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The system of opportunities for expert cooperation in international and national practice[1]

Introduction

At this year's Saint Ladislaus Day Conference, I presented how the organizational structures of European forensic institutes (Dutch, English, Estonian) create practical opportunities for institutionalized support in developing unified expert opinions. The presentation provided an international overview and summary for domestic criminologists, summarizing the system of expert collaboration from both quality management and a forensic perspective. One of the main objectives of the Hungarian Institute for Forensic Sciences (HIFS) is to strengthen collaboration across various expert fields. The legal background and institutionalized forms of joint expertise offer opportunities for experts working in different areas to address complex forensic problems more effectively.[2] At this year's Saint László's Day Conference, in the section titled *"The Science and Expertise of Forensics,"* my colleagues, Dr Eszter Dudás-Boda and Dr Alexandra Fullár, showcased joint activities conducted at the competency boundary between

[1] This study is the English version of the presentation delivered at the conference 'The Science and Practice of Law Enforcement' held in Pécs 27.06.2024.

[2] Act XXIX. of 2016 on Forensic Experts, 2. § (2).
Lontai, M. – Kosztya, J.S. (2023):: The challenges of institutional expertise in the light of technological development. [Az intézményi szakértés kihívásai a technológiai fejlődés tükrében.] Ügyészek lapja, 30(5-6) 75–90
Fülöp, P. – Ujvári, Zs. – Petrétei, D – Kiss, I. - Dudás-Boda, E. – Metzger, M.– Fullár, A. (2023): Az igazságügyi szakértői szemléltetés modern eszközei és lehetőségei [Modern tools and possibilities of forensic expert illustration], Ügyészek lapja, 30(5-6) 91–102
IRM Decree 31/2008 (XII. 31.) on the operation of forensic experts, 30-31. §
26/2017. (VI.30.) Action by the Director General of HIFS on the temporary Organizational and Operational Regulations of the Hungarian Institute for Forensic Sciences (with amendments in a unified structure)

the fields of anthropology and trace expertise. They showcased shared achievements and possibilities of their fields through practical case examples.

Complex forensic problems and their approaches

In institutional practice, it often occurs that an expert question lies at the boundary between relevant fields of expertise. In such cases, addressing the question without overstepping competencies is only possible through collaboration among experts, resulting in unified expert opinions. When two or more fields need to conduct examinations related to evidence, a critical issue arises; the order in which the evidence should be examined by each expert. The sequence is especially crucial when one field's examination might contaminate or destroy traces or material residues that are essential for another field's analysis.

In the case of complex examinations involving minimal residual material or trace evidence, the challenge is that, due to the required examination order, not all fields of expertise can achieve the highest level of certainty in their conclusions. For collaborating disciplines, some loss of information is inevitable. Therefore, it is advisable to evaluate the results from different examinations, collectively, to maximize the value extracted from complex evidence. A new approach is needed whenever existing methods are inadequate for extracting all—or the most—information from the evidence. The thorough, multifaceted examination and reconstruction of events and actions can only be accomplished through the combined efforts of multiple fields of expertise. The logical sequence of examinations can be determined through a comprehensive evaluation of possible scenarios using a multidisciplinary approach.

To answer the questions posed by appointing authorities and resolve complex forensic problems, experts establish propositions at both the source and activity levels.[3]

In a multidisciplinary approach, experts from various fields conduct examinations simultaneously. While staying within their own fields and methods, they build on and reinforce findings from other disciplines. In contrast, an interdisciplinary approach involves experts working together to conduct a complex, integrated examination of the issue, combining their insights to offer a completely new, multifaceted perspective.

The organizational structure of forensic institutes and complex, joint expertise

The Netherlands forensic institute (NFI) [4]

The NFI is one of the world's leading forensic laboratories, offering products and services from its state-of-the-art headquarters in The Hague to a wide range of national and international clients, including the police, prosecution, courts, as well as private and business sectors.

