Accreditation and standardization in forensic science - present and future of reliability of forensics examination and expertise

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Abstract

The author deals with the issue of standardization and accreditation in forensic science as a key factor in achieving the reliability of forensic evidence. In this regard, the author gives a concise summary of the application of the international standard ISO 17025, which refers to the accreditation of forensic laboratories. The paper presents forensic institutions in Europe that are accredited to ISO 17025. With tending of assurance of the reliability of forensic work, as one of the cornerstones of a fair judiciary, autor in the paper also points on that what is considered as future in the field of accreditation and standardization of forensic work. That is mosty related on the work of the technical committee TC 272, which is based on the development and application of forensic standards, which will include a complete forensic process from finding on-site material traces to the presentation of findings and opinions by forensics at the court room.

Keywords*: forensic science, accreditation, standard ISO 17025, reliability of forensic evidence, technical committee TC 272.*

I. Introduction

For the last 30 years role of forensic examinations and expertise is of great importance for the work of the judiciary system. Namely, at the end of the twentieth century, analytical methods were developed using primarily DNA testing (deoxyribonuclearic acid), chromatographic methods (gas mass and liquid chromatography), scanning electron microscopy (which could increase up to 300,000 times), and in particular the development of information technology (computers, internet, mobile telephony), lead us to the situation that even small traces can be faunded on the crime scene, identified by using of modern technology, and presented at the court by forensic experts. The use of identification forensic methods, such as DNA analysis and fingerprint analysis and the creation of applicable and operational databases with more than a million search patterns (for example, the DNA Database DNA Database - NDNAD National DNA Database, contains about one million ipo DNA profiles), classified as forensic evidence as an indisputable means of illuminating and prosecuting criminal offenses. This is because modern forensic methods meet high quality criteria of evidence, namely: relevance and credibility. In forensic expert circles, for the DNA realm of DNA testing, it is commonly said that only sky is the limit of their potential, and for the domains of digital forensics, it is commonly said, neither sky is the limit of their ability!

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However, in the time of expansion and (non) justified optimism of the forensisation of science and their application in the judiciary, there is anxiety and caution. Persons who possess expertise and skills gain unusual power. Engaged by the judiciary, protected by the authority of science, provide testimony that justice participants simply can not understand. There is a paradox similar to Juvenal's critique of Plato's state who will guard the guardians? That is, who can establish the probative value of the findings and opinions of the forensic who is called before the court precisely because of its knowledge, which court and the parties not posess? Furthermore, are the tests, measurements, calibration, etalonization used in contemporary forensic examinations scientifically valid? Are forensic laboratories performing sophisticated examinations and expertises, staffed and technically trained and equipped to produce technically valid results? As mentioned in the text so far, there is a clear and important role for forensic examinations and expertises in order to illuminate criminal offenses and prosecute their perpetrators. However, in the proper sense, the Forensic Laboratory has demonstrated that the tests and expertise carried out by competent and scientifically based must be accredited in accordance with the international standard ISO 17025. In contemporary judicial systems in the European Union and the United States, confidence in the forensic forensic examinations and the expertise is based on the application of ISO 17025 as the most important single standard for standardization and testing[1].

II. Application of ISO 17025 standard in forensics

Confidence, reliability, precision, accuracy and other activities for forensic examinations and expertises in the EU and candidate countries are carried out by the European Network of Forensic Science Institutes (ENFSI)[2]. The most important activity of this reference and respectable netwokr is the impleement of ISO 17025 quality standard in forensic laboratories in European countries. This is best described in the ENFSI Quality Policy[3] (Policy on standards for accreditation), where, among other things, it states that one of the aims of the ENFSI is to forensic evidence preforming in laboratories accredited to ISO 17025.

