer review procedures, where a second examiner reviews the work of a first examiner, have been an accepted standard for a long time. But, in recent years there has been criticism about the human factor effects in examinations performed by forensic examiners. Different types of peer review are used in practice, often applied without a clear empirical justification of the actual value in a forensic setting [1].
In peer review, the judgement of a second examiner can be influenced by the judgement of the first examiner when that examiner's conclusion is known to the second examiner. Anchoring bias [2], where adjustment from the judgement of the first examiner, the anchor, is insufficient is an inherent threat to such a peer review procedure.
In order to get a deeper understanding of anchoring bias in forensic peer review, we designed a study. In this study the relative number of conclusions where there is a discussion about the evidential strength between the first and second examiner are compared between two peer review procedures. In one of the peer review procedures verification is performed in a non-blind manner and in the other in a blinded manner [1]. This presentation shows the outcomes of the study by focusing on the occurrence of anchoring bias in forensic peer review.
Although this study was performed with firearms examiners the outcomes are useful for other forensic feature comparison disciplines.

References:
1. Ballantyne K.N., Edmond G & Found, B. For Sci Int, 2017; 277:66-76.
2. Tversky A. & Kahneman D. Science, 1974; 185:1124-1131.

13:30 – 14:00 **Break**

14:00 – 15:00 *Validation of selected steps of comparative examination of fibres*

Aleksandra Michalska
Institute of Forensic Research, Krakow, Poland

Abstract: One of the tasks that forensic fibres experts face is answering whether there are any fibres present on delivered evidence. And if yes, whether they are consistent with fibres from which delivered garments are made. In order to answer those questions, various analytical steps are performed, including fibres recovery, searching step, fibres recognition as well as a comparative examination of fibres. The last of these stages is mostly based on microscopic evaluation of images or spectra delivered by the microspectrophotometry (MSP) technique. This lecture will demonstrate validation of selected aspects concerning microscopic fibre recognition and comparison, including thickness measurements. The validation of MSP measurements and the overall procedure of fibres comparison introduced inInstitute of Forensic Research will also be discussed.

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15:00 – 16:00 *Validation of comparison procedure for glass microtraces*

Grzegorz Zadora[1,2], Aleksandra Michalska[1], Agnieszka Martyna[2]
1) Institute of Forensic Research, Krakow, Poland
2) University of Silesia in Katowice, Faculty of Science and Technology, Institute of Chemistry, Forensic Chemistry Research Group, Katowice, Poland

Abstract: This lecture will outline a step-by-step validation process of a comparison procedure for glass microtraces subjected to compositional analysis by scanning electron microscopy coupled with energy dispersive X-ray spectrometry (SEM-EDX). The discussion will cover key issues of the above-mentioned analytical procedure, including sample preparation and interpretation of analytical results by applying likelihood ratio models. A problem related to a question – does a change of SEM-EDX equipment in the laboratory require a new glass database used in the interpretation process? – will also be addressed.

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2nd December 2021

8:55 – 9:00 **Opening of webinar**

9:00 – 10:00 *Calibration in quantitative analytical methods: is it an overlooked task?*

Marco Vincenti
1) Department of Chemistry, University of Turin, Torino, Italy
2) Centro Regionale Antidoping - Orbassano (TO), Italy

Abstract: In the validation of quantitative analytical methods, most of the papers published in the scientific literature mention "calibration" just as one step - among many others – to be accomplished within the validation procedure. Actually, these papers do not consider that preparing a thorough calibration curve is pivotal to the correct assessment of most of the other validation parameters, including accuracy, exactness, limit of detection, limit of quantification, absolute uncertainty, and reflexively any other parameter involving a quantitative determination. To prepare a calibration curve under rigorous statistical control the following steps should be consecutively followed: (a) determination of homo- vs. hetero-scedasticity; (b) choice of the weighting correction (1, 1/x, 1/x2); (c) choice of the order of calibration model; (d) final choice of the calibration interval inside which certain performance properties can be assured. Quite luckily, once a reliable calibration model has been prepared, the remaining validation parameters can be established at once. The present lecture explains how to proceed rapidly and safely.

10:00 – 11:00 *Validation of subjective disciplines in forensic science with examples from paint analysis*

Knut-Endre Sjåstad
National Criminal Investigation Service, Oslo, Norway

Abstract: The process of paint analysis involves a combination of different subjective, qualitative and semiquantitative methods, methods that are subjected to different sources of variation. Hence, validation of the process, extending beyond the simplistic approach of proving that the equipment may be fit for purpose is challenging.

Robustness based on subjective, non-quantitative (i.e. qualitative) opinions may seem as contradictory. Measures to validate the "to the best of my knowledge" statement will be debated in this presentation. How do we in practice validate subjective disciplines without too many numbers to lean on?

11:00 – 11:30 **Break**

11:30 – 12:30 *Approaches and challenges in validation of hair analysis*

Alberto Salomone
1) Department of Chemistry, University of Turin, Torino, Italy
2) Centro Regionale Antidoping - Orbassano (TO), Italy

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Abstract: The quality of data is a key pre-requisite in forensic toxicology, as the final results are regularly used in judicial cases. This is true also for hair analysis, and for all the situations in which the hair analysis findings have a pivotal role for the final decision and the implementation of legal measures. Standards for fundamental validation parameters are provided in several guidelines, albeit these remain non mandatory documents. Therefore, the laboratories must choose among different approaches and adjust the proposed parameters to the method requirements and the application type. In this presentation, all main validation parameters will be discussed, with special attention to the most critical for hair analysis (e.g. recovery). In particular, the parameters will be presented according to the real situations in which hair analysis becomes crucial.

12:30 – 13:30 *Validation studies for oil spill identification*

Olli Laine, Kaisa Jalava, Martin Söderström
National Bureau of Investigation, Forensic Laboratory, Vantaa, Finland

Abstract: Oil spill identification studies include identification of an oil type and comparison of oil spill and potential source samples. Gas chromatography with flame ionisation detection (GC-FID) and mass spectrometry (GC-MS) are analytical techniques of choice in oil spill identification. In ongoing validation studies identification criteria have been determined for three types of mineral oil-based products, which are gas oil, heavy fuel oil and lubricant oil. Another goal has been validation of comparison criteria for a likelihood ratio (LR)-based oil comparison method, which is under development. For oil type identification numerous commercial oil products have been analysed with GC-FID and GC-MS techniques to determine identification criteria for three different oil types. In addition, mixtures containing various ratios of gas oil and heavy fuel oil, gas oil and lubricant oil and heavy fuel oil and lubricant oil have been analysed also with GC-FID and GC-MS techniques to obtain both identification and comparison criteria for mixtures of oil products.