METHODICAL AND STAFFING FORENSIC CHEMICAL LABORATORIES IN FORENSIC INSTITUTIONS OF RUSSIA SYSTEM

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The analysis of the effectiveness of methods of analytical chemistry to meet the challenges of the judicial examination. The experience of the work of foreign forensic chemistry laboratories and identify problem questions regarding insufficient level of scientific and methodical, personnel and methodological support of forensic institutions of Russia. Formed proposals for modernization of the existing Russian system of forensic establishments and circuit training expert personnel in the field of forensic chemistry.

Keywords analytical chemistry, forensic chemistry, expert report, experts, training of chemists, methodological support for forensic-analytical chemistry laboratories

Thus, we propose the following set of measures to address these issues:

● The establishment of the state system of compulsory licensing of forensic activities.

● Accreditation of laboratories of all forensic institutions to comply with Standard ISO / IEC 17025-2009.

● Reject the Agency on the basis of the principle of operation for the state forensic and forensic agencies and to establish their operation in the framework of the state system of higher education.

● The organization of mass execution of expert opinions in the interests of the various ministries, departments, organizations, individuals and other interested parties of legal proceedings on a contract basis in each region.

Conclusions

These activities will provide high quality forensic, scientific and methodical, educational, developmental and other types of forensic chemistry. It will also help increase efficiency in the recruitment of science and engineering in practice as a forensic chemical laboratories, and other areas of forensics.

Forensics is of a great importance in establishing the evidence base during investigations and litigations; its history includes several hundreds of years [1]. Nowadays it is no doubt that successful crime prevention is possible only with the help of strict scientific basis which makes use of a wide range of scientific methods and technical facilities. In order to support this process effectively, the scientific and technical system must be improved and make constant progress, resting upon the fundamental developments in natural sciences including analytical chemistry. Employment of analytical chemistry methods for solving forensics issues requires prospective forensic estimation of research results so as to form an independent source of investigative and evidentiary information. At the same time new issues always emerge in forensic practices. In this connection the analytical chemistry methods are used in a modified form meeting the peculiarities of issues and nature of research objects [2]. Thus, we have all reasons to imply the term «forensic chemistry» as a part of applied analytical chemistry aimed to solve forensics issues.

For the first time forensics became a research object for European doctors and chemists in the first half of the XIX century. Their surveys were devoted to toxicological research of the biological origin materials by reactive chemistry methods [3]. Very many analytical chemistry methods came into use to solve a wide variety of issues in modern forensic chemistry. With all that, along with physical-chemical analysis methods, chemical methods remain quite popular with forensic chemistry [4, 5]. Moreover the existing methodological support for forensic chemistry even for one type of an expertise object frequently implies the solving of common issues using chemical, chromatographic and spectral methods of analysis as a whole. In Russian forensics the term «forensic chemistry» did not settle in as an independent term. At the same time analytical chemistry became one of the basic elements of the multistage process to deal with corpus delicti of an investigative case. This is a forensic research of materials, substances and items (FRMSI) which has been developing since 1950–1960s in expert bodies of the soviet Ministry of Justice upon resolving two meaningful issues. These are a full-time training for a large circle of forensic experts including physicists, chemists and engineers and also a creation of a centralized tool-analytic base sufficient for researches of main incoming substances and materials. For now the FRMSI has evolved into an independent field of forensics. Despite the fact that FRMSI's goals are assigned in every specific case, its common issues are among the following:

● Discovery, i.e ascertainment of presence\absence of target objects.

● Diagnosis, i.e. determination of nature, name, purpose, application field or other classification qualities of objects and circumstances of investigation formation.

● Identification, i.e. identifying of several objects or its parts (elements) [12].

In the Russian Federation the uniformity of state regulation measurements covers the measurements that are fulfilled in compliance with a court order, procuracy authorities and government bodies of executive powers. In this case the unity of measurements in state forensic institutions is assigned to the federal bodies of executive power which they belong to [13]. The functioning of forensic chemistry laboratories in state forensic institutions can be performed beyond the national accreditation system [14] even while performance of expert reports of compliance assessment for industrial and other products and also other products that have to meet the obligatory requirements established by the legal system of the Russian Federation.

The functioning of forensic chemistry laboratories is not specifically prescribed by the Russian legal system, but this process is performed within a broader term called forensic functioning and is governed by the Federal law № 73 «On state forensic functioning in the Russian Federation» of May 31, 2001 [15]. The article 11 of this law equalizes state forensic institutions and expert branches created by federal bodies of executive power and constituent entities of the Russian Federation. Along with this, the forensic expert reports performance is independently prescribed by every governmental agency but federal bodies of executive power in their turn compose a list of types of forensic expert reports performed by subordinate state forensic institutions and their branches [16, 17, 18, 19].

Besides this, depending on a certain type of litigation the forensic expert report administration and performance fall under the corresponding code (civil, administrative, arbitration or criminal procedural). So far, state and non-state forensic functioning (except for expert reports on industrial safety) is not subject to obligatory licensing and certification [20, 21, 22]. But the national standard of the Russian Federation GOST 52960–2008 [23] developed by the Association of analytical centers «Analytica» and brought into effect in 2009 is used only with leading non-state forensic institutions in Russia [24].

Meanwhile, in the Russian Federation forensic chemistry laboratories are the main and essential part of the majority of state forensic institutions which function within different ministries and departments. Thus, in state forensic institutions of Ministry of Internal Affairs of Russia such laboratories are included in structural subdivisions in charge of expert reports on materials, substances and items. Several methods of forensic chemistry are widely employed in laboratories in charge of performing criminalistic and various forensic engineering reports (trasology, ballistics, explosives studies and others) and it is also used with criminal experts while performing their duties on the scene [16, 25]. In such a way forensic chemistry laboratories are integrated in Russian state forensic institutions of the Ministry of Justice, the Federal Customs Service, the Federal Drug Control Service [26, 27, 28]. Moreover, state forensic institutions of the Federal Security Service and the Ministry of Defense of the Russian Federation contain their own forensic chemistry laboratories that conduct chemical and toxicological surveys on biogenic objects [17, 29]. The functioning of these state forensic chemistry laboratories being subordinate to the Ministry of Health and Social Development is aimed at researching a wide range of biological objects [30]. Non-state forensic organizations and private experts in forensic chemistry appeared in the post-perestroika period as an alternative to the state forensic institutions. The functioning of these organizations is solely aimed at subjects which turnover is not banned [31, 32].

As the result, a present-day level of the methodological support for forensic chemistry laboratories in state forensic institutions is regulated by governmental (inside) directions, instructions and recommendations [16, 17, 30] that are being formed because of unclear requirements of the Federal law № 73 mentioned above. Non-state forensic institutions regulate their functioning by their own regulations, while private forensic experts do this just with civil contracts. Thus, all requirements for tools, methods and techniques must comply with the contents of the article 8 of this law which states that «An expert must thoroughly and completely conduct an impartial research on a strict scientific and practical basis within their respective specialty. An expert conclusion must be based on the statements allowing to verify validity and authenticity of conclusions made on the basis of the conventional scientific and practical data». Apart from this, the article 11 of this law states that «State forensic institutions of the same type must administer and perform their forensic expert reports on the basis of unified research and methodological approach to expert practice, professional training and specialty of an expert». Requirements of this law for competence

of a forensic expert are in the article 13 which states that «An expert position in state forensic institutions can be assigned to a citizen of the Russian Federation who has an university degree and has completed a subsequent training in a certain expert specialty in accordance with statutory and regulatory enactments of the respective federal bodies of executive power» and «Professional qualification assessment of an expert and their eligibility accreditation to perform expert reports independently are fulfilled by qualifications commissions in accordance with statutory and regulatory enactments of the respective federal bodies of executive power». These requirements are also stated in the article 41: «an expert report can be performed beyond state forensic institutions by individuals who have particular knowledge in science, technology, art and craft without being a state forensic expert» [15]. It is important to note that major responsibility for expert reports results is of a personal matter in the Russian Federation [33], i.e. it is fully laid upon an expert but the management of the report performance is laid upon the head of a state forensic institution.

