



Technical Note

The Portuguese Association of Forensic Sciences Model for Forensic Expert Certification: An Urgent Need and Regulation Proposal [†]

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- [†] Regulation of the Professional Practice of Forensic Specialists (RPPFS) approved by the Portuguese Association of Forensic Sciences.



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Abstract: A certification for Forensic Specialists is urgently needed. Indeed, with the “CSI Effect”, assorted education in this field flourished in many countries, resulting in discrepancies in experts’ skills and quality that may compromise judicial decisions. Our technical proposal aims to pragmatically establish a Regulation of the Professional Practice of Forensic Specialists (RPPFS) by defining the general requirements for its recognition, which must include appropriate experience/training/pedagogical processes for each of the five certification levels. This regulation has been approved by the Portuguese Association of Forensic Sciences and is advocated and recommended to reduce divergence among experts’ skills. This general regulation can be easily applied to major forensic specialties such as clinical forensic and basic medicine and those working within the framework and intersections of biology, chemistry, physics, mathematics, among others. Further guidelines for certification must be produced for each forensic area.

Keywords: forensic sciences; certification; accreditation; competence; specialist; education; graduation



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1. Introduction

Forensic Sciences are concisely defined by the cliché “the application of science within a legal framework”. Partially motivated by the dissemination of fictional criminal series, higher education courses in the Forensic Sciences have increased their scope, syllabus, and size. In this field, the forensic specialists certification is of uttermost importance to assure scientific rigorousness in such a sensitive sector of society, with the aim of protecting the object of forensic sciences, which is, in a broad sense, the victim. Certification is also relevant for qualifying professionals to deliver scientific and credible forensic reports in order to refrain from compromising judicial and judiciary decisions. Miscarriages of justice in previous decades have been often neglected by the involved stakeholders, despite their relatively high

occurrence and significance [1–5]. Traditionally, forensic institutions are largely unregulated by governments, relying on self-initiated operational procedures and a limited budget investment for developing forensic-specific standards and operational policies [6].

Certification represents a relevant procedure by which an authoritative body formally recognises that a specialist is competent enough to conduct specific tasks. In this work, we aimed to pragmatically define general principles concerning the professional practice of forensic specialists and recognising and regulating it. The main objective is to limit misleading statements solely based on empiricism, perception, and “innate talent” with no statistical support while reinforcing the scientific basis of all evidence in Forensic Sciences. Interestingly, the European Union supported the “find an expert” project [7], which compiles national expert registers when existent. Moreover, relevant national legislation such as the Netherlands Register of Court Experts (NRGD) has been available since 2010 and provides a consistent quality framework regarding experts for Criminal Courts [8] and potential expansions to both Civil and Administrative Courts are expected. Sommer [9] reviewed the United Kingdom’s various attempts to assess, certify and register expert witnesses, including those from specific specialisations such as digital evidence. Notable differences also exist between countries, addressing the importance of reflecting, regulating, and harmonising this matter across borders.

In this study, we aim to present a Regulation of the Professional Practice of Forensic Specialists (RPPFS) representing a wide-ranging scheme that was approved by the Portuguese Association of Forensic Sciences. This represents a general framework, and specific areas of Forensic Sciences will have their own regulations regarding technical standards, skills, mandatory knowledge, and education that must be fulfilled, thus supporting the Justice duly. Our recommendation—linking higher education and underlying research and scientific development, with professional training—should be considered alongside other standards, such as the International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) (e.g., ISO/IEC 17025, ISO/IEC 21043 series) and pre-existing laws, national standards and codes of practice (e.g., Forensic Science Regulator Act introduced in 2007 to England and Wales) [10,11].

2. General Attributes of a Forensic Specialist

A forensic specialist is a qualified professional who has forensic working experience and education certified by a training entity and/or that has attained a bachelor’s degree, master’s, PhD, and/or habilitation in Forensic Sciences. The general competencies of forensic specialists encompass the following: (i) offering qualified expertise to the administration of Justice; (ii) practising Forensic Sciences while respecting the *legis artis* of each area; and (iii) contributing to scientific research and teaching within the scope of their training.

Forensic specialists can exercise their professional activity in institutions where the forensic speciality is necessary, namely in the following: (i) courts supporting prosecutors, lawyers, and judges; (ii) lawyer offices; (iii) security forces/organisations; (iv) technical-scientific police laboratories; (v) national institutes of Forensic Science; (vi) forensic laboratories; (vii) border controls; (viii) company security offices/departments; (ix) insurance companies; (x) audit companies; (xi) social reintegration services; (xii) assistance centres for victims; (xiii) commissions for the protection of children and youth; (xiv) hospitals and health centres; (xv) casework in private consultancy to prosecution/defence; and (xvi) education or research in universities.

3. Professional Experience, Continuous Post-Graduate Education, Bachelor, Master, and Doctoral Degrees, and Habilitation Title in Forensic Sciences

Professional experience; continuous post-graduate education; bachelor’s, master’s, PhD degrees; and habilitation obtained in general/specific forensic areas or a broad scope of scientific areas are eligible for certification if the professional is able to demonstrate competency in professional forensic activity. In this RPPFS, only the preferred characteristics for training and education in Forensic Sciences are defined. For our current proposal, the

European Credit Transfer and Accumulation System (ECTS) was followed as a tool of the higher education area to create more transparent study plans and courses. The general concepts and background for the five levels of the RPPFS are provided below:

- I. Professional experience and continuous post-graduation education—the professional who, although not holding a high university degree, has professional experience of at least 10 years in a specific forensic setting. Although not mandatory, it is highly recommended that this professional experience is complemented by a post-graduation/specialisation course of approximately 30 ECTS in a generalist or specific area of forensic sciences obtained from an institution recognised by law to offer post-graduation courses. To participate in this education, the scientific board of the training institution must recognise the previous professional experience of the expert.
- II. Bachelor's degree (first cycle of studies)—at least 3–4 academic years (minimum 180 ECTS) focused on Forensic Sciences, through the biological and biochemical, chemical, physical, medical, odontological, psychological, sociological, mathematical, statistical, earth sciences, computer science, ethical, and law domains. The training provided in this degree should allow aspiring forensic specialists to obtain and develop knowledge and skills in various scientific areas of intervention in Forensic Sciences suitable for investigation at the crime scene and the production and preservation of evidence presented in court. The degree's general objectives should train graduates capable of solving problems inherent in forensic expertise, according to recognised procedures and respecting scientific, social, and ethical principles established by the judicial system. The curricular plan must combine the institution's training with the forensic experience of a team of experts with several hands-on classes taking place with simulated forensic practice. This relationship is vital for qualification in specific areas and knowledge interchange between academy/research settings and daily practice, which are essential for pedagogical outputs. The following scientific areas should always be covered, involving theoretical–practical and practical classes: Analytical Chemistry, Ballistics, Biochemistry, Biopathology, Biotoxicology, Criminal Law and Criminal Procedure, Cybercrime, Criminology, Ethics and Deontology in Forensic Sciences, Environmental Toxicology, Forensic Psychology, Fire and Explosives, Food Toxicology, Forensic Anthropology, Forensic Botany, Forensic Entomology, Forensic Dental Medicine, Forensic Laboratory, Forensic Genetics, Forensic Geology and Soil Science, Forensic Microbiology, Forensic Serology, General Principles of Forensic Sciences, Handwriting Analysis and Forensic Linguistics, Human Anatomy, Fingerprint Analysis, Mathematical Methods of Data Analysis, Medico-Legal Autopsy, Instrumental Methods of Analysis, Organic Chemistry, Psychoactive Substances, Sample and Traces Collection, Physics, and Victimology. At the end of the course, students should be provided the opportunity to develop a forensic investigation research project and gain professional experience in forensic settings.
- III. Master's degree (second cycle of studies)—at least 1–2 academic years (approximately 120 ECTS, with no less than 50 ECTS dedicated to a research project in Forensic Sciences) providing specific training for professionals to address issues related to obtaining scientific-based evidence in a multidisciplinary forensic context. A master's degree also promotes scientific research, preventing the theorising of practices from appearing abstractly or only based on empirical experience. These specific objectives provide future forensic master's with knowledge and skills, including the following: (i) conducting master's dissertations with forensic relevance and publishing in specialised international journals with peer review; (ii) integrating multidisciplinary teams for judicial or judiciary cooperation; and (iii) developing in-depth knowledge in various intervention areas of the Forensic Sciences, extending the standard activity of investigation, innovating, and deepening professional skills.

- IV. PhD (third cycle of studies)—at least 3–4 academic years (approximately 240 ECTS, 180 ECTS of which are dedicated to a research project in Forensic Sciences), aimed at developing a thesis in Forensic Sciences. In the end, the forensic specialist should have improved knowledge and skills surpassing point III above, supervising future candidates and cooperating in the teaching of Forensic Sciences. The PhD can also be organised in areas of specialisation, as previously discussed [12].
- V. Habilitation in Forensic Sciences—attests the quality of the pedagogical, academic, professional, and scientific curriculum in Forensic Sciences; the capacity to perform research in the area; and the aptitude to direct and conduct independent scientific work. This recognition diploma can only be awarded by committee examinations based on the following: (i) an appreciation and discussion of the candidate's curriculum, mainly focusing on the relevant research activity, advanced training, and the authorship of scientific works of recognised quality, their current research activities and future projects, and other relevant aspects of the curriculum, namely, the pedagogical work; the supervision of dissertations and theses in the scope of master's and doctoral degrees, the dissemination of knowledge and culture, and providing services to the community; (ii) the presentation, appraisal, and discussion of a report on a curricular unit, group of curricular units, or cycle of studies in Forensic Sciences; and (iii) a seminar presentation or lesson on a topic within the scope of Forensic Sciences and its discussion.

4. Technical Proposal for Five Levels of a Forensic Specialist

A designated academic/scientific entity in each country must award and validate the levels mentioned below and may delegate certification in specific forensic areas to other entities. For all due purposes, the five levels of a forensic specialist are as follows:

- (a) **Level 1 Forensic Specialist**—the qualified professional in scientific areas of Forensic Sciences certified by experience or continuous post-graduate education in an accredited institution, in accordance with point I. The candidate must demonstrate a curriculum in forensic areas (e.g., Forensic Toxicology, Forensic Dental Medicine, Forensic Genetics, Forensic Anthropology). Each specific area will produce their own guidelines regarding minimum hours of education and/or the minimum period of forensic professional routine expertise. It should be noted that even within a particular forensic area, sublevels of expertise and hierarchy may require specific education, as recently suggested [13];
- (b) **Level 2 Forensic Specialist**—the qualified professional with a bachelor's degree in Forensic Sciences or specific speciality forensic areas, in accordance with point II;
- (c) **Level 3 Forensic Specialist**—the qualified professional with a master's degree in Forensic Sciences or in specific forensic speciality areas, in accordance with point III and the general recommendations for a Level 2 Forensic Specialist (broad scope bachelor's admitted);
- (d) **Level 4 Forensic Specialist**—the qualified professional with a PhD degree in Forensic Sciences or in specific forensic speciality areas, in accordance with point IV and the general recommendations for a Level 2 Forensic Specialist (broad scope bachelor's admitted);
- (e) **Level 5 Forensic Specialist**—the qualified professional with habilitation in Forensic Sciences, in accordance with point V and the general recommendations for a Level 4 Forensic Specialist.

Each level can be paired with specific areas within Forensic Sciences, as will be defined in future regulations (e.g., Level 1 Forensic Specialist in Ballistics and Level 2 Forensic Specialist in Forensic Genetics). Each area will produce specific guidelines complementing the general requirements. Applying for certification in each speciality will demand the general base requirements specified above.

5. Conclusions and Future Perspectives

Forensic Sciences is a fascinating “brave new world” that attracts the daily attention of human resources and media. Forensic specialists confront constant challenges gathering, preserving, and examining evidence to present their interpretations in clear, comprehensible, and scientifically valid reports [8,14,15]. The complexity of Forensic Sciences arises from its diversity of disciplines, which are broadly characterised into chemical, biological, and physical sciences [14]. Our RPPFS is a proposal to regulate the skills/education that forensic specialists should have to assist lawyers, judges, and other judicial and judiciary system players. While in some jurisdictions, experts are appointed by the judge, as it occurs in France, in other countries such as in Portugal and United Kingdom, they are chosen and instructed by the parties themselves [7]. Since all involved players are becoming more aware of certification benefits [10], we expect this proposal to be increasingly adopted by different countries. Moreover, given the likely differences in the curricula and practical skills assessments between different universities, it will be the duty of national professional forensic associations or designated governmental entities to award, with a scientific sponsorship, those with validated and recognised education in the forensic field. Since one common problem is the duration of the trial, qualifying forensic specialists based on their professional, academic, and scientific skills will also certainly help to reduce time to make the court decision as previously suggested [7]. Regarding scientific background, several authors highlight that, for admissions of scientific evidence, it is important that data undergo the scrutiny of peer review and publication [16,17]. Nevertheless, since authors and peer reviewers are humans, misconduct may lead to dubious results and conclusions or publication in non-recommended predatory journals [18–20]. Obtaining this certification proves that a forensic specialist has reached a certain standard of understanding and education in Forensic Sciences in general or in a specific area. However, this does not exclude the need to comply with regulations and requirements eventually established by professional associations such as Medical Associations, Dentistry Associations, and Psychology Associations, which protect a given speciality (e.g., forensic medicine, dental medicine, psychology). Although we are aware that this reality is more easily applied to European countries and further enhances ERASMUS cooperation programs of the European Union in this field, other non-European countries can also find a relevant platform for certification after adapting to the specific academic and judicial organisations of each country.

Finally, it is important to highlight that, in their daily routine, Forensic Specialists, in addition to ensuring the chain of custody, are obliged to adopt ethical and deontological conducts consistent with the role they exercise and exert functions with independence and autonomy. Therefore, it is incompatible with their profession to exercise any profession or position that hampers those core values in whole or in part or when there are possible conflicts of interest. Moreover, as in all fields of science, applicants should keep their skills and knowledge up to date.

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