The ISO 17025 standard is intended for the use of the development of laboratory quality management systems, administrative and technical operations (Majstorović & Majkic-Sing, 2006:5). The use of this standard will, among other things, help, in cooperation between laboratories of different countries, which is of great benefit in illuminating criminal offenses of cross-border crime, terrorism and corruption. The purpose of applying the ISO 17025 standard in forensic laboratories is to achieve reliability of testing and results obtained in the laboratoryes.

The quality of analysis and the results of judicial expertise are important for the judicial system, law enforcement, crime prevention and health policy, as well as international harmonization, exchange and coordination of information and forensic data in the world.

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[1] ISO / IEC 17025 was first mentioned in 1999 by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), (Calibrate Inc./The Pipet People, 2014).

[2] www.enfsi.eu.

[3] http://enfsi.eu/wp-content/uploads/2016/09/160727_qcc-acr-001-006_policy_on_standards_for_accreditation.pdf.

Compatibility and acceptability of laboratory results between the countries has been facilitated by their compliance with ISO / IEC 17025: 2005 - an International Laboratory Quality Test and Calibration Standard, in relation to the recommendations of the ILAC-G 19: 2002 International Laboratory Accreditation Association for Forensic Scientific Laboratories. Compliance with ISO 17025 also ensures compliance with ISO 9001, which in itself is not a substitute for ISO 17025 compliance, ie is not sufficient for the technical competence of the testing lab.

Quality devotion is the functional principle of forensic testing and expertisation. Standrad quality ISO 17025, pays attention to the technical conditions (including the importance of expert training, adequate accommodation of their necessary equipment and environmental conditions, validation methods, access to the required equipment and reference standards, quality control and reporting of results) and management requirements (including document control, response to customer needs, preventive and corrective action, the need for regular audits, compliance with the quality management system and continuous improvement). In the following, we will present on which way application of certain parts of the standard contributes to the reliability of forensic testing and expertisation. Also, since standard ISO 17025, as a rule, covers the entire work of the forensic laboratory, this description of all the parts of the standard greatly overcomes the scope of this work, and hereafter we provide a description of the pieces of standards relating to the reliability of forensic application in order to illuminate criminal offenses and prosecute their perpetrators.

1. Log Control / Chain of Evidence

Accredited forensic laboratory according to ISO 17025 standard, it has systems for making, marking, managing, storing, moving, locating and destroying all records in paper and electronic form.

The technical records include all written case-related materials, including sample layout description, document dossier, case files (including drawings and diagrams), photographs, telephone conversations, spectrums, calibration and other quality control data, working parameters instruments and records, reports, statements, etc., records and records on the maintenance of instruments and training of a court expert, records of competencies and authorizations.

Technical records shall be kept in a safe and secure place, to avoid damage, decay, unauthorized access or loss, for a period depending on the needs of the applicant / investigator (police, court and / or prosecutor) and relevant regulations under the jurisdiction of forensic laboratories. In this way, by applying the aforementioned standard part, in a forensic laboratory accredited according to ISO 17025, the possibility of modification, contamination, subsequent changes and replacement of the test material for testing is excluded (Simonović, 2009:237).

2. Staff-forensics

The greatest treasures of a forensic laboratory are people who work in it! The forensic laboratories and forensics employed in them have policies and procedures for identifying training needs and providing training to staff-forensics in order to assist in achieving and maintaining skills (eg through defined training programs at the workplace, participation in scientific and expert meetings, seminars, conferences and workshops, technical training, courses by suppliers for instrument work and maintenance, and further education and training). While training is being done, the staff-forensics have been closely

monitored, in a way to monitor and evaluate the effect of the training. If the training effect is tested or verified, check criteria should be determined (eg by tracking the appropriate tests or by an expert's analysis, or by comparing the results of individual tests with the results obtained from other training forensics). When needed, training programs also include training on the development of evidence in court.

