

# Crime Forecasting in the Digital Age: A Theoretical Framework

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## Abstract

*The aim of the study is to describe the criminological framework of crime forecasting based on special literature, practice materials and research. Analytical, synthesis, inductive, deductive and descriptive research methods are used in the article. The authors conclude that the development of full, comprehensive and highly reliable crime forecasts is a laborious and complex process. Predictive measures should be designed in a more urgent manner – this might encompass the reporting of anticipated crimes in advance, as well as the indication of changes in the overall structure of crime and dangerous trends of a specific type of crime. Consequently, there must be a warning effect in order to prevent possible adverse trends.*

## Keywords

criminal offence • crime • forecast • forecasting

## Introduction

Crime is common to all societies. Only its political, social, economic and cultural developments and the basis of life of society affect the nature of crime and its factors. Crime includes ‘specific types of crime’, as well as fear of crime or a sense of insecurity. For example, the fear of possible violence prevents an individual from making full use of the living space that might be at their disposal. Specific types of crime also include crimes committed by using the situation. In the period from 2010 to 2023, the indicators of the criminal statistics of Latvia show that the total number of registered criminal offences decreased from 2015 to 2022, while in 2022 an increase in registered criminal offences can be observed (see Chart: Number of registered criminal offences in the country, 2010–2022).

The public danger, harmfulness and fear of crime as a social evil do not get any less. In addition, there is an increase in various criminal manifestations in the cyber-environment. The rapid technological developments are transforming the world, covering ever new spheres of life, including crime. The digital age has led to an intense transition from physical criminal offences to criminal offences in the virtual environment. The digital space is becoming infinite. It has significantly changed the individual’s behaviour, covering not only human action but also the mind. One has to agree with Jānis Baumanis’s opinion that ‘technological development and the availability

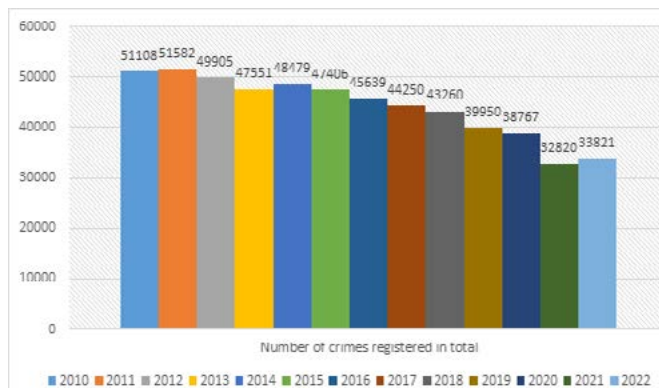


Chart: Number of registered criminal offences in the country, 2010–2022

of information in the virtual environment actually bring territorially and otherwise distant societies closer together in real life’ (Baumanis, 2020). Nowadays, in a cybercrime case, an investigator has to identify a huge amount of evidence in electronic or digital form. A digital crime scene, contrary to a physical one, contains computer systems or computer networks. A set of data of investigation and circumstances of the scene can provide information on the personality, motivation and characteristics of the offender (Kipāne, 2019). Taking into account the diversity of criminal offences, the research of crime, including cybercrime, must have an interdisciplinary approach (not only the legal aspect, but also, e.g., the psychological,

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technical and medical aspects). Therefore, the joint work of multidisciplinary specialists is of importance.

It is obvious that information and communication technologies have a significant impact on almost all public spheres. Modern technologies, such as artificial intelligence (AI), change our lives with both positive and negative effects. The field of AI has gained relevance in many parts of the world in recent years; it is developing rapidly and is a challenging process. AI brings with it a variety of dangers, such as non-transparent decision-making, gender discrimination or other types of discrimination, intrusion into private life or use in criminal offences (Eiropas Parlamenta 2021. gada 6. oktobra rezolūcijā par mākslīgo intelektu krimināltiesībās un policijas un tiesu iestāžu īstenoto mākslīgā intelekta izmantošanu krimināllietās [2020/2016(INI)]). The study of various aspects of challenges associated with the protection of human rights and the subsequent prevention of violations is, as is known, one of the most necessary and important measures for strengthening the rule of law and improving the legal system. Cyberspace is a global, infinite, multicultural and multi-layered space, and in this infinity it is difficult to regulate (Kīnis, 2022). The authors emphasise the need to take into account the fact that technologies are developing, so that there should be an understanding of the peculiarities and characteristics of the specific technologies, as well as an understanding of how to ensure the provision of human rights. One of the Eastern wisdom lessons highlights that the past is no longer there and, without thinking about the future, it may not be either. Similarly, in the field of criminology, one must think about tomorrow being aware of the past – and predict and establish crime control measures accordingly. One must agree that it is impossible to fully predict the future and control the possible development of the situation if there is no complete information regarding the processes that have affected the development of crime so far, together with there being an unavailability of data pertaining to the experiences of other countries in solving similar issues (Mežulis, 2006). In this sense, the crime forecasting process of law enforcement authorities and the implementation of practical activities based on theoretical guidelines are essential.

The aim of the study is to describe the criminological framework of crime forecasting based on special literature, practice materials and research. The authors use the works of scientists in Latvia and abroad – from Eastern and Western Europe, as well as America. The article studies the conceptual framework, as well as the theoretical and practical aspects, of criminological forecasting. Such research methods as the analytical and synthesis methods are used to describe concepts and learn about development trends. In turn, by the means of inductive and deductive methods, the authors will provide opinions. Crime is described as a social adverse phenomenon by using the descriptive method.

## Research results and Discussion

Today, in the digital age, there is an intensive transition from physical criminal offences to criminal offences in the virtual environment. The public danger, harmfulness and fear of crime as a social evil do not diminish. Thus, the basis for a safe living environment – in the real world and cyberspace – is not only crime prevention but also the direction of criminological forecasting (crime forecasting).

Each of the sub-branches of legal science has its own specific system of concepts. Crime is a criminological concept where criminal offence is its core element. In criminology, a criminal offence is considered as a set of external environment and individual characteristics, and as a defined process in time and space. A criminal offence is a complex phenomenon in itself and can be described by using five components: space; time; legal regulation (*mala in se*; *mala prohibita*); the offender; and the target or victim. These components are sufficient and necessary for existence of a criminal offence. The existence of these components also justifies the four dimensions that are used in criminology for explaining a criminal offence: the legal one; the offender; the dimension of the victim; and the place or situation (Brantingham & Brantingham, 1981).

Crime has always been a societal challenge. Since ancient times, ways have been sought to influence this negative social phenomenon. The relevance of the study is determined by the fact that the main task of criminology as a science of crime research is directed towards the development, improvement and implementation of the crime prevention system in practice. The authors believe that the clear basis for a safe living environment is not only crime prevention but also direction of criminological forecasting (crime forecasting). It should be noted that the environment is a significant factor in the increase or prevention of crime (opportunities to commit a crime). One can prevent, predict and combat the phenomenon when it has been studied. This means that crime-assessment work is unthinkable without criminological forecasting. 'Every more or less extensive criminological study or conclusion that has a forecast nature must be based on a deep and comprehensive analysis of social changes in public life and research on the impact of these changes on crime' (Stumbina, Birkavs, Niedre, 1981).

## Theoretical Aspect of Criminological Security

Each sub-branch of law also has its own specific objectives and tasks, which must be defined as specifically and accurately as possible. Before focussing on the study of crime forecasting, the authors will describe the importance of the science of criminology.

Criminal legal sciences respond to the current crime situation

and seek to control it and are focussed on restoring justice. In fact, the task of criminal law disciplines is to prevent the risks of crime. It should be accepted that the genes of criminology as a science can be seen in the criminal proceedings as a double helix of legal and practical aspects (Baumanis, 2007). Moreover, it should be noted that criminological forecasting covers not only crime forecasting but also forecasting the development and improvement of the science of criminology. The evolution of new sub-branches of criminology is deterred by objective societal processes, for example, one can outline medical criminology as a sub-branch of criminology, and also criminological security as a framework for criminological research. The security triad encompasses the **individual, society and country**. The vector of ensuring criminological security implementation is the protection of triad interests as one of the directions of the protection of human rights. It aims to ensure effective actions by national authorities in the event of threats to national security. Enforcement of criminological security is directed towards: (a) protection of the rights of the individual; (b) countering crime in the country; and (c) combating crime in the international area (global nature). Tasks and objectives of the criminological security strategy are: (a) ensuring the protection of the interests of the triad; (b) reducing the vulnerability of the threatened object; (c) adequate provision of law enforcement authorities; and (d) effectiveness of prevention measures – increasing the level and scope of preventive action activity.

In accordance with the Cabinet Regulation No. 595 'Regulations regarding Groups of Scientific Disciplines of Latvia, Scientific Disciplines and Sub-branches' (Noteikumi par Latvijas zinātnes nozaru grupām, zinātnes nozarēm un apakšnozarēm) adopted 27 September 2022, criminology is a sub-branch of legal science. Today, criminology has taken a fairly prominent place among legal sciences. Firstly, it is related to the growth of various types of potential and real threats (including criminal ones) or the growth of information about certain threats. Secondly, criminologists, according to their professional competences, are also socially active, sufficiently creative and integrative. Thirdly, in society, particularly during the crisis and post-crisis period, there should be an objective need to model the prospective development model, taking into account new potential criminal realities (Vilks, Kipāne, 2020). Criminological studies serve for the in-depth study and evaluation of crime and its related elements. The emergence and manifestations of crime vary from country to country, as well as across region and place and over time, and so does the set of criminal offences. Furthermore, crime is caused by a variety of factors. Many criminological theories focus on the factor that contributes to becoming an offender. The causes are found in temporal or otherwise distant factors such as upbringing, genetics, and psychological or social processes (Klarks, Eks, 2011). At the same time, it should be acknowledged that the

science of criminology in Latvia cannot boast of systemically extensive crime cognition researches. It is reasonable to point out that in today's 'risk society', criminology must develop as a mission to ensure public security, as well as to establish and implement successive criminal policy. Furthermore, the authors are convinced that the analysis of criminological processes must become interdisciplinary; this should be a combination of knowledge from several specialities (Brewer, 1999). Interdisciplinary research in law is becoming increasingly popular these days. Although criminology is an independent sub-branch of legal science, it has close interactions with both other sub-branches of legal science and other sciences. Crime is a special form of social activity. It is known as a social activity with a minus sign or an adverse social phenomenon (Kriminoloģija, 2004). Counteraction to such adverse social phenomenon may be an interdisciplinary approach. The interdisciplinary approach is based on a combination of discipline theories and methodologies, including integration, and it is characterised by review and violation of discipline boundaries (Medne, Muravska, 2021). In this context, one can mention the insights of administrative criminology, within which the theories of predisposed agents and intimidation as a solution are criticised by emphasising that crime is the result of the situation. Therefore, the task of the justice system is to create barriers to crime. In this case, the focus is on anticipating an event and preventing a criminal offence, rather than punishment or rehabilitation (Young, 1999). Thus, the focus of exposure is on what precedes the event, not on what follows.

Specialists admit that people generally do not consider a way to be protected from sudden incidents. People's lives and property can only be ruined because they do not have minimal security thinking. For example, every Internet user is at risk of a cyber-attack, as confirmed by a population survey conducted at the end of 2021. At the end of 2021, more than 70% of the population surveyed mistakenly believe that they are not at risk of a cyber-attack (Kiberuzbrukuma riskam pakļauts ikviens interneta lietotājs. 2022). This highlights the issues of victimology, where the commission of criminal offences has been facilitated (and sometimes also contributed to) by the victim's thoughtless, wrong behaviour or overconfidence. It is appropriate to quote an associate professor of the University of Virginia, Kevin Driscoll, who mentions that 'cyberspace is an integral part of the encrypted system. Thus, the knowledge of cryptography helps to identify and prevent cybercrimes. An important tool for protection against cybercrimes is cyber hygiene – the improvement of the Internet culture, an integral part of which is the possession of the complex procedures applied by cybercriminals' (Driscoll, 2016). One can therefore point out that the information society is a knowledge society – and one that involves not only ordinary knowledge but also what is called digital literacy. Digital literacy includes not

only knowledge of technology but also the ability to work in a team, critical thinking, etc. (K̇inis, 2022). This knowledge is essential for criminologists when analysing and studying crime trends, dynamics and development perspectives, as well as in the dimension of crime prevention and forecasting. Any study cannot do without scientific knowledge, and therefore, the authors will analyse the theoretical framework of criminological forecasting.

### Content of the Concept of Criminological Forecasting

Criminological forecasting (crime forecasting) is a form of social prediction. Researchers have long sought to predict a criminal offence before it happens. The foundations of criminological forecasting were set up by Belgian scientist Adolphe Quetelet (1796–1874), who pointed out the regularity of a criminal offence and the independence of statistical indicators. In 1835 Quetelet wrote 'with full reliability one can predict how many people can stain their hands with the blood of their loved ones, how many official frauds and poisonings there will be. It can be determined with as much precision as the number of deaths and births' (Vilks, 1998).

The concept of criminological forecasting is formulated in the literature as a scientific prediction of future trends and patterns of crime (this phenomenon in general, its individual types, groups, etc.), which constitute perspectives of the science of criminology. Undertaking a study of the quantitative and qualitative features of crime in the past and present enables the establishment of the regularities of the development of this adverse social phenomenon in the future (Riabikin, 1993). Criminological forecasting is based on knowledge of crime trends, as well as the processes that affect crime. In the authors' opinion, the following explanation is sufficiently precise: criminological forecasting is a scientific assumption made by scientists or practitioners and based on research (cognitive) conclusions about changes in crime trends or the likelihood of a criminal offence committed by certain individuals in the future (Luneev, 2011). On the other hand, the authors emphasise that in order to fully predict the future and model the possible development of the situation, an appropriate and complete amount of information is needed regarding the phenomenon to be studied, as well as comparable data pertaining to the experiences of other countries in solving similar issues. By nature, a criminological forecast about the development of crime allows a glimpse into the future. It helps to plan preventive action as predicted, as well as to reduce or neutralise the causes of crime and contributing conditions. Criminological forecasting allows the development of sound recommendations for the planning of crime prevention, control and combating.

Forecasting is a process and the final result is predicting the outcome of the course based on specific data (forecasting). Is a crime-free society possible? In the film 'Minority Report' (starring Tom Cruise) from 2002, the imagination of an ideal society is reflected in a world where there is almost no crime. Clairvoyants predict when murders will soon occur, allowing the police to detain a 'future criminal' – the perpetrator of a soon-to-be-planned-but-not-realised crime. In other words, forecasting is the process of obtaining information about a phenomenon, state of events, structure and dynamics in the future, involving obtaining information about phenomena that do not exist at the time the prediction is made. The purpose of making crime predictions/forecasts is to obtain an (at least tentative) understanding of what is likely to happen in the near future if nothing is done to prevent crime and reduce the fear of crime. The authors emphasise that the forecasts are only a possible model for the development of social situations, which does not determine the best constructive action to prevent adverse phenomena. Of course, forecasting crime will not completely prevent its occurrence, but to a certain extent it will ensure security from crime in sensitive areas. Both those living in the territory and strangers must know what criminal offences are committed and how they are committed in the specific territory (Bogomolov, Lepri&Staiano, 2014). Seasonal fluctuations of crime patterns, or seasonal waves, which have sufficiently persistent regularities, also have an impact. This allows the development of a special criminological calendar for a year, which would show which months of the year have a higher criminogenic potential, in addition indicating the most common type of crime. As indicated, this type of calendar also makes a rational use of the capacities, capabilities and means of the crime prevention subject to counter crime (Kriminologija, 2010).

Crime forecasting is a process of ascertaining the possibility of changes in the state of crime (state and regularity) in the future with the help of scientific methods, studying the social and legal phenomenon in the past and present. The main aim of crime forecasting is to identify the general indicators describing the development (changes) of crime in the future, to identify adverse and positive trends in the formation of regularities, and to outline techniques for changing the phenomenon or stabilising it in the necessary direction.

It is indicated in the theoretical literature that the approach to the development of criminological forecasts may be differentiated depending on its degree of novelty in at least two groups (Vilks, 1998):

1. The traditional approach where information and knowledge about a predictable object is obtained using previously developed and sufficiently familiar methods. Only the information obtained and the newly developed prognostic model have novelty.
2. The non-traditional approach, which is used only in

individual cases to identify adverse social trends and determine upcoming trends.

Criminological forecasting is the theory and practice of continuous acquisition and processing of information about the future of crime development. Predictions are made about the state and structure of crime and certain types of crime, as well as the possible illegal behaviour of a particular person. The object of criminological forecasting is crime, specifically cognition of determinants of crime. Identifying the determinants of crime is a part of criminological research, during which the determining factors of crime are discovered, analysed and predicted with scientific methods aimed at clarifying the possibilities for the implementation of successful prevention of crime (Baumanis, 2007); a range of persons who commit criminal offences and may commit offences in the near or distant future, including within the forecasted time interval; victims of a crime; predicting the places that are most likely to become crime scenes and then intervening in the activities that take place in those places. A strong basis for the spatial predictive development of crime is the crime pattern theory. 'Activity node' is the main concept of the crime pattern theory; according to this concept, when the price of crime needs to be gauged, it is necessary to carry out a prediction of the consequences of criminal offences in terms of possible material damage and other losses. The material damage caused by criminal activities is currently listed to a certain extent; a specific element or object of criminological forecasting is the forecasting of the preventive potential of law enforcement activities or criminal offences.

Crime forecasting can be implemented at the following levels: crime in general; type of crime (violent crime; property crime; recidivism); and separate criminal offence (theft, fraud, etc.). It must be accepted that predicting crime is not an easy process, because crime is systematic and not a random social legal phenomenon (Ruiz & Sawant, