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Prospects For The Development Of Forensic Examination In The Context Of Scientific And Technological Progress

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ABSTRACT

Objective: *This study examines how forensic examination has developed as a scientific field in the face of swift scientific and technological breakthroughs, with a focus on improving techniques and technical instruments.* ***Method:*** *Recent advancements in forensic equipment and the scientific foundation of new approaches were systematically reviewed. The analysis emphasizes advancements in object detection, data administration, and assessment procedures while highlighting the importance of expert competency in line with certain credentials.* ***Results:*** *There have been notable developments in forensic technology, such as new tools and methodological enhancements that raise the accuracy and dependability of tests. Contentious issues are rigorously analyzed, including inconsistent language, financial difficulties, and the upkeep of sophisticated machinery.* ***Novelty:*** *The study presents novel approaches to systematizing forensic data and highlights the necessity of scientifically proven methods, highlighting the vital role of expert qualifications in the research process. It also emphasizes opportunities for future progress in forensic examination as both a scientific discipline and a practical application field.*

INTRODUCTION

During the development of technologies and techniques, new types of equipment, tools, devices, processes are observed, as a result of which many areas of human activity are facilitated. Improvement of techniques and technological cycle allows to speed up and simplify many processes, saves resources and simplifies the work of at least the expert in the field.

Modern development plays an important role not only in the industry or in the production of various goods, but also in simplifying the work of the forensic expert and increasing its efficiency. Because new devices are emerging that allow obtaining information of forensic importance, and for this, less time and labor is spent than before, and since the error rate of new devices and equipment is less than the samples of previous equipment, the reliability of research results is increasing.

For example, the following devices have been developed or improved in recent years:

1. A dactyloscopy (fingerprint) scanner that allows you to work without various dactyloscopy powders and is directly connected to a computer;
2. Personal identification systems that allow to restore the vital image of a person based on the skull as a result of having special software;
3. A video-spectral comparator (comparator) for document research using various high-resolution light sources, light filters, obliquely incident light illuminators;
4. Devices for molecular genetic research;
5. Optical and electronic microscopes;

6. Equipment for detecting changes in markings and signs on the car body;
7. Devices for measuring the speed of the bullet, etc.

The above is a short list of advanced technical tools and technologies used in forensics. Currently, technical tools and materials for the forensic expert or related experts are also being improved at the scene of the incident.

Forensic expertise is a field of scientific knowledge related to various sciences, in particular, natural and technical sciences. Therefore, the advanced achievements of all disciplines are relevant and important for forensic activity, and these achievements must be introduced into this activity. Professor T.V. Averyanova emphasized this in her works when she thought about the integration (integration) and differentiation (differentiation) of scientific knowledge [3].

At the same time, it will be necessary to think about the problems of introducing new knowledge, advanced achievements of natural and technical sciences into the theory and practice of forensic examination. For example, the difficulties in using computer tomography as a reliable, non-destructive method of analyzing the physical condition of metal objects can be mentioned. Tomography is a research method that does not affect the object and does not require special sampling or preparation for use (use) in research.

The use of computer tomography in the conduct of various forensic examinations allows the analysis of various objects and the performance of many practical tasks. Including the production of important medical products, quality control of castings, metrology and additive technologies, aviation, geology, as well as the creation of modern composite and construction materials [4, P.13].

The tasks of such studies can be:

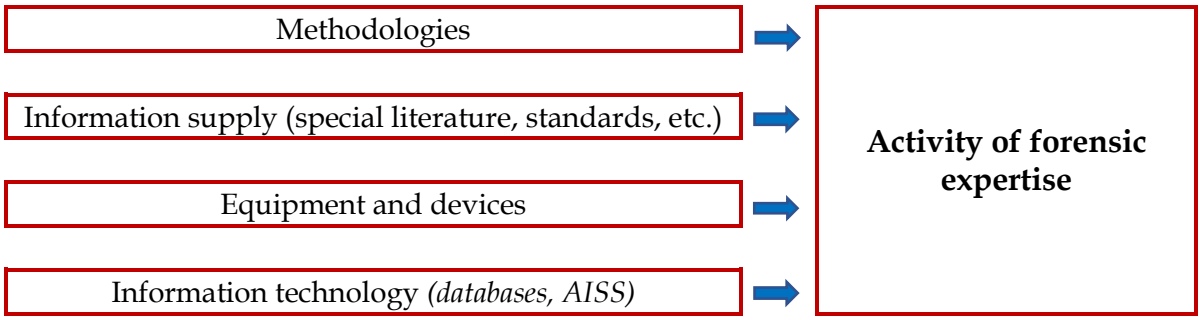
1. To determine the causes of operational violations of various facilities and objects;
2. Control the quality of products and study their characteristics;
3. Get information about the raw materials used in the production of metal materials, the tools used for the production of the product, the technology of the production cycle and many other things [5, 6].

Tomography methods allow to study the internal structure of objects step by step without destroying and changing them, and allow not only to confirm the presence of a defect in the material, but also to diagnose its topography, to determine the effect of the defect present in the product on the functional properties of the product [7]. However, the difficulty of equipping forensic institutions with such devices limits their use and therefore the possibility of conducting such studies.