For each forensic expert, a record of his / her education, qualification and training is kept, together with a list of jobs for which he has been trained and authorized (eg for conducting certain types of tests, issuing test reports, giving opinions and interpretations, and working with a particular type equipment). This information should include a date, responsibilities and authorizations, so that all forensics clearly understand the scope of their duties and responsibilities. By applying this part of the standard, the full reliability of the forensic experts who performed the examinations / expertises in the same field of examinations / expertise is provided.

3. Forensic staff specifics

When it comes to so-called. Forensic staff, regardless of whether they are doing fieldwork (on the scene of a criminal event) or in a lab, it is necessary to have certain skills related to the evidence material such as: detection, identification, protection, documentation (written and photo / video, packaging, labeling, safe transport, to ensure that it does not change the evidence material by proper handling, which could make it partially or completely unsuitable for the analysis and thus negatively affect the results of the analysis.

Personnel should be trained to ensure that no material changes (physical, chemical or biodegradable nature) occur to prevent material loss or contamination, to avoid sampling, both when locating and sampling, as well as during transport or disposal (if necessary fridge / freezer), and handling the same during laboratory work and storage after completing the analysis.

In this respect, it is necessary to know the basics of handling different materials (liquid, solid, powdery, volatile, chemically aggressive, poisonous, biologically dangerous) and be aware that many materials may have latent nature (invisible) or are present in very small quantities microtracks) and to find the necessary knowledge of optical detection methods (eg use of lupe or light sources of different wavelengths - commercial products: UV lamp or forensic light).

Forensic staff must also have sufficient knowledge in the area of application of legal regulations relating to drug-related material handling, treatment of persons face-to-face when encountering such material, with persons related to the particular case and must be trained for teamwork (eg. with a prosecutor, medical staff, etc.).

In many countries, laboratory forensics have the task of appearing as expert witnesses in court proceedings, ie, at the main trial, elaborate and interpret the results of the analysis and answer the questions of all participants in the proceedings (prosecution, defense, judges, accused and injured parties).

In this regard, appropriate staff must have the necessary education, knowledge and experience to carry out this responsible job.

4. Methods of testing and analysis, validation of methods and procedures

Forensic laboratory accredited according to standard ISO 17025, use appropriate methods and procedures for all tasks: sampling, handling, transport and storage of evidence, use of equipment, testing, evaluation and interpretation of results and

reporting. Methods and procedures are fully documented and easily accessible to all parties in a judicial procedure.

The documented method contains the following:

– Method name, method reference number;

– Scope of the methods (eg analytes, matrices, concentrations, ranges, known interferences - the interactions of the individual components that the analysis material may contain);

– Theoretical principles of the method;

– A set of validation parameters and reference to a document containing validation data;

– Chemicals, appliances and equipment, including technical specifications; Reference standards, required materials, required ambient conditions (eg room temperature) and some stabilization time (eg setting time for GC);

– Description of the step by step process, including:

a) any special precautionary measures taken;

b) requirements for sampling, marking, packing, transport and preservation of samples;

c) preparation of samples, reference materials, standards for control and calibration of the analysis;

d) requirements for checking and calibration of equipment (eg standard sample release, adjustment and mass spectrometer calibration);

e) process of analysis / test procedure and quality control (eg use of blind tests, control and calibration standards);

f) recording and processing of results (eg calculations, preparation of calibration curves and scales), including acceptance or rejection criteria (for example, if the results out of the calibration range or the control of the quotient are unacceptable);

g) results report requirements;

h) requirements for the Report on the Unreliability of the Method.

