Challenges of the forensic science facing new technologies*

RETOS DE LAS CIENCIAS FORENSES ANTE LAS NUEVAS TECNOLOGÍAS

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ABSTRACT

In the era of new technologies, used in the field of criminal justice, the forensic science has passed real challenges facing those means of gathering and administering scientific evidence in criminal proceedings. Artificial intelligence and how it meets the judiciary is a well-known question for the high-tech in the field. The current paper aims at analyzing and discussing the features the judicial activity in criminal matters is characterized with during the criminal proceedings. The most important elements of new technologies come to state the consequences that they produce in criminal cases investigated by means of forensic evidence including new digital technologies. In order to achieve the proposed goal of the current paper, certain main purposes have been highlighted, which consist particularly in the procedure of using methods of forensic science for the investigation of crimes, as well as elements of new means of technologies including artificial intelligence. The proposed topic is carried out through qualitative research methods conducted on approaching challenges of the forensic science facing new technologies, combined with in-depth elements of criminal proceedings.

RESUMEN

En la era de las nuevas tecnologías, utilizadas en el ámbito de la justicia penal, la ciencia forense ha superado retos reales a los que se enfrentan esos medios de recopilación y administración de pruebas científicas en los procesos penales. La inteligencia artificial y cómo se enfrenta al poder judicial es una pregunta bien conocida para la alta tecnología en el campo. El presente trabajo tiene como objetivo analizar y discutir los rasgos que

caracterizan la actividad judicial en materia penal durante el proceso. Los elementos más importantes de las nuevas tecnologías vienen a manifestar las consecuencias que producen en los casos penales investigados mediante pruebas forenses, incluidas las nuevas tecnologías digitales. Para lograr el objetivo propuesto en el presente trabajo, se han destacado ciertos propósitos principales, que consisten particularmente en el procedimiento de uso de métodos de la ciencia forense para la investigación de delitos, así como elementos de nuevos medios de tecnologías, incluida la inteligencia artificial. El tema propuesto se lleva a cabo a través de métodos de investigación cualitativa realizados sobre el abordaje de los desafíos de la ciencia forense frente a las nuevas tecnologías, combinados con elementos en profundidad del proceso penal.

I. Introduction

In the era of globalization, the phenomenon of committing crimes seems to be a global issue itself, due to the features that the activity of forensic investigation in the context of digitalization has. The legal means of forensic crime investigation creates, generally speaking, a judicial framework used by the judicial bodies in purpose to solve criminal cases they are invested with.

Committing crimes at the transnational level is at the same time a particular issue (Boister, 2018,) that has broken for a long time ago the conventional barriers, both from the point of view of the ways of manifestation and the *modus operandi* as well. In such framework, the procedure of forensic investigation of serious crimes, including those committed by violence (Douglas *et al*., 2013), or even very serious crimes, such as those committed in a transnational manner, which involve trafficking of any kind, from human beings, arms, drugs, artefacts, to terrorist attacks, was re-assessed in order to combat these phenomena, but more particular to prevent the serious crimes.

From this perspective, both the prevention of criminality and the punishment of perpetrators are functions in the judicial authorities' focus and the legislative ones at the national and supranational levels. Thus, in purpose to punish perpetrators, a determining role is occurred by the activities of discovering crimes, gathering evidence, and identifying perpetrators. These activities should be carried out in such a way to solve criminal cases through legal means and procedures organized on fundamental principles of criminal proceedings, such as legality, equality, reasonable time, and presumption of innocence, on the one hand, and on the specific principles of forensic science, on the other hand.

First of all, it is about the rapidity of carrying out the forensic activity, which states that such activity should be carried out at the earliest moment of committing crimes. Under these circumstances, the forensic investigation bodies are able to clarify several aspects related both to the crime committed and perpetrator.

Per a contrario, as long as the forensic experts delay the activity both at the crime scene and within the laboratory or prevaricate themselves from submitting forensic examination reports to the judicial bodies, then the result fails either partially or totally

(Avdija, 2019), because of serious risk for the samples existed on the crime scene to be lost. In this matter, delaying forensic investigation activity may conduct to sanctioning forensic expert, according to Article 175 (8) of Code of Criminal procedure of Romania.

Secondly, it is about the efficiency in carrying out forensic investigation activity. Although it is not regulated by Code, the efficiency principle works in close connection with the rapidity procedure of forensic investigation. Despite this feature, the above stated principle is mainly involved in technical procedure of carrying out forensic examinations. In other words, this principle occurs in the manner in which the forensic experts apply their knowledge in the field of forensic science in practice.

Thirdly, the objectivity features the forensic investigation activity in which the forensic experts are called to contribute to finding truth in criminal cases. In this matter, they are obliged to analyse objectively *de facto* situation, under real circumstances the crime was committed in (Bouchaud *et al.*, 2019), as well as to submit objective conclusions contained in the forensic examination reports. It is imperatively that the conclusions should be based on the evidence gathered from the crime scene or those related directly to these ones.

Fourthly, the principle of opportunity characterizes the forensic activity during the procedure of administering forensic evidence in criminal cases. It leads to discovering evidence, fixing and analyzing them on the one hand. The principle is also related to the activity of technical and scientific investigation of material samples, as well as all to other pieces of evidence which could serve as means of evidence, on the other hand.

Taking into account all these principles the forensic science is working with, the activities carried out by the forensic experts are covered by the main hypothesis which leads to the idea that the crime scene is very abundant in pieces of evidence, which must carefully be sampled in such a manner not to destroy or distort them.

Last but not least, the entire activity in the field of forensic investigation requires the use of new means of technology. Bearing in mind the progress of technological means of investigation, used in several fields the forensic science is connected with, such as physics, chemistry, computational devices, it could be understood that some specific techniques of investigation have been enhanced in the last decades.

In this context, it is observed the challenges of forensic science facing new technologies in purpose to solve legally and substantially the criminal cases, based on conclusive, pertinent and genuine evidence, gathered by the investigation bodies in order to clarify the circumstances of committing crimes.

According to these issues, a set of questions might be asked.

► Are new technologies able to control criminal phenomena in such a way to create the reasonable conviction that high-tech provided in the judicial field will help the judicial bodies in achieving the scope of criminal proceedings?
► In what measure is the artificial intelligence able to substitute the classic procedures and what are their results?
► Does artificial intelligence have technical capacity to optimize and streamline criminal proceedings?

These are only a few pertinent questions to which it is looking for obtaining relevant answers as a consequence of the research conducted on the current topic. They must also be conclusive for the role and the place of new technologies occurred in the forensic investigation activity.

In order to achieve the proposed aims, a structured well-defined and qualitative research activity has been conducted on the topic of new technologies and their particular features, as well as the situation of how they face the justice in criminal matters, particular view upon the judicial activity of gathering and administering scientific evidence.

II. Artificial Intelligence and the justice in criminal matters

The connection of artificial intelligence with the administration of justice in criminal cases has for a long time been discussed by doctrine in criminal matters (Sourdin, 2018). Even if the practitioners are usually facing this procedure and its means of activity, the new manner in which criminal justice is carried out through new methods and scientific techniques which lead to the field of digitalization seems to be at the first sight more antagonistic issue than a realistic one.

However, in practice it has been viewed that there is a simplification of procedure in situation of solving criminal cases in which scientific methods and techniques of high-tech intervene. They help the judicial bodies in finding truth and solving cases based on conclusive, pertinent and genuine evidence, as scientific ones.