At the same time organizational directions of quality assurance in expert reports are among the next ones: a forensic institutions accreditation, a methodological support standardization (methods and techniques), an expert facilities certification (equipment and expendables), a training system improvement and a professional development of state forensic institutions' employees [34]. It is worth noticing that issues of forensics techniques standardization have become acute since mid-1980s. The standardization has been supposed to be a means of contributing to univocally interpreted results but the method has been a guide for a laboratory functioning. In 1990s the Forensic Science Center of the Russian Ministry of Internal Affairs was actively involved in process of certification of expert methods, with all that the method was understood as any mentioning about expert issue resolving in criminalistic literature [35]. The need for certification of the methodological support for forensics is suggested as one of the ways for non-state forensic functioning improvement, which differs from the state one not only by a quick-to-perform expert reports but also a minor awareness of non-state experts on procedural, organizational and methodic peculiarities of this practice [36, 37]. Some Russian forensic institutions and organizations began to create independent systems of voluntary certification of the methodological support for forensics expert reports. However the present-day voluntary certification of independent systems is performed only on a contractual basis in regard to non-state experts and organizations [38, 39]. The accreditation is suggested as an effective method of the overall competence confirmation and forensic laboratories independence which simplify the valid choice of an expert research performer and an expert opinion assessment. Among state forensic institutions the Test Center (materials science subdivision) of the Criminology Institute for the Special equipment Center of the Russian Federal Security Service in the Analytical laboratory accreditation system [41] and forensic laboratories of the Forensic medicine center of the Russian Federation for the Ministry of Justice [42] have already been through the accreditation to meet the requirements of the GOST ISO/IEC standard 17025 [40].

Despite all of the aforesaid, there is no any unified methodological approach within the functioning of forensic chemistry laboratories of Russian forensic institutions among different agencies. This fact excludes the unified scientific and methodological approach to the experts' professional training and negatively affects the quality of expert reports and psychological factors as well as assessments' difference while performing repeated or comprehensive researches when they are commissioned to experts of different agencies [43]. To resolve this issue, the Federal Interagency Coordination and Methodological Council on Forensics and Expert Research (FICMC) has been functioning on a voluntary basis in Russia since 1996. It is aimed at the organizational, research and methodological assistance for the state forensics improvement and also at searching for suggestions to provide the unified research and methodological approach to experts' practices, professional training and specializing. To make the FICMC more representative it contains heads of state forensic institutions and expert services of all federal bodies of executive power as well as representatives of the Supreme Court of the Russian Federation, the Supreme Arbitration Court of the Russian Federation and the Office of the Prosecutor General of the Russian Federation [44]. However in order to unify the methodological support for forensic expert reports within priority guidelines over the 2000–2011 period the FICMC recommended expert and criminalistic branches of Russian state forensic institutions of federal executive power bodies only 8 guidebooks for practical use, only 5 of them are directly relevant to forensic chemistry [45]. The absence of unified legislative guidelines and formulations for forensic functioning administration in Russia causes one more trouble. The functioning of non-state forensic institutions along with state, non-state organizations and private experts that occasionally perform expert reports has

no special legal grounds. The number of annual expert reports performed by state forensic institutions is great and it is increasing steadily. With all that the present-day demand for judicial proceedings performed by state forensic experts cannot be completely met. Issues that require special professional qualifications appear in a very wide range of scientific and practical fields and can go beyond the competence of state forensic institutions. That is why it is impossible to do without non-state agencies and private experts. For today there is no any legal formalization for such significant points as conditions for establishment of non-state forensic agencies, their heads' status, training and retraining of private experts, professional requirements and other significant regulations for forensic practices. As the result, non-state forensic institutions having encroached on functions that in fact belong to state ones do not provide appropriate professional performance, their expert opinions often do not meet the requirements of a case evidence [46]. Among non-state forensic institutions only separate specialized branches being a part of several Russian universities have been managed to advance to the high-standard forensic performance [47].

The foregoing description of legal regulation and administration of forensic chemistry laboratories that enter forensic institutions and organizations have contributed to emergence and accumulation of a large number of troubles that evidently affect an overall level of their methodological support and forensic expert reports quality in general. Thus, in state forensic institutions of the Russian Ministry of Defense the number of expert reports to be performed is constantly increasing. There is an acute need for material and technical base upgrade and staff development. As the result, the current level of forensic expert reports does not meet the requirements of military justice bodies as it essentially limits a body of evidence during crime investigations [48, 49]. Forensic institutions of the Russian Naval Service have troubles both with technical equipment of its branches and professional training [50]. Except for the need to improve the material and technical support administration [51], the cases of staff misuse and false approach to registration discipline administration must be excluded in expert-criminalistic branches of the Russian Ministry of Internal Affairs [52]. Modern criminality has an obvious advantage in technical equipment over law enforcement authorities where state forensic administration plays one of the key roles. At all stages of crime prevention this administration has its goals to employ effective methods and technical facilities that comply with a higher level of science advancement in order to expose, disclose, investigate and prevent crimes [53]. There is an inadequate knowledge of law disciplines among experts who have a degree neither in jurisprudence nor in expert assessment and represent expert-criminalistic branches of the Ministry of Internal Affairs of the Russian Federation. This shortage cannot be compensated by refresher courses in the agency system of state forensic institutions. One of the solutions for this issue is a staff retraining which is based on higher education institutions' knowledge in law and engineering along with the involvement of leading experts from forensic centers of the Ministry of Internal Affairs (Chief Administration of Internal Affairs, Directorate of Internal Affairs) [54]. Nevertheless this problem is typical for the most of forensic institutions. Development of the expert staff for forensic institutions of the Russian Federation is primarily achieved by the retraining of staff with higher education degrees and is based on these institutions. However certification of personnel who have completed this retraining reveals significant gaps in law theory. As a rule these employees are specialists in very particular fields. For example, specialists in natural, humanitarian sciences and engineering are not aware of essentials of substantial and procedural law, criminal law and forensic theory. Lawyers who retrain as forensic experts come across even bigger troubles since they do not have essential knowledge in different fields of science and engineering that are supposed to be accumulated within several years of practical work. Even in this case some objects of expert report are not available for research because of absence of regular basic professional education [38]. According to the administrative board of the Ministry of Internal Affairs of the Russian Federation, the decrease of the scientific staff qualification is caused by low-standard scientific researches performance [53]. In forensic chemistry's and chemical-toxicology's laboratories of the Russian Bureau of forensic medical examination apart from shortage in material and technical, informational and methodological types of support for the forensic functioning there is a drift of trained and skilled personnel. It also goes along with the absence of interest among young specialists with higher non-medicine education who have completed basic training and in «pharmacy» or «chemistry» [55].

Main issues of state forensic institutions of the Ministry of Justice of the Russian Federation are:

- Absence of the methodology-proven list of unified equipment for specific kinds of forensic expert reports.

● Different level of up-to-dated equipment supply of forensic institutions of the Russian Ministry of Justice with (making use of out-of-date equipment).

● Different level of professional training for experts and of their ability to use the existing equipment.

● Long terms of expert reports performance.

● Inadequate scientific and methodological support.

● Absence of unified methods for all forensic institutions; compliance with legal requirements.

● Great opportunities to put pressure on experts, corrupt performance of expert reports.

● Inadequate administration and transparency of income generation in forensic institutions.

● Excessive number of expert reports commissioned by courts and law enforcement agencies [56, 57].

One of the the issues that significantly affect the quality of expert researches is extreme work overload with many types of expert reports in state forensic institutions which leads to delay of legal procedures. Capabilities of the state forensic functioning are roughly bound by budget financing. Nowadays they are practically depleted and cannot fully keep up with increased courts' demand for expert reports. The circumstance stated above led to the fact that terms of expert reports performance, provided that real report performance is overfulfilled by 1,5 times, may last from 3 months till 1,5 years. With all that, such long terms due to various reasons may occur both in state institutions and private experts. According to some specialists, time expenditure reduction for experts reports can be fulfilled in different directions:

● Increase of research amount is possible through expert staff augmentation and pay rise.

● Start-to-research terms reduction is possible through quality increase of materials for expert reports, coordination of text and list of issues with individuals that order expert reports.

● Terms of performance reduction is possible through implementing new techniques and making use of up-to-date technical facilities.