5. Development and validation of forensic methods, used for testing and expertisation

The methods and procedures used for forensic examinations and examinations are based on papers published in reviewed scientific journals (for example, Forensic Science International, Journal of Forensic Sciences, Journal of Analytical Toxicology, Journal of Chromatography and UNODC / LSS publications based on published papers[4]) and needs

[4] Following the Dauber case, the Supreme Court of the United States agreed that the provisions of the Ordinance on Evidence (Federal Proofs) should not apply to the admission of scientific evidence in the case (1993), rather than a „Fixed Test". Thus, after a full 70 years, the „Fret test" is replaced by the rule that the evidence presented in a particular case must meet the following five conditions: a) Can the theory or technique on which a critical scientific testimony is based can be verified? b) Does the technique involved have a known error rate in its application? The professional expression for the mentioned measurement uncertainty and the same implies the percentage of error in performing some forensic examinations, analyzes and expertises; c) Is the relevant theory or technique discussed in the professional circles and whether it is published in the form of reviewed books and / or in the form of reviewed scientific work; e) What is the level of acceptance of the theory or technique in the relevant scientific community; f) To what extent are there standards for determining the acceptable use of the subject technique? There is also a sixth criterion that needs to be fulfilled in the court's evidence presented (*General Electric Co.* v. *Joiner*, 522 U.S. 136), reads: - Relevance, which implies examining the

to meet client needs. If published methods are unavailable, methods developed in the laboratory may be authorized, provided they meet the intended purpose and meet the needs of the client. In that case, the examination record should contain sufficient details of the method applied so that the other qualification analyst understands the method and the results obtained.

Validation is by confirming, reviewing and providing objective evidence that certain conditions for a particular purpose are met. Guidelines on what is appropriate in different circumstances and for different methods can be found in many publications.

Verification is similar to validation and shows that forensics are applied according to the foreseen specification, and is used when the method is validated at another location.

When computers or automated equipment for collecting, processing, recording, reporting, storing or finding test or calibration data are used, a forensic engineer in the accredited laboratory ensures that the software developed by the users is fully documented and validated in an acceptable manner.

The accredited forensic laboratory possesses the documented forensic records that were involved in the validation affairs, the dates, the results obtained, the procedures used, the statement that the method corresponds to the intended use and the authorization to the place, signed the approval.

When the forensic laboratory introduces a method validated in another (accredited) laboratory, it must first demonstrate the reliability of the method in its own laboratory, in addition to any performance characteristic of the method published in the literature. The record of this performance verification is kept for future reference.

6. Equipment

Forensics and / or accredited laboratory in which they work, have procedures and instructions, whose application guarantees the reliability and performance of the equipment being used. The list of equipment owned by accredited laboratories is maintained with the record of its location, date of purchase, service history and maintenance. The main items of equipment (eg instruments such as spectrometers, chromatographs etc.) should have their own log for recording this information, kept close to the instrument.

Forensics in the accredited laboratory are trained in the use of equipment, and are handled only by authorized personnel when assessing that they are trained. Training and authorizations in the accredited laboratory are documented and archived.

In an accredited forensic laboratory, equipment is regularly inspected during use, using documented procedures, thus proving that its performance is still acceptable (eg, the instrument can be checked before each set of samples for assay to be sure of correctness). This may include temperature, gas pressure, adjustment, calibration, etc. depending on the instrument. For test purposes, test samples are also analyzed. Updated instructions on how to use and maintain equipment (eg abbreviated internal operating instructions as well as manuals supplied with the manufacturer) are available (preferably with the instrument) to appropriate laboratory personnel.

Equipment that has a significant impact on the accuracy of the test results is calibrated according to schedule, using documented procedures available to authorized

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validity of conclusions drawn between theoretical analysis and practical examples of the aforementioned problem. This rule is also interpreted in a way that the judge must reject the conclusions made by the expert, which have not been accepted by the relevant scientific community.

users. All equipment in the accredited laboratory is marked (eg label with calibration status data: date of the previous calibration and expiration date or other criteria for calibration) to avoid replacement with non-calibrated equipment. The calibration of important equipment (eg scales, thermometers, pipettes) is recorded, including certificates, if available, to be kept.

Forensic who is responsible for the equipment, ie the procedures and records that follow from it, who is in charge of a specific device, should identify deficiencies and propose taking corrective actions. If the defect is serious, the concrete device must not be used until the problem is resolved and the way in which the problem is resolved, the time and date are documented in the defined form and deposited in the equipment log. Similarly, the equipment that does wrong, so that it no longer provides reliable results or is found to be defective, should be withdrawn from use. To prevent its use, it should be insulated, clearly marked or labeled as „out of use" as long as it is calibrated or calibrated or tested to work properly.

