

## **“Improving the Reliability and Validity of Forensic Science and Fostering the Implementation of Emerging Technologies”**

ENFSI as a network of over seventy forensic Institutes from European countries, consistent with its aim to ensure that the quality, development and delivery of forensic science throughout Europe is at the forefront of the world, is imperative to have the foresight to recognize the scientific and technological trends that will concern forensic community in the years to come. The result of the upcoming trends in forensic science will undoubtedly include the provision of new methods to address pending forensic issues along with new challenges to deal with.

ENFSI builds and adjusts its strategic planning concerning innovation and research to ensure that the latter results in “products” which meet its stakeholders’ needs. ENFSI’s monopoly status in Europe due to its uniqueness and its broad representation in Europe enhances collaboration and implementation of innovation’s results that can contribute to a safer society.

In December 2011 the Council approved the creation of a European Forensic Science Area<sup>1</sup>, the so called EFSA 2020. During the Dutch Presidency (in 2016) an Action plan<sup>2</sup>, based on the EFSA 2020 was approved by the Council. ENFSI was appointed by the Council, as main coordinator in three actions and cooperated for two additional actions due to the recognition of its important role “as a platform for efficient knowledge exchange, with a view to developing minimum quality requirements, facilitating international collaboration and identifying important systemic needs for the forensic community”<sup>2</sup>. The EFSA 2020 has come to an end (as a Council Conclusion from the Law Enforcement Working Party) and ENFSI on the basis of the experience gained, intends to draw up the way towards “Improving the Reliability and Validity of Forensic Science and Fostering the Implementation of Emerging Technologies” by this vision document.

The Vision is a position statement providing a European direction and promoting research, development and innovation for forensic science. The focus areas in the Vision are results of ENFSI’s close collaboration with strategic partners in International Forensic Strategic Alliance<sup>3</sup> - superscripted (IFSA). The findings of the SOCTA 2021<sup>4</sup> and the EMPACT Priorities and Common Horizontal Strategic Goals (CHSG) mentioned in the Council Conclusions for EMPACT 2022-2025<sup>5</sup> were taken in consideration when establishing the Vision. The outcome of research and development in the focus areas listed below, will positively impact on efforts and actions to tackle crimes in the EMPACT Priorities areas by providing multidisciplinary forensic capabilities to Law Enforcement and the Judicial Authorities.

All activities which are included in the Vision aim to provide reliable, transparent, impartial and robust forensic science services all the way from the crime scene to the courtroom.

The Vision is structured in three pillars including focus areas which are important for ENFSI when developing strategic plans and defining new project themes.

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<sup>1</sup> Council Conclusion on the vision for European Forensic Science Area 2020. Approved December 2011

<sup>2</sup> Council Conclusion 10128/16

<sup>3</sup> For more information on IFSA please visit [ifsa-forensic.org](http://ifsa-forensic.org)

<sup>4</sup> SOCTA- Serious and Organised Crime Threat Assessment (published 12 April 2021)

<sup>5</sup> Council conclusions setting the EU’s priorities for the fight against serious and organised crime for EMPACT 2022 – 2025 (st8665/21)

## The content of a strategic foresight

The purpose of the Vision is to support harmonized and balanced development of forensic science and its role, which significantly contributes to making law enforcement in Europe more efficient and effective.

The following focus areas under each pillar are the most important for strengthening the position of forensic science:

### 1. Meeting the Future

**1.1 Biometrics** allows a person to be individualised and authenticated based on a set of recognisable and verifiable data, which are very distinctive. There are a number of issues related to the exchange of biometric data; therefore, ENFSI encourages studies to have a safe and robust procedure for use and exchange of biometric data.

**1.2 Applications of Artificial Intelligence (AI)** is an umbrella term for explaining advanced computer intelligence. It summarises the efforts to simulate human cognitive thinking and decision-making, leading to machines able to use experience for learning, adapting, adjusting and revising to new inputs on basis of large amounts of data. ENFSI should explore the possibilities of using AI in processes relevant to the forensic science.

**1.3 New tools for crime scene investigation;** Documenting, recording and analysing scenes needs to evolve to incorporate the investigative opportunities provided by developments in point of response analysis and developing digital technologies. Opportunities for new communication- and case presentation- methods should be explored and harnessed to emphasise the value of findings at the trial in order to assist the court in its judgment. ENFSI should support this to be explored in order to elaborate the opportunities provided by developments in the area.

**1.4 Emerging biological and chemical evidence types ‘-omics’** are novel methods of analysis (‘-omics’) that can lead to the identification of large molecules such as proteins or metabolites which can provide information about people, their activities and their environment. This has already proven their value to forensic science, especially where samples do not contain DNA or its analysis is limited to degradation or interferents, the sample may contain sufficient proteins for informative analysis. ENFSI should keep updated concerning emerging techniques to be aware of their possibilities/limitations, promoting dissemination of knowledge and advancements in this broad area.

**1.5 Emerging technologies and Industry 4.0;** as new science and technology innovations, such as nanoscience and nanotechnology, occur, it will create new requirements for forensic services, including the management of big data (IA, ‘-omics’, forensic intelligence). ENFSI should keep updated concerning coming techniques to be aware of their possibilities/limitations.

## 2. Strengthening the impact of forensic results

**2.1 Transfer, persistence and background abundance;** Understanding how materials transfer from one surface to another, how they persist once transferred and how the background abundance of materials is fundamental to the interpretation of evidence in scientific examinations. This is a critical aspect of understanding which activities may have been responsible for the presence of the material. ENFSI should encourage studies to understand transfer, persistence and background abundance to underline the reliability of forensic examination and interpretation.

**2.2 Forensic data sharing** across agencies and jurisdiction is on-going and is predicted to increase in the future. Where relevant, the forensic community should study the differences in data collection methods and file formats which hinder the exchange of information, vital to maximizing the use of forensic analysis and comparison. ENFSI supports the harmonization of formats in datasets and offers tools to share reference data.

**2.3 Facing the challenges with Migration-Trafficking-Smuggling,** ENFSI should facilitate awareness raising initiatives with the target groups from the investigative authorities to promote integrated multidisciplinary capabilities of the forensic service providers in combatting migration, trafficking and smuggling. This concept should be of high priority within the forensic community.

## 3. Demonstrating Reliability in Forensic Results

**3.1 Fundamentals in Forensic Science;** including a broad scope of possible areas to explore e.g. the understanding error rates in subjective and interpretative analysis involving pattern recognition of features of comparisons for individualizations and source attribution, or the development of ground truth data sets across a range of evidence types for source and activity level. ENFSI supports studies of the fundamentals in forensic science; to explore it further in order to develop or confirm that used methods/procedures are valid and robust in forensic conditions, to enhance the forensic science practice.

**3.2 Forensic human factors;** understanding of how human interaction impacts on decisions at all levels of a forensic investigative process, from the scene of crime to the court room, which are critical for the development of safe justice outcomes. ENFSI should encourage studies in this broad area.

**3.3 Quality and competence assurance** are topics that are most relevant when exploring new techniques and procedures. ENFSI should promote the continuation of support in quality and competence assurance matters also in relation to new demands that are relevant with new techniques or methods that are not yet fully established in the forensic community. Dissemination of information/training activities (including e-learning) on an expert working level and the conduction of proficiency tests/collaborative exercises are important tools to achieve this goal.