● Quality increase of researches being performed is possible through qualification improvement of experts of all types of ownership and agency's institutions, expansion of qualification requirements that are to be met by state forensic expert, expert activity of individuals who are not state forensic experts [38].

Majority of the state forensic experts (without service staff) are concentrated in forensic institutions and branches of the Ministry of Internal Affairs, the Ministry of Health and Social Development and the Ministry of Justice. With this being said, the system of state forensic institutions of the Ministry of Justice of Russia (and to some extent of the Ministry of Health and Social Development) is the only state experts' structure independent from inquiry and investigation bodies, courts and any agency's interest [38]. At the same time the affiliation of state forensic institutions and investigation branches to the same agency can be a reason for an expert challenge in courts [58], as the article 7 of the Federal law № 73 states that an expert must not be dependable on any agency or individual, parties or other individuals who have interest in outcome of a case [15, 58].

Current situation with low-standard scientific and methodological support for forensic chemistry laboratories and the whole Russian system of forensic activity need to be reformed. But the main body of suggestions for improving this kind of activity is idle. Unfounded calls for reformation of the financial motivation in experts, consolidation of the material and technical base, improvement and creation of techniques deepen the existing issues [38, 59].

Inadequate level of development of the methodological support for Russian forensics in general and forensic chemistry in particular required personal interference of the Russian President early in 2012, who charged the Russian government and concerned ministries and agencies draft a proposal for consolidation of the material and technical base of state forensic institutions, establishment of the state policy and improvement of the Russian legal system on forensics, administration of the unified methodological support for forensics, implementation of up-to-date ways and methods for expert research, control for quality performance of non-state forensic institutions, organizations and private experts, providing an adequate level of expert professional training [60]. The Supreme Court of the Russian Federation draws attention of national courts to necessity of «… the most extensive use of scientific and engineering achievements for the purpose of comprehensive and objective investigation of circumstances that must be proved in criminal cases through expert reports performance, when there is an investigation that needs to employ particular knowledge in science, engineering, art and craft for resolving issues emerged during a trial» [58].

In search for ways of improvement of methodological support for forensic chemistry laboratories one can appeal to foreign countries' experience which depends more on the level of their overall development and less on peculiarities of their current legal system. For the English-American List of national legal systems, which includes England, The USA, Northern Ireland, Canada, Australia, New

Zealand and also former colonies of the British Empire (49 states total), relativity of legal regulations for forensic issues is typical. The peculiarity of the forensic functioning within the English-American List of national legal systems lies in its maximum compliance with existing practices. The expert reports performance is regulated by the civil and criminal procedural codes and has a quite simplified nature in comparison with both developed classifications and a system of forensic science in Russia. The classification of forensics having divided into categories, kinds, species and subspecies is practically uncommon but reduces to a list of forensic disciplines instead. Distribution of permits for expert reports performance is fulfilled by authorized non-state professional forensic associations. As a rule regular forensic chemists have a university degree in chemistry. There is a widespread system of professional training for forensic experts via short-term courses on key issues of peculiar forensics fields. The forensic system of the English-American List of national legal systems also stands out for the high level of material and technical support and prominent amount of state and private grants for researches in forensics fields. At the same time there is a strong tendency towards the unification of techniques and forensics terminology. There is a specific hierarchy of forensic expert positions in forensic laboratories. They are specialists in forensic science of 1, 2, 3 ranks (specialists, technicians, scientists in forensics (2 rank), forensic scientist supervisor (3 rank), leading manager in forensic science of 1 and 2 ranks). Besides there is a quite active process of accreditation of forensic laboratories and quality control for laboratories functioning. Great attention is paid to an expert errors analysis. Some of the most difficult and knowledge-intensive kinds of forensic expert reports are performed by forensic laboratories which are national scientific units of universities [61, 62, 63].

Britain has the most transparent process of expert report performance. In this country expert researches are performed upon the request of both defense and prosecution. Any party is able to control the whole process of expert performance, read all papers including worksheets, check and witness research results. These results are to be presented in court by those who performed this research, they must explain the court what these results mean [64].