This state-owned organization, specialized in trace evidence and investigative objects, is structured into four main units: [5]

- The Biological Traces Department (human, animal, plant) conducts, among other things, anthropological, bloodstain pattern analysis, DNA, forensic medical, pathological, and toxicological examinations.
- The Chemical and Physical Traces Department (materials and objects) is responsible for examinations such as fire and explosive

[3] Petrétei, D. (2023): Working modes of forensic experts. In: Pecsi Hataror Tudomanyos Kozlemenyek XXV., 301–308

[4] Source: https://www.forensicinstitute.nl/ Accessed: 20.06.2024

[5] Source: https://www.forensicinstitute.nl/about-nfi/organisation/structure Accessed: 20.06.2024

Source: https://www.forensischinstituut.nl/forensisch-onderzoek Accessed: 20.06.2024

analysis, chemical analysis, drugs, elemental fibres, glass, paint, trace evidence, pyrotechnics, firearms and ammunition, and gunshot residue analysis.

- The Digital and Biometric Traces Department (digital, audio-visual, biometric) carries out tasks such as image analysis and biometric identification, recovery of deleted or damaged multimedia files, digital technology examinations, data analysis, search engine investigations into fraud, murder, and child pornography, reading and recovering data from digital and mobile devices, speech and voice research, statistical calculations, traffic accident investigations, and fingerprint identification.
- The Special Services and Expertise Department conducts multi- and interdisciplinary forensic examinations in an institutionalized manner. Experts working in the field of Interdisciplinary Forensic Examination (IDFO) can help provide an overview in a comprehensive opinion by demonstrating the coherence of the data and determining the combined evidential value of the traces. The IDFO examination requires at least two different versions of the event and examination results from multiple forensic expert branches. Within this department, there is a dedicated group focused on the microanalysis of invasive traumas. This group specializes in examining injuries caused by stabbing, cutting, incising, and blunt objects on victims of fatal violent acts. They investigate the cause and mechanism of these injuries in a multidisciplinary context, working alongside forensic pathologists, anthropologists, trace experts, and micro-trace material experts.

In cases of criminal investigations (OEM), the NFI's Crime Scene Investigation (PDO) team can provide trace experts who, upon the police's request, offer advice, support the investigation, and ensure the professional collection and preservation of evidence in cases involving crimes against life.

United Kingdom – Forensic Laboratories (EUROFINS®)[6]

EUROFINS is a multinational laboratory diagnostic enterprise that provides forensic services to various branches of the justice system in the United Kingdom, with scientific support from the Defence Science and Technology Laboratory (DSTL).[7]

As a private organization specializing in trace evidence and investigative objects, EUROFINS has two main service profiles from a structural perspective, offering the following examinations:

Firstly, their forensic expert services include physical forensic examinations. In the field of biological traces, their services cover the analysis of human body fluids, tissues, and bloodstain morphology. They offer a comprehensive case review service to support investigations at all stages, with a particular specialization in unresolved homicide, missing persons, and sexual offenses. A dedicated team handles cold cases, consisting of scientists with extensive expertise and over 150 years of accumulated forensic experience. These scientists review previously conducted work and use new technologies, the world's most advanced forensic tools, and alternative approaches to uncover crucial evidence.[8] The laboratory provides a wide range of DNA technologies and techniques, covering all routine and specialized analyses, and is constantly working on developing and applying new DNA technologies for forensic science.

In drug examination, they offer a broad range of tailored solutions specifically designed for identifying, analysing, and interpreting all types of drug abuse. For firearms and ballistics, the service includes standard packages for quick, cost-effective routine work, such as weapon identifica-

[6] Source: https://www.eurofins.co.uk/forensic-services/our-services/physical-forensics/ Accessed: 20.06.2024

[7] Source: https://www.gov.uk/government/organisations/defence-science-and-technology-laboratory/about Accessed: 20.06.2024

[8] Source: https://www.eurofins.co.uk/forensic-services/our-services/physical-forensics/cold-case-investigations/ Accessed: 20.06.2024

tion and classification, ammunition identification and classification, comparison of bullet and cartridge case markings, and comparative examination of gunshot wounds, with the capability of conducting on-site reconstructions and analyses in special cases.

In the area of tools and trace evidence examination, the services include the documentation and analysis of fire-related, toxic, and corrosive substances, and the collection of footwear impressions from 2D and 3D surfaces, including those in blood, on the body, and in soil. They also examine tire prints (from leather, fabric, and other objects), tool marks, locks, keys, fingerprints, composite traces (such as weapons, fabrics, gloves, etc.), glass, paint, textile fibres, gunshot residue (GSR), and unknown powders and liquids.

When processing sexual offenses, they provide a victim-centered approach, offering a comprehensive range of forensic expert services to the police, sexual assault referral centres, and prosecution authorities.

In the field of toxicology, they offer the full spectrum of services, including the analysis of extensive body fluids and tissue samples in cases of suspected poisoning and sudden or unexplained deaths, extracted from minute traces of drugs and poisons, as well as sub-therapeutic levels of medications, with result interpretation based on the specific circumstances of each case.

Secondly, in the realm of digital forensic services, they provide digital and audio-visual investigations, image and video file analyses, as well as examinations of mobile devices for their clients.

The Estonian Forensic Institute (EKEI) [9]

Operating within the police framework and organized into field-specific divisions, the professional organizational units of the forensic institute are

[9] Source: https://www.ekei.ee/en/efsi-organization/efsi-organization Accessed: 21.06.2024

the departments. [10] These include the Forensic Medicine Department, the Biometric Department, the DNA Department, the Document Examination Department, the IT Department, the Chemistry Department, the Toxicology Department, the Vehicle and Traffic Accident Investigation Department, and the Technical Department, which conducts forensic examinations (such as trace, weapon, fingerprint, and handwriting analysis). The regional forensic medicine departments are located in four major cities. Within the institute's structure, there is no institutionalized multi- and interdisciplinary unit; however, collaboration between experts from different departments is ensured.

The Hungarian Institute for Forensic Sciences (HIFS) [11]

The forensic expert institution, operating under ministerial supervision and organized by specialized fields and geographical location, consists of professional organizational units, namely institutes and departments. These include the Central Dactyloscopy, Genetics, Physical, and Chemical, Narcotics Examination, Criminalistic (trace, weapon, handwriting, and document examination), Toxicology Expert Institute, the Blood Alcohol and Fire Investigation Department, the Medical, Technical, Tax, and Accounting Expert Institutes, as well as the Regional Institutes. Within the institution's structure, there is no institutionalized multi- and interdisciplinary unit; however, expert cooperation and unified expertise are ensured across institutes and departments. In daily practice, a trace expert typically coordinates the investigations of the participating specialized fields, evaluates individual results, and interprets them comprehensively.

[10] Source: https://www.ekei.ee/en/ekei-kui-organisatsioon/organization-chart Accessed: 21.06.2024

[11] Source: https://nszkk.gov.hu/szervezet-es-tevekenyseg Accessed: 20.06.2024

The Importance of Accreditation

The management systems of the aforementioned foreign institutions are based on the application of the international standards ISO/IEC 17025[12] and ISO/IEC 17020,[13] as well as the ILAC G19 guidelines containing the modules of the forensic examination process, and the ILAC P15 ISO/IEC directive, which includes the requirements for various types of inspection bodies.

The management system of the Criminal Forensic Expert Directorate of the HIFS – consisting of six central expert institutes and an independent expert department – is based on the national standard derived from the MSZ EN ISO/IEC 17025 international edition and the application of the ILAC G19 guidelines.