Moreover, the connection established between criminal proceedings and the artificial intelligence has been discussed, from the point of view of the consequences produced. Equally, doctrine has analyzed the "europenization" of high-technologies used successfully in criminal justice (Quattrocolo, 2019), particular attention being paid to those means of new technologies of the forensic investigation of crimes. In this matter, criminal sciences are considered as a "slow-changing factor, clearly because cultural shifts are slow-evolving phenomena: only settled down transformations can be ratified by the law, not only in the statutory-law legal system" (Quattrocolo, 2019). The author speaks about the multicultural environment the criminal sciences must be divided in for a better understanding of the principle of diversity in a unique matter. In fact, the involvement of new technologies are more suitable for the forensic science than the criminal ones.

The involvement of artificial intelligence in criminal justice is diverse, analyzing in accordance with each judicial system of the European countries (Ewald, 2019). Regarding the case of Romania, the justice in criminal cases is organized firstly under the European principles of due process (Gless, 2013), but equally under the classic principles applied in the procedure of solving criminal cases from the very beginning.

Subsequently, the forensic science is undoubtedly the science of law the criminal proceedings is connected to in achieving above mentioned principles of criminal proceedings. The nexus new technologies - criminal procedure is usually viewed under activity of defendants' surveillance, which is considered as means of encroachments

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in their private life, despite the limitation imposed by the constitutional provisions (Guimaraes, 2019). In this context, it is very important for all actors involved in the judicial proceedings that the parties' fundamental rights are fully respected and guaranteed by the judicial authorities.

In this regard, jurisprudence has admitted that a reason of appeal was related to the defendant's audio-video recording which had a determining role in pronouncing the solution of conviction, being contested and ordered to forensic examination. Although the judicial bodies have ordered the forensic examination of digital evidence, it could not be carried out because of the Anti-Corruption National Department refuse to provide the forensic expert with original digital device on the defendant's surveillance (Decision no. 297/A/2018). Bearing in mind that the defendant was convicted on those means of evidence, this means that the court of law has legitimated the legality of evidence by infringing due process. As long as the audio-video recording was carried out outside of the criminal proceedings, the only one consequence which could be stated in the matter conducts to removing it entirely from the means of evidence submitted in criminal case. For these reasons, the appeal court has also stated that this evidence cannot support the convictions.

According to Article 6 of the European Convention on Human Rights, the above stated procedure of the first instance has infringed the principles of due process. Moreover, the investigation phase has been deprived, as well as the activity of criminal investigation was not carried out within the criminal proceedings. Thus, the case of nullity intended was not analyzed by the court of first instance, even the preliminary procedural stage has been the main reason for the court of law to send the criminal case back to the prosecutor. The invalidation of judicial decision has imposed removing those activities of gathering evidence, as they have been analyzed and discussed at the time of stating upon the defendant's guilt, taking into account that all these acts have been achieved during the preliminary procedural activity, the investigation phase being started on *in rem* activity firstly, while after that exercising accusation was ordered by the prosecutor.

It is relevant that the legal provisions and mechanisms provided by the forensic science along with the regulations in criminal matters are those which order to individuals a particular behaviour they have to respect. Otherwise, a set of judicial instruments of coercion and punishment intervene according to the perpetrators' guilt proved by administering evidence also gathered by means of forensic technologies.

Approaching criminal proceedings in its classical limits, according to the legal rules being independent from the other legal institutions provided by the other sciences (Dzehtsiarou, 2011) it is connected with, is a weakness from the point of view of the main criminal proceedings' purpose, that of discovering entire crimes committed and punishing guilty perpetrators.

Although it establishes relations with other auxiliary sciences of law, the forensic investigation procedure is not deprived of the feature of *autonomous science*, knowing that it means a whole of ideas, theories, concepts and principles, which are applied in the activity of achieving criminal proceedings. Nevertheless, the application of science of digital technologies in criminal proceedings means a new concept of penetrating

them due to the fact that "information technology and digital information is so specific that users only see the tools with which this information is transmitted (...). The inference is drawn that digital information with the relevance property contained in computers and other hardware (...) may be present in the materials of the criminal case in the form of a printout of a text file, a screenshot of the video, decryption of a video or phonogram" (Lazareva *et al*., 2019).

In order to achieve the scope of criminal proceedings, the judicial activity in criminal cases including the forensic investigation procedure cannot be viewed as a separated issue, but more particularly in connection with other areas of law, whose nexus is considered the role of legal norms, in a unitary judicial system.

Approaching new technologies is analyzed not just from the perspective of scientific methods the forensic science provides the investigation bodies with, but from the point of view of the advancing science too. It is considered so because "it is undisputed that, in the last decades, the contemporary society witnessed a computational turn, that, now we all understand, is not only a breath-taking scientific advancement, a radical change in every professional realm, but, overall, is one of the most rapid, astonishing and wide-spread cultural changes ever occurred" (Quattrocolo, 2019).

Under the project of application of artificial intelligence in criminal justice system, the Council of Europe has identified no less than five principles (European Commission for the Efficiency of Justice, 2018), as follows:

i) principle of respecting fundamental rights;
ii) principle of non-discrimination;
iii) principle of quality and security;
iv) principle of transparency, impartiality and fairness;
v) principle "under user control".

According to the above stated principles, the Council of Europe has reiterated the idea that "When artificial intelligence tools are used to resolve a dispute or as a tool to assist in judicial decision-making or to give guidance to the public, it is essential to ensure that they do not undermine the guarantees of the right of access to the judge and the right to a fair trial (equality of arms and respect for the adversarial process)" (European Commission for the Efficiency of Justice, 2018).

This statement cannot be understood as a concept that working process of artificial intelligence and its interference over the criminal justice system may generate a deprivation of judges from their discretion or even secret in deliberation of judicial decision. Moreover, the situation may not have serious influences on the parties' fundamental rights (Negri, 2019), although doctrine has stated that "fundamental rights - such as the one to a fair trial - are in jeopardy and the outcomes of the decision-making process may impact significantly on the individuals' condition (...)" (Quattrocolo, 2019).

Therefore, the illegal validation of the means of evidence gathered by the investigation bodies through the defendant's digital audio-video surveillance, as well as the appropriate technical records of giving of audio-video recording content is a serious motive of illegality

of decision pronounced. This is because such recording was made with the infringement of legal provisions which regulate the terms and conditions the forensic technical examinations may be carried out during the investigation phase. It is considered so, due to the fact that, by law, the forensic examination on the audio-video recording elements authenticity may not be carried out under the investigation bodies fault themselves. The same is true in cases in which the investigation bodies do not provide the forensic experts with the original optical support containing the information on the evidence disputed.

III. FORENSIC INVESTIGATION THROUGH NEW TECHNOLOGIES: CONCEPTUAL APPROACH

The procedure of forensic investigation of crimes is mainly associated with the principles of criminal justice, those of prevention of criminality, on the one hand, and finding truth in criminal cases based on pertinent, conclusive and genuine evidence, on the other hand.

From a historical point of view, it has been observed that the criminal proceedings carry out the procedural functions by appealing the principles, theories, and methods of investigation that the forensic science offers in practice. Among them, digital forensic science has a set of rules of new generation, which belong to the concept of "designing technology", in such a manner to achieve and spread up efficiency over the samples investigated. Doctrine has made a comparison between the past, present and future, which emphasizes that "digital forensics is one part in a more complex social construction process where standards and methods of IT forensic of the 21st century meet evidentiary procedural rules in criminal justice of the 19th century, hence applied by a judiciary of the 20th century" (Ewald, 2019).

During the activity of carrying out the judicial competences, there are interesting areas for the judicial bodies in which they do not have speciality knowledge. More particular, some evidence, such as digital ones, can be administered in criminal cases exclusively through specific forensic means of evidence which constitute the exclusive competence of forensic investigators.

The forensic examination is ordered by the judicial bodies in cases in which speciality knowledge of experts are necessary in order for them to clarify some technical aspects the crime is featured with.