Except for what was said above, in the USA as opposed to Russia there is no multistage hierarchy of police forensic institutions and of the Ministry of Justice system. In the USA the forensic functioning is fulfilled by state and non-state forensic institutions of different organizational models which number is rather considerable. There are forensic laboratories in states at police departments and at sheriff offices in big urban areas, at the Ministry of Justice of the USA, at ministries of justice of separate states and at the United States Department of Defense, at the Ministry of National Security, at the Secret Service and some other agencies. At this moment the Subcommittee of forensic science of the Scientific Committee of the National Research and Engineering Council plays a significant role in functioning of forensic institutions. It participates in financial issues of state forensic institutions, forensic laboratories accreditation, experts' certification, approval of new forensic methods. The Ministry of Justice of the USA plays a key role in forensics issues. The biggest state forensic institution is the Laboratory of FBI at the Ministry of Justice of the USA which was founded in 1932. The laboratory serves to provide the expert reports performance, expert staff training, assistance for experts on state and local level. Apart from other FBI's Laboratory structural branches that make use of the forensic method, there is a designated Chemistry Unit. Taking into account agency peculiarities, similar forensic chemistry laboratories function as parts of forensic institutions of the Drug Enforcement Administration, the US Secret Service, the Bureau of Alcohol, Tobacco, Firearms and Explosives – ATF, the Internal Revenue Service, the US Fish and Wildlife Service, the United States Postal Inspection Service and others. Besides this, each state of the USA has its own system of state forensic institutions. The Forensic Service Administration and the Forensic Science Committee perform organizational and methodological management of state forensic institutions in every particular state. These institutions accredit forensic laboratories of a state, control the quality of expert reports and coordinate the functioning of forensic laboratories of a state of those ones established by public authorities [65, 66, 67].

In 2005 the US Senate decided to make an overall examination of condition of forensic science and practice in the USA. In this connection the independent Forensic Science Committee was established by the National Academy of Sciences in the autumn of 2006. It included representatives of different forensic sciences, lawyers and researchers of allied sciences. The committee has always followed three main goals set by forensic science. They are assistance in solving crimes and ascertaining guilty persons, innocent people prosecution prevention and national security protection. Involvement of many representatives of science and practice from different fields to collaborate with the Committee let them make an overall and objective survey on emerged in forensic

science and practice issues of scientific, organizational, methodological, political and financial nature. The Committee stressed that American forensic practices and achievements in forensic science are rather dissimilar among different states, regions and country in general. There is a shortage for financing of laboratories with god personnel and technical facilities, the difference between states' legal systems is exposed, condition of research methods standardization and laboratories accreditation, forensic experts certification. Many states do not claim forensic laboratories for obligatory accreditation, no quality control for forensic sciences curriculums in colleges and universities. In opinion of authors of the paper, none of the existing state institutions of the USA can solve the accumulated set of issues in forensic science and practice [68]. Generally the work of western expert-criminalistic institutions may be assessed as an effective one. It is worth noticing that besides balanced organization structure and good technical equipment, successful and well-built system of expert staff training makes a significant figure among the contents of the success [69]. In leading countries of the world forensic chemists job positions are occupied by specialist in chemistry and physics who have admission to independent report performance upon completion the initial traineeship [70]. One of the effective methods of the improvement of scientific-methodological support for forensic institutions in many developed countries is an accreditation of forensic laboratories in order to comply with the standard of the International Standards Organization ISO 17025 [34, 71–74] which functions in Russia as GOST ISO/IEC 17025–2009 [40].

The main present-day tendency for forensic institutions in developed countries is their active cooperation within various professional associations. Nowadays in the world there are dozens of forensic expert associations in different fields. As a rule these associations are non-profit and are divided into international and regional ones depending on other countries' involvement. Associations and communities are the most popular form of international co-operations. Other forms of international co-operation are international teams of experts, forensic programs of international organizations, guilds, foundations, alliances, institutions, centers, international networks of forensic institutions, etc. Besides professional associations of forensic experts there are several international educational organizations educating forensic experts for international issue resolution, in particular for participating as experts in international courts and tribunals, international human rights organizations. Some multifunctional international organizations, for example the Interpol, contain forensic branches in the form of working groups and teams. The Interpol also organizes and holds international conferences and symposiums on the whole set of forensic expert reports. A variety of professional organizations function for the benefit of forensic chemistry development. So the International Association of Forensic Toxicologists has its headquarters in London and associates more than 1400 experts in analytical toxicology and other allied sciences all over the world. The purposes of this association are to join efforts and so simulate researches in forensic toxicology. The International Association of Forensic Science – IAFS was founded in 1957 and consolidated scientists and practical persons in various fields of forensics, among which are forensic medicine, toxicology, dactylography, forensic biology, drug research and others. The Association defined its main directions in forensic science development, scientific and engineering information exchange between forensic experts and scientists and also in holding training seminars [75, 76]. One of the biggest international forensic organizations is the European Network of Forensic Science Institutes (ENFSI) which was established in 1995 by analogy with the American Society of Crime Laboratory Directors (ASCLD) to become a member of which is free for any representative of European country. The ENFSI functioning does not interfere with national legal system on forensic issues but its purpose is to obtain a high-quality of forensic expert reports in European countries. An ENFSI member which is an educational or forensic institution must perform at least a half of all types of expert reports in its country, has a status of state importance, has at least 25 employees and has a necessary accreditations. At this moment 50 forensic institutions from 32 countries are members of the ENFSI. In the ENFSI Russia is represented by the Russian Federal forensic center for the Ministry of Justice, the North-West region forensic center for the Ministry of Justice and the Expert-criminalistic center for the ministry of Internal Affairs. The ENFSI includes three regular structures: the Expert Working Group Committee (EWGC), the Quality & Competence Committee (QCC), the European Academy of Forensic Science (EAFS). The Working Groups are organized in accordance with forensic fields of concern, they provide professional assistance for colleagues from national forensic institutions and publish their news-bulletins. For today 15 working groups are established in the ENFSI. Five of them forensic chemistry is of a great importance:

- Forensic documentation inquiry.
- Forensic drug inquiry.

- Forensic fiber inquiry.
- Forensic varnish and paint inquiry.
- Forensic fire and explosion inquiry.

The Quality & Competence Standing Committee is aimed at establishing an optimal regulation and successful operation of expert working groups and the ENFSI members. In addition, the responsibility of this committee is to create international standards and improve expert practices in general. The committee holds its seminars, cooperates with international organizations on accreditation and certification matters. One of the significant forms of activity of the committee is holding interlaboratory tests aimed at expert researches on presented educational objects. During the tests the laboratory takes the material to be researched which was prepared on basis of real law cases. Conditional circumstances of a case and other input data are stated as well. An expert opinion given after the research is sent to the committee and is being analyzed with relation to results reliability, methods, equipment, means, standards and units of measure, assessment criterions of intermediate results used. Generalization of such control tests lets to improve expert research methods and assess performance quality of forensic laboratories of the ENFSI members. The European Academy of Forensic Science exists as a permanent acting structure of the ENFSI. The Academy achieves its goals by holding a scientific conference and special projects in co-operation with expert working groups and the permanent committee of expert working groups. It also takes part in producing, supplementing and fulfilling the strategic plan of the ENFSI. Some companies being producers of equipment and facilities for forensics have already been working on meeting the ENFSI standards. Dynamics development of the Network and integration processes happening in forensics let us conclude that the ENFSI affection the functioning of national forensic institutions will increase within the next decade. With all that the main focus will be on unification, certification and standardization of forensic research methods and quality performance improvement of expert reports 75, 77, 78]. Studying the current situation in other countries it is worth mentioning the Chinese People's Republic where functioning of agencies' forensic institutions which have a sound material-technical and financial base is typical. Foreign publications are used as methods of forensic researches. To develop professional skill in their staff, leading experts of state forensic institutions from many developed countries (including Russia) are invited to give lectures [79, 80].

The post-soviet states have similar common issues on material-technical, scientific-methodological, personnel and informational support. This situation can be explained by inadequate and inefficient system of material-technical support and payments in state forensic institutions and branches. Moreover the main part of the forensic activity is concentrated in state forensic institutions which report to agencies and function without special permits (licenses) [81, 82, 83]. Regular expert trainings in most of these countries are possible only within limited number of specialties. That is why leading practical specialists and lecturers from higher education institutions of Russia are engaged for expert trainings. The shortage of expert staff contributes to reduction of forensic laboratories number in regions and workload increase of current expert reports in laboratories of central state forensic institutions. The experts' work overload during excessive report performance leads to a time handicap for appropriate methodological work on experts practices generalization and new research methods development [84, 85, 86, 87].