The independent Hungarian accreditation body, the National Accreditation Authority (NAH)[14], serves as the internationally accredited organization recognized by the International Laboratory Accreditation Cooperation (ILAC).[15]

The ISO/IEC 17025/2017 standard defines the general requirements for the competence of testing and calibration laboratories, including international requirements for risk assessment, risk management, and risk-based thinking. Its main principles are a more flexible management system, less rigid regulation, and greater autonomy for laboratories in building their systems. Laboratories identify, assess, and neutralize the impact of their risks.

The ISO/IEC 17020/2012 standard defines the requirements for the operation of various types of organizations conducting conformity assessment and inspection activities, encompassing standards for the competence, impartiality, and consistency of their inspection activities.

[12] Source: https://www.iso.org/standard/66912.html Accessed: 21.06.2024
[13] Source: https://www.iso.org/standard/52994.html Accessed: 21.06.2024
[14] Source: https://www.nah.gov.hu/hu/ Accessed: 19.06.2024
[15] Source: https://ilac.org/ Accessed: 19.06.2024

The management systems, procedures, and risk management of accredited organizations, along with continuous internal and external monitoring, ensure compliance with standard requirements.

ENFSI Multidisciplinary Collaborative Exercise (MdCE)

For forensic laboratories, the use of collaborative exercises (CE) and proficiency tests (PT) is a routine part of the management system. Traditionally, PTs and CEs are discipline-specific tests and exercises, meaning that typically, a single type of laboratory examination is conducted on the test material. However, in real cases, the same forensic examination material often needs to be examined from various evidence perspectives. Currently, PT and CE providers do not offer multidisciplinary exercises for forensic institutes capable of complex, cross-disciplinary cooperation.

Recognizing the need for multidisciplinary collaboration practices and sharing gained experiences, the European Network of Forensic Science Institutes (ENFSI) has summarized the concept, planning, preparation, implementation, coordination, and evaluation of a series of exercises covering multiple forensic disciplines. The ENFSI's expert working groups have been successfully conducting collaborative exercises within their fields for years. [16]

The examination areas participating in ENFSI's Multidisciplinary Collaboration Exercises so far include:

- **2022**: DNA, fingerprint, document, and handwriting analysis
- **2023**: DNA, fingerprint, explosives, and hair/fibre analysis
- **2024**: DNA, fingerprint, fire, and burn residues, document, and handwriting analysis

[16] Zampa, F. – Bandey, H. –Bécue, A. – Bouzaid, E. – Branco, M. J. – Buegler, J. – Kambosos, M. – Kneppers, S. – Kriiska-Maiväli, K. – Mattei, A. – Zatkalikova, L.(ENFSI 2022): Multidisciplinary collaborative exercise: organisation and outcomes. Forensic Science International: Synergy 2024. 8 100465

These exercises are popular within the ENFSI community, and sharing the results enhances participants' knowledge and significantly contributes to the development of their specific fields. Efforts are ongoing to establish a unified best practice and develop a recommended examination methodology.

Summary

Through my presentation at the St. Ladislaus Day conference and this publication, I aim to highlight the importance of conducting complex investigations with a multi- and interdisciplinary approach, as well as the significance of unified expert analysis. Opportunities for cooperation exist both within institutions and between institutions and individual experts.

Western European forensic institutions support expert collaboration through their evidence/examination object-specific and institutionalized organizational structures, utilizing a multi- and interdisciplinary approach. In these institutions, cutting-edge forensic services are provided in an institutionalized manner to their clients. In contrast, the professional specialization and institutional structure of the Estonian and Hungarian institutes enable collaboration across disciplines. Specifically, in the case of the HIFS, the professional fields are suitable for multidisciplinary analyses based on personal expert relationships, and for issuing unified expert opinions that are grounded in law.

The development and accreditation of complex investigative methods and procedures, along with multidisciplinary practices, facilitate expert collaboration. As a result, it becomes possible to extract the maximum amount of information from the examined objects, providing all parties involved in the justice system with a more comprehensive picture of the investigated event, and ultimately supporting the establishment of the most well-founded facts possible.