The Code of Criminal procedure of Romania, adopted by Law no. 135/2010, regulates at Article 97 para 2 (e) the examination record as a mean of evidence, which can conduct to finding truth in criminal cases, while at Article 172-181 thereof the judicial examinations, including the forensic ones.

From a technical point of view, the forensic examination may be ordered by the judicial bodies in several cases (Decision no. 385/RC/2018, Decision no. 428/RC/2018, Decision no. 101/A/2019), in which the call for an expert is necessary for the activity of establishing *de facto* situation including all circumstances of committing crimes, such as in cases of homicide in purpose to find the ballistic information on the gun used by

the perpetrators (Decision no. 385/RC/2018), as well as in cases of burglary, in order to establish the perpetrators' fingerprint digital evidence.

Nevertheless, jurisprudence has emphasized that according to Article 172 (1) of Code of Criminal procedure, ordering forensic examination is basically conditioned by establishing preliminary character of necessity of the expert opinion in purpose to clarify particular crime circumstances (Decision no. 172/A/2018). Moreover, the above stated condition cannot be achieved only on the premise that the forensic expert has supposed only the possible insufficiency of evidence in order to prove the identity of acts incriminated. This is because the expert opinion as well as the conclusions provided in particular cases should be stated in accordance with the scientific character foreseen, required in all areas of forensic examinations (Alamoreanu *et al.*, 2014).

The forensic tactics has an important role in solving criminal cases. In this regard, the tactics rules specific to forensic science help the investigation bodies in carrying out procedural activities. They refer to the tactics in the matter of organizing activity of criminal investigation, carrying out the crime scene investigation, the activity of search, as well as surveillance of persons during the criminal proceedings, identifying perpetrators and goods, or carrying out reconstruction of *iter criminis* in particular cases of homicide.

The forensic science is focused on two main directions of achieving its functions. First of all, it is about the function of prevention of committing crimes. This function is viewed in an objective manner, at the macro- society level. This means that the perpetrators will been thinking twice at the moment of preparing their criminal activity, if they know how enhanced the means investigation are. Secondly, about the function of discovering crimes and identifying perpetrators in order to bring them under criminal liability in accordance with their guilt. If paying attention over the functions pointed out above, they are also the main directions of the judicial bodies' activities as well as of the entire justice in criminal cases. Equally, the forensic investigation bodies are looking for achieving the purpose of prevention in committing other crimes and finding truth by means of new technologies.

Moreover, it is well-known that the concept of "computational" influence upon the judiciary is generally speaking more than a traditional cybercrime, knowing that it has been outlined in the recent past. At present, a new era of computational research has been developed and occurs over the idea of a most sophisticated phenomenon (Barfield and Pagallo, 2018) leading to "theorise the application of the classic legal categories to artificial intelligence entities" (Quattrocolo, 2019).

The new technologies which are currently applied in the administration of justice in criminal matters have consequence on the way of investigation of crimes as well as in the manner in which those crimes were committed. The involvement of artificial intelligence is viewed under the umbrella of its consequences over the society that is entirely protected by the provisions of criminal matters.

Actually, the influence of artificial intelligence in the field of forensic examinations could be discussed from the perspective of "the absence of a back-ground research on

the risks it may entail to the area of the core values of the society" (Quattrocolo, 2019) also under protection of the provisions in criminal matters.

The digital technologies are also focused on the revolution in technology which consist in accessing data generated by digital devices which also produce digital evidence (Janaki, 2016). The process might be called a triangulation or the theory of "three D" - particular attention upon Digital Data - Digital Device - Digital Evidence. All these computational resources are able to determine uncountable amount of data in a short period of time, and under low costs (Katz, 2013).

The above stated elements of forensic technological evidence are premises for a background of "electronic justice" being argued as a pattern of development of e-justice in form of the administration of justice.

IV. CONSEQUENCES OF USING NEW TECHNOLOGIES IN THE FIELD OF FORENSIC INVESTIGATION

The main consequences in the field of connecting new technologies with forensic science arise from the relation established between the criminal justice system and criminal sciences which is defined as an interdependent and interaction in protecting social order.