Summing up the above we can assert that the FRMSI is estranging from forensic chemistry and is turning into one of the legal disciplines which for resolving its issues uses research results having got by forensic chemistry and some other natural sciences methods. At the same time with regard to analytical chemistry the main goals of forensic chemistry can be formulated like this:

- Chemical identification of a research object.
- Chemical analysis of research objects.
- Chemical compatibility of research object.

From the above it follows that the FRMSI's goals remain unachievable without resolving forensic chemistry issues which nowadays are ignored in the FRMSI. The objects of the FRMSI as well as of forensic chemistry are material objects which are subject for a circumstances (facts) survey that are important for a case investigation [12]. Typical objects of forensic chemistry are:

- Biogenic objects.
- Narcotic drugs, psychotropic substances and their precursors; superpotent and toxic substances.
- Oil product, combustibles and lubricants.
- Explosives.
- Chemical marking agents.
- Weapons and ammunition.
- Provisions.
- Polymers and rubbers.
- Documents data.
- Glassworks and ceramics.
- Metals and alloys.
- Paints, varnishes and coatings.
- Synthetical fiber materials.
- Construction materials.
- Soil-origin substances.
- Perfumery and cosmetic products.
- Trace objects.

Applying basic elements of analytical chemistry modern system [88] we can describe forensic chemistry's field of activity as a solution algorithm for the majority of the FRMSI's practical issues. These issues can be resolved by methods of analytical chemistry in regard to particular object:

1. Choice of a disclosable or a definable component.
2. Forensic issue assignment.
3. Choice of forensic chemistry method.
4. Selection of forensic chemistry facilities.
5. Resolving of methodological issues of forensic chemistry.
6. Chemical research performance.
7. Processing of chemical research results.
8. Forensic chemistry issue resolution.
9. Results discussion.
10. Resolution of an assigned issue.

To summarize we can assert that forensic chemistry is a high-demand field of analytical chemistry which methodological support exceedingly lags behind with modern issues that appear during legal procedures. Existing issues of methodological support for forensic chemistry laboratories are mostly connected with inadequate level of material-technical, scientific-methodological, personnel and informational support for Russian forensic chemistry laboratories functioning. It causes quality decrease and delay of the expert reports performance. In conditions of work overload of forensic laboratories and absence of commitment to conduct researches by experts chemists there is an irrevocable loss of results of a great quantity of isolated experimental researches which also diminishes the level of methodological support of this activity area.

All of the aforesaid proves the insistent need and strategic importance of critical analysis of today's situation within all components of the methodological support for forensic chemistry expert reports which are methodical guides, its methods and facilities and expert chemists as well. With the absence of reform initiatives that should particularly proceed from the Russian legal system, the majority of proposals for improving the forensic chemistry laboratories functioning is idle and is based upon requests for boosting financial backing, staff increase of branches, above mentioned staff training and establishing the system of non-state experts' certification. Taking into account the experience of foreign forensic laboratories we can assert that the existing Russian system of government financing for forensic institutions and expert training arrangement are no capable of providing the adequate level of methodological support for the functioning of forensic chemistry laboratories.

Thus, the following set of activities is proposed for resolving the mentioned issues:

- Establishing of the governmental system of obligatory forensic activity licensing.
- Accreditation of all forensic institutions' laboratories to comply with standard of the GOST ISO/IEC 17025–2009.
- Abandon the agency-based principle of functioning for state forensic institutions and establish their functioning within the state higher educational system.
- Organization of mass performance of expert reports for the benefit of different ministries, agencies, organizations, private individuals and other interested parties of legal procedures on a contractual basis within each region.

Carrying out of these activities will provide a high quality of forensic, science and methodical, educational, design and experimental and other kinds of forensic chemistry. It will also contribute to efficiency increase while employing scientific and engineering achievements in practical work both forensic chemistry laboratories and other fields of forensics.

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