7. Work with subject-testing, sampling, labelling and packaging

The accredited forensic laboratory has procedures to exclude samples of all types of material trace in place at the laboratory, and these procedures are available and located at locations where the samples are excluded. The sampling procedure ensures that part of the sample taken for analysis is representative of the whole sample.

Sampling materials, all kinds of material evidence submitted for forensic testing, analysis and/or expertise, are recommended for sampling plans and procedures published by internationally recognized organizations such as UNODC[5], ENFSI or SWGDRUG[6].

The general principles of sampling of submitted material traces in accredited forensic laboratories are:

– In the case of a small number of suspicious items (typically 10 or less) all items should be taken. If large individual items are to be homogenized before taking samples or taking multiple samples from the total quantity of that item;

– In the case of a large number of items, it is impractical to take them all, and the sampling strategy needs to be adjusted to ensure that the samples taken are representative of all items. If the material is not homogenized, it must first be separated into homogeneous groups I then define and then document (make and approve appropriate procedures and guidelines) the appropriate sampling plan for each group.

The accredited forensic laboratory has instructions that ensure that the materials to be tested are properly sampled, labeled, packaged, and stored before being delivered to the laboratory. The labeling is so organized (of course, following the documented procedures and instructions) to allow a unique identification of samples and sub-samples and their connection to the original source. The manner of packing the delivered material traces in the accredited laboratory (acting according to the definitions and by approved laboratory management, procedures and instructions) prevents unauthorized access and loss or contamination of samples during transport (Ivanović & Ivanović, 2016:95).

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[5] United Nations Office on Drugs and Crime. https://www.unodc.org/.

[6] Scientific Working Group for the Analysis of Seized Drugs. http://www.swgdrug.org/.

8. Laboratory Reception, Handling and Treatment

The accredited forensic laboratory has documented procedures for receiving and retrieving the relevant incriminated material traces or samples. The documents accompanying the submitted material include each item and sufficient information for the laboratory to understand what is required by the application. Each item is assigned a unique number, the corresponding details are entered into the lab system of case records.

In the laboratory, an authorized person (defined by appropriate procedure and instructions) receives and carefully checks the samples and documents.

The accredited forensic laboratory has an efficient and documented system for safe storage of samples before and after the test, which links the sample to other information submitted to the same (eg, an analysis request) identifies each sub-sample prepared from the sample and shows the course of the analysis, the date of issue of the report on the analysis, as well as the date and manner of disposal of all remaining samples after analysis. The work system in the accredited laboratory is so organized and functional that it ensures that the submitted samples for testing, analysis and / or analysis can not be physically replaced by inspecting the records or other documents, also by documented procedures, the accredited laboratory ensures the absence of opportunities to reach loss and / or damage of samples during storage, handling and analysis.

9. Results report

The results of the analysis in the accredited forensic laboratory are presented in a precise, clear, unambiguous and objective manner and meet the requirements of the applicant. The format of the report is defined to suit all kinds of analyzes that are being made and minimizes the possibility of misunderstanding and misuse.

III. Application of forensic accreditation in the countries of Europe

Accreditation of forensic jobs in European Union countries started for practical reasons. Namely, cross-border crime and terrorism forced the European states to intensify and operational police cooperation. This cooperation includes, among other things, operational forensic cooperation, which is mostly and mainly seen in the exchange of interstate exchange of forensic data, such as DNA profiles, fingerprints, traces of passenger cars, traces of footwear, traces of narcotics, traces of explosives and other forensic biometric and other data.

In order to highlight criminal offenses in the area of cross-border crime, there is often a practical and pragmatic situation, namely forensic data obtained in one state, used as evidence in the police and in the court of another state. The mentioned has led to the need to introduce common forensic standards in European countries. Of course, the European Union was first reacted in that direction as an inter-state space that guarantees high standards in the area of rights and security. With this aim, the Council of the European Union, 23.06.2008. adopted Decision 208/615 / JHA „Strengthening cross-border cooperation, particularly in the fight against terrorism and cross-border crime". This Decision, inter alia, provided that the states of the European Union would more effectively begin exchanging forensic databases and identifying perpetrators suspected of terrorist offenses and interstate crime. Soon after the Council of Europe Decision No 208/615 / JHA was adopted, it was necessary to make the same modification, the

manager of its reliability, operability, eligibility and legal norms[7]. The Council of the European Union did so by adopting Decision 2009/905 / JHA, 30.11.2009, years, which refers to the accreditation of forensic institutions in the European Union. This Decision is aimed at securing the integrity, compatability and usability of forensic data (now DNA profiles and fingerprints) from one country to another.

In order to provide the objective set out in the Council of Europe Decision 2009/905 / JHA[8], it obliges all EU member states to have at least one forensic institution accredited according to the international quality standard ISO / IEC 17025. Article 5 of the said EU Council Decision strongly suggests that in order to recognize forensic testing, analysis, research and expertise, each Member State must adhere to the stringent requirements required by the ISO / IEC 17025 quality standard. The implemen- tation of the EU Council Decision under item 7, imperative for Member States, requires the following (Ivanović & Rump, 2011:163):

a) Accreditation of the DNA Laboratory until 30.11.2013. years;

b) accreditation of dactyloscopic laboratories up to 30.112015. years;

c) inclusion in the national legislation of the EU Council Decision 2009/905 / JHA, by 30.05.2016. years;

d) The Council will, by the end of 2018, monitor the application of this Decision in the Member States.

Implementation in practice, Council of Europe Decisions 2009/905 / JHA, is entrusted to the ENFSI Association. Since ENFSI full members are not only forensic institutions from the European Union but also candidate countries for accession to the European Union[9], the condition for retaining membership in ENFSI was accreditation by 2013 (except for three forensic institutions, which were members of the ENFSI project-EMFA-2[10], The European mentoring for forensic accreditation and for these institutions deadline was the 2014. Year was forensic institutions from Montenegro, Serbia and the Russian Federation.

Quality Control, Quality Standards and Accreditation, Quality Management and Compensation Committee (QCC[11]) is responsible to the ENFSI. The following table gives the data of the ENFSI Quality and Competency Committee, which outlines the current situation in the area of application of forensic standards in the countries of Europe, members of ENFSI (Enfsi members are not forensic institutions from Bosnia and Herzegovina, Albania, Moldova and Belarus It should be mentioned that Portugal has not yet managed to accredit its forensic laboratory !?) (Rakočević, Ivanović & Maver, 2017:301).

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[7] Council Decision 2008/615/JHA of 23 June 2008 on the stepping up of cross-border cooperation, particularly in combating terrorism and cross-border crime. http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%2014459%202010%20INIT

[8] Council framework Decision 2009/905/JHA of 30 November 2009 on Accreditation of forensic service providers carrying out laboratory activities. https://publications.europa.eu/en/publication-detail/-/publication/9c1f8a74-4287-4f2a-bf02-0df5f9a8f01f.

[9] Constitution ENFSI (statut ENFSI-a). http://enfsi.eu/wp-content/uploads/2017/06/181107_ENFSI-Constitution_181107-approved.pdf.

[10] It is about the EMFA-2 project, European mentoring for forensic accreditation and for these institutions the guard was 2014. year. They were forensic institutions from Montenegro, Serbia and the Russian Federation).

[11] The Quality and Competence Commitee. http://enfsi.eu/about-enfsi/structure/standing-committees/ qcc/.

Table 1. Overview of European states accredited by their forensic institutions according to SIO 17025, ISO 17020 and others (ISO 9001, ISO 17065, ISO 17043), as well as an overview of accredited DNA analysis and Dactyloscopic analyzes[12].

	Forensic institution accredited (by what standard)	**Accredited DNA analysis method**	**Accredited method of dactyloscopic analysis**
Armenia	ISO 17025, ISO 9001, ISO 17065	Not	Ne Not
Austria	ISO 17025	Not	ISO 17025
Bulgaria	ISO 17025	ISO 17025	ISO 17025
Cypar	ISO 17025	ISO 17025	ISO 17025
Croatia	ISO 17025	ISO 17025	ISO 17025
Ches Republic	ISO 17025	ISO 17025	ISO 17025
Danmark	ISO 17025	Not	ISO 17025
Estonia	ISO 17025, ISO 17020	ISO 17025	ISO 17025
Finland	ISO 17025	ISO 17025	ISO 17025
France	ISO 17025	ISO 17025	ISO 17025
Georgia	ISO 17025	ISO 17025	ISO 17025
Germany	ISO 17025, ISO 17020	ISO 17025, ISO 17020	ISO 17025, ISO 17020
Ireland	ISO 17025	ISO 17025	ISO 17025
Italy	ISO 17025, ISO 9001	ISO 17025	ISO 17025
Latvia	ISO 17025	ISO 17025	ISO 17025
Lithuania	ISO 17025	ISO 17025	ISO 17025
Macedonia	ISO 17025	ISO 17025	Not
Montenegro	ISO 17025	ISO 17025	ISO 17025
Netherlands	ISO 17025	ISO 17025	ISO 17025
Norway	ISO 17025	ISO 17025	ISO 17025
Poland	ISO 17025	ISO 17025	ISO 17025
Romania	ISO 17025	Not	ISO 17025
Russian Federation	ISO 17025	Not	Not
Serbia	ISO 17025	ISO 17025	Not
Slovenia	ISO 17025	ISO 17025	ISO 17025
Slovakia	ISO 17025	ISO 17025	ISO 17020
Špain	ISO 17025, ISO 9001, ISO 17043	ISO 17025	ISO 17025
Sweden	ISO 17025	ISO 17025	ISO 17025
Switzerland	ISO 17025, ISO 17020	Not	ISO 17025
Turkey	ISO 17025	ISO 17025	Not
Great Britain	ISO 17025, ISO 17043	ISO 17025	ISO 17025

[12] ENFSI/QCC survey 2016.

Ukraine	ISO 17025	ISO 17025	Not

Table 1 shows that virtually all European countries have accredited their forensic institutions, mostly and mostly according to the international standard ISO 17025, and by ISO 17020[13], ISO 9001[14] and ISO 17043[15].

IV. Conclusion

The quality of analysis and the results of forensic examinations depends to a great extent on the efficiency and effectiveness of the judicial system, with the aim of fair and equitable implementation of legal norms, further crime prevention, international harmonization, exchange and coordination of information and forensic data in the world. The above-mentioned, contemporary judicial procedure puts in front of the imperative forensic institutions, the results of the analysis, testing and expertisation performed in forensic laboratories:

– reliable,
– valid,
– based on standard procedures,
– compatible with results in other countries, other scientific and professional circles, internationally recognized institutions,
– in accordance with the evidentiary standards of the appropriate judicial, administrative and legal systems,
– get in the required timeframes, in an effective and efficient manner.

The guarantor of the mentioned factors in forensic work and treatment is accreditation according to the international ISO 17025 quality standard. This standard regulates all segments of the work and procedures of a forensic laboratory. In addition, accreditation according to ISO 17025, implies the compatability and applicability of forensic evidence obtained in one country during the conduct of an evidentiary proceeding in another country, particularly in cross-border crime, terrorism and corruption cases.

Accreditation as a factor for the reliability of forensic post-work and work is of great importance for the implementation of the Council of Europe Conclusions on the forensic scientific area and forensic infrastructure EFSA 2020 (Council conclusions on the European Forensic Science 2020 forensic science infrastructure in Europe[16]). Priority of the goals of the Council of Europe's mentioned document is the accreditation of forensic laboratories by 2020, but also, among other things, the development of European forensic databases, why the conditions for the creation of European forensic databases of DNA and Dactyloscopy have already been achieved. However, by pursuing the goals of meeting the Conclusions of the Council of Europe, EFSA 2020, it is necessary by 2020 to create a database of illegal drugs, firearms, manuscripts and documents, footprints and so on, and to fulfill the aforementioned goal, it is necessary to accredit

[13] Inspection Standard Application document. http://www.fnovi.it/sites/default/files/old_fnovi/userfiles/files/ISO-IEC-17020-Inspection-Standard-Application-Document.pdf.

[14] Quality Management System. https://www.iso.org/standard/62085.html.

[15] Proficiency Testing Provider Accreditation Documentation Kit. https://www.globalmanagergroup.com/Products/PTservices-17043-accreditation-documents-manual.htm?.

[16] http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/jha/126875.pdf.

these forensic methods according to ISO 17025 standard.

As mentioned above, the international ISO 17025 quality standard refers to forensic work and treatment in a forensic laboratory. However, as forensic examinations, analyzes and expertises are based on on-site forensic work, which involves finding traces of material, further fixing, exclusion, packing and sending forensic examination. This part of the forensic treatment from a person's point to a forensic laboratory implies accreditation according to ISO 17020. However, both standards currently regulating and controlling the reliability of forensic treatment are not strictly forensic standards. For example, the ISO 17025 standard applies mostly and mainly to a (basically) chemical and / or toxicological laboratory, while the ISO 17020 standard has the name Requirement for the work of inspection bodies (Bencivenga, 2015:341). Since accreditation is a process that is constantly changing, supplementing and supplementing, the forensic community through the ISO organization (International Standardization Organization[17]), within which the Australian Standardization Organization[18], has joined the organization of the Technical Committee for the Adoption and the subsequent application of international standards that will standardize forensic work from detecting material traces on the scene of crime and to interpreting (reporting) the results of court forensic work! The aforementioned Technical Committee (TC 272) has hitherto made three standards:

– ISO 18385 Reduction of the risk of human DNA contamination in products used in the collection, storage and analysis of biological material for forensic purposes. (Minimizing the risk of human DNA contamination in products used to collect, store and analyze biological material for forensic purposes);

– ISO 21043-1 Forensic Science - Part One, Concepts and Definitions (Forensic Sciences - Part 1: Terms and Definitions);

– ISO 21043-2 Forensic Science - Part Two, Recognition, Recording, Collection, Transportation and Storage of Items (Forensic Sciences - Part 2: Recognition, Recording, Collecting, Transport and Storage of Items).

In addition to constructed and aggressive standards, TC 272, there are currently four more forensic standards in operation, namely:

– ISO 20964 Specification of consumable material used in forensic procedure-requirements for sampling whales. (Specification for consumables used in forensic process;

– ISO 21043-3 Forensic Science Part 3: Analysis (Forensic Sciences - Part 3: Analysis);

– ISO 21043-4 Forensic Science Part 4: Interpretation (Forensic Sciences - Part 4 Interpretation);

– ISO 21043-5 Forensic Science - Part 5 Reporting (Forensic Sciences - Part 5 Reporting).

The completion and enhancement of standards, which are under the scope of TC 272, is expected in May 2020. The standardization of standards and their implementation in forensic laboratories will make a big contribution to the reliability of forensic testing, analysis and expertise, and thus the righteousness as one of the fundamental foundations of a society that strives to be righteous and right as the finest of the democracies.

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[17] International Organization of Standardization. https://www.iso.org/home.html.

[18] Standards Australia. https://www.iso.org/member/1524.html.

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