RESEARCH METHOD

The effective development of forensic activity depends largely on the use of new scientifically based methods of researching various objects in expert practice, it depends on the level of its information supply with special literature and the level of standardization of this activity and the introduction of the latest information technologies (AISS (automatic information search system), databases, information systems), as well as modern equipment and devices. Schematically, the above points can be expressed as follows [8, P.191]:

Figure 1. The development of forensic activity



It is known that any expertise methodology, which includes the base of equipment and devices necessary for research, research should include a list of used equipment, devices and equipment that must be used to study the properties and condition of the object. Therefore, the possibility of using one or another device and equipment is assumed at the writing stage of the development of the relevant methodology as a sequence (algorithm) of solving the expert task. Tested and tested methodology confirms the introduction of new techniques into the practice of forensic expertise.

However, even now, there is a lack of methodological support for a number of areas of forensic activity, for example, research of cash receipts, research of substances of unknown nature, etc.

RESULTS AND DISCUSSION

The principle of impartiality is always followed in the classification of forensic expertise and in the development of methodologies. Based on the traditions of the development of science and technology, it is now possible to deviate from the above principle, because now is the era of development of computer technology, and the approaches to accounting and systematization of data, object detection and research are changing. Therefore, the professional competence of a forensic expert who can conduct the necessary research in a certain field of knowledge, relying on his qualifications and special knowledge, is of great importance.

Now, many tasks are performed on a computer, or rather, on special programs created for personal computers. Therefore, data must be properly and efficiently collected (searched, recorded, and retrieved) before it can be processed by a specific computer program.

No special knowledge of science, technology, art or craft is required to properly download data for processing by a computer program. But knowledge is required to determine the characteristics and condition of the research object. Also, special knowledge in the field of statistics is required for competent statistical processing of existing data on the object (objects) of research.

Also, among the theorists and practitioners in the field of forensic expertise, there are still a number of controversial issues related to the introduction of new achievements of science into the practice of forensic expertise. For example, from the point of view of the theory and practice of forensic examination, one of the main issues is the problem of correct application of the apparatus of terms and concepts. In this case, practitioners prefer to use science-based terms and concepts to quickly and accurately perform the practical tasks before them. However, theoretical scientists have a different approach to problems in different scientific areas, which does not correspond to the needs of practice.

In addition, in the conditions of the improvement of various technical tools and

technologies, it cannot be ignored that new types of equipment and devices are being created that can quickly solve the tasks of object research without low costs and with fewer errors. At the same time, there is a question of finding funds for such equipment and devices and their maintenance.

In conclusion, it is possible to think about the prospects for the development of forensic expertise as a field of scientific knowledge and practical activity, and we emphasize that the following areas of development of this field are important:

First, to improve the legislation regulating the activity of forensic experts in the Republic of Uzbekistan. Here, it is appropriate to develop and implement draft laws on uniform requirements for state forensic examination institutions and non-state forensic examination organizations with different departmental affiliations. For this purpose, to ensure the implementation of Decree No. PF-6256 [1] of the President of the Republic of Uzbekistan dated July 5, 2021 "On measures to improve the forensic expert system in the Republic of Uzbekistan", as well as collecting information on forensic experts and expertise, complex automation of their processing processes, conveying information about the activities of forensic experts to the population and authorized bodies, it is necessary to create a special electronic information system designed to ensure all types of information cooperation with organizations related to the implementation of expert actions.

Secondly, the development of normative legal documents regulating the activity of forensic institutions on international cooperation. Judiciary reforms implemented in Uzbekistan in recent years made it possible to strengthen the guarantees of protection of the rights and legal interests of citizens and entrepreneurs, as well as ensuring the independence of the judiciary and the openness and transparency of the activities of the courts. At the same time, within the framework of the principle of "New Uzbekistan - a new court", further expansion of the population's access to justice requires the acceleration of the reform of the judicial system and the introduction of advanced international standards in the field. Therefore, by the Decree of the President of the Republic of Uzbekistan No. PF-11 dated January 16, 2023, to ensure the true independence of the judiciary, in order to increase the efficiency and quality of court activities, a short-term strategy for bringing the judicial system to a qualitatively new stage for 2023-2026 was approved and within the framework of this "Strategy" - to create all opportunities for citizens and entrepreneurs to protect their rights and legal interests in courts, full implementation of the principles of dispute and equality of parties in court proceedings, improving the legislation aimed at ensuring the impartiality of courts in practice - was defined as one of the priority tasks of ensuring justice [2].

Thirdly, news such as the above will further increase the efficiency of crime fighting activities in Uzbekistan; to strengthen the world-class status and condition of forensic expertise; allows to carry out joint scientific-research and methodical activities with expert institutions of foreign countries in order to determine the cases in which special knowledge in the field of science, technology, art or craft should be proven by effective performance of tasks.

CONCLUSION

Fundamental Finding : This study underlines the crucial role of integrating sophisticated technology and scientifically established procedures into forensic expertise, emphasizing the importance of professional skill and multidisciplinary knowledge. Enhanced legislative frameworks and international cooperation are crucial for advancing

the field in Uzbekistan, notably in guaranteeing effective crime-fighting measures and conformity to global norms. **Implication :** In order to ensure fair practices and promote greater openness, the findings emphasize the need for unified legislation and processes for both state and non-state forensic institutes. Additionally, establishing electronic information systems and introducing cutting-edge equipment might greatly increase forensic process efficiency, improving access to justice and the general caliber of forensic exams. **Limitation :** Although this study offers a thorough overview of the opportunities and challenges in forensic expertise, it is constrained by its emphasis on Uzbekistan's institutional and legislative frameworks; more extensive comparative analyses with other nations may provide more information about international best practices. **Future Research :** Research should concentrate on the creation of universal terminologies and frameworks to close the gaps between theoretical approaches and real-world applications in forensic science, as well as the integration of emerging technologies like artificial intelligence and machine learning into forensic practices.

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