A thorough explanation can be analyzed from the general question. Why do we need new technologies in the forensic investigation? Beside advancing the degree of development of new high-tech products they are featured with, at present digitalization of the investigation procedure is so common especially in cases of serious crimes committed in a digital context (Pedrina, 2019).

On the one hand, the new technologies and its involvement in the field of forensic investigation must be discussed from the point of view of the finalization of judicial activity, which consists in pronouncing judicial decisions in criminal cases. It is well-known that the forensic science has became "digitalized", at present being involved in the field of investigating serious crimes. It is about the cases of homicide (Decision no. 428/RC/2018), counterfeiting goods or money and digital crimes (Decision no. 530/2017), for example.

On the other hand, its feature is observed both in *modus operandi* used by the perpetrators and in the variety of digital instruments used by themselves, also under the criteria of digitalization (Hilgendorf, 2018). The jurisprudence in criminal matters has stated solutions in cases in which serious crimes are committed by using digital means (Decision no. 253/A/2020).

From a technical point of view, the consequences of using new technologies in the forensic activity could be discussed through balancing the advantages and disadvantages of using new means of digital technologies and their involvement in the judiciary (Gladysheva *et al*., 2019; Lageson, 2019).

Analyzing the activity of researching current topic, three main advantages have been outlined, as follows. One of them refers to gathering evidence rapidly, with low costs, the second to the fullness of exact data on the crimes committed, while another one on the perpetrator and the circumstances the crime was committed in.

At the same time, the disadvantages refer to the digital crimes which are also committed through using devices and means of high-tech whose hiding in digital environment the perpetrators are looking for in such a manner for them to be exonerated from criminal liability.

Moreover, the forensic investigation cannot achieve its scope during the criminal proceedings in the absence of provisions of criminal sciences, which incriminate antisocial behaviour, and suppose a procedure. Thus, the regulation of forensic investigation means the investigation of crimes under a procedure regulated by laws into force. It implies also the activity of solving criminal case and applying punishment (Ashworth, 2015).

The new technologies create also useful facilities for the forensic investigation (European Commission for the Efficiency of Justice, 2018). In this area, the system of new digital technologies provides full ranges of data used by the investigation bodies as digital evidence in criminal cases. Moreover, it generates new means and procedures of investigation based mainly on analyzing sets of available data (Balkin, 2017) either public or private.

The use of algorithm in the field of forensic seems to be more a fantastical operation than a scientific one. The concept of the interference of big data and algorithm in making decision process has been highlighted by doctrine at international level (Mittelstadt *et al*., 2016). The concept is also debated by the Council of Europe, which presents the use of artificial intelligence algorithms in the judicial systems of the member states (European Commission for the Efficiency of Justice, 2018).

Despite its valuable effect over the forensic investigation, the above mentioned issue exceeds the current topic interest and analysis. At the same time, the Council of Europe has pointed out that "Data based on judicial decisions that is entered into a software which implements a machine learning algorithm should come from certified sources and should not be modified until they have actually been used by the learning mechanism. The whole process must therefore be traceable to ensure that no modification has occurred to alter the content or meaning of the decision being processed" (European Commission for the Efficiency of Justice, 2018).

The involvement of artificial intelligence in the forensic investigation could thus be understood more a theoretical concept rather a practical one. That theory was argumentatively combated by forensic experts who are usually working with digital technology (Nieva Fenoll, 2018). In this regard, the specialists in the field of criminal procedure have provided sceptical people in the matter with serious arguments to confirm the positive theory.

In fact, doctrine has approached this topic from several points of view, one of these being involved in practical consequences the new technologies produce in the field of forensic investigation. For this reason, it has been emphasized that "To some extent, this matches with the premises from which I moved, it is to say, the connate feature of criminal law to following rather than preceding (or progressing with) social changes (...)" (Angele, 2017).

As a general feature, it is obvious that the artificial intelligence is interfered to forensic investigation, having consequences in the procedure of decision making process, also viewed impossible to be currently achieved without certain digital outputs (Zavrsnik, 2018).

Basically, committing a crime creates the legal framework of releasing judicial mechanisms of forensic investigation to fight illegal actions in order to punish perpetrators according to their guilt. Under this scenario, the forensic investigation bodies have to proceed to carry out those investigative activities including that of gathering forensic evidence in purpose to discover all criminal activities committed, to gather evidence to prove criminal acts, in such a way for the courts of law to solve the criminal case, and pronounce judicial decision either of condemnation of defendants, if the evidence state so, or decision of acquittal, if the evidence provide contrary.

In cases of condemnation, the judges may use entire judicial mechanisms the judicial procedure in criminal matters provide them with, in order to state, beyond any reasonable doubt, that the crime exists and it was committed by the defendant with the proved guilt.

For the judicial mechanism activated by the forensic investigation bodies, at the investigation phase, the consequences of interference of new technologies must be balanced and compared with the achievements of artificial intelligence upon the entire judicial activity of solving criminal cases.

During the procedure of achieving justice purpose in criminal cases, the artificial intelligence is analyzed by comparison with human intuition the judges are using of in the decision-making process, particular attention being paid on the criminal liability, applicable punishment, defendant's guilt, administering evidence, deliberation procedure a.s.o.

Although the theory is less understood at the first sight, the above stated features cover particular element of algorithm that is better understood by practitioners in criminal matters. It seems to be more a necessity of evaluation *de iure* situation, than the aim to prescribe limitations and outlined ideas.

V. Conclusions

The era of new digital technologies was very much a curiosity for theorists than the practitioners. Even a series of new means of forensic methods and scientific technologies were applied in practice, due to the forensic experts' involvement in the area of high-tech, the theorists are still unaccustomed to such "revolution" in science, generally speaking, in particular to its implication in the field of justice in criminal cases. On the first analysis of case, it could be appreciated that there is no connection between digital technologies and artificial intelligence, on the one hand, and the criminal proceedings, on the other hand, because of their antagonistic features. Despite this argument, the jurisprudence references state that solving criminal cases as well as the activity of deliberation in criminal trial are carried out inclusively with algorithms which seem to have applicability in the forensic science rather than in the criminal sciences. Thus, the

artificial intelligence is reflected in the syllogism the judge's decision is based on, regarding the crime committed and the circumstances it was featured with, as well as the defendant's guilt.

The main judicial elements of criminal proceedings are changed from probabilities in certainties based on a deductive logical judgement and conclusive, pertinent and genuine evidence, including scientific ones, gathered through forensic methods and digital technologies provided by the forensic science.

The involvement of new technologies in carrying out the justice in criminal cases must be concluded from the point of view of both positive and negative consequences they produce in practice. The use of new technologies in criminal proceedings complies with practical application, in terms of technology and legal support. It has the advantage to allow in-depth access of involved parties to the judicial information and case-law.

Moreover, the connection of artificial intelligence with criminal justice was also for a long time ago viewed as a new side of technological development. In this direction, the judicial authorities have reacted in finding new legal ways of implementing such technologies in criminal justice, due to the fact that they help them to achieve the purposes of criminal justice entirely.

At the same time, the main advantage of using new means of technologies in criminal justice is related to the procedural functions which are currently achieved in due course and through using low costs for the administration of justice.

Consequently, in the era of digitalization, the forensic science achievements are not possible in the absence of new means of technologies including artificial intelligence. At present, there is a necessity of using such means of digital technologies combined with forensic science in defining the purpose of criminal proceedings.

Finally, *de facto* situation stated in criminal proceedings shows that in criminal cases of serious crimes, digital information is attached in the form of electronic evidence, also considered material evidence, such as flashcard, CD-rom, memory card (Lazareva *et al*., 2019). In these situations, the procedure in criminal cases does not necessitate another type of digital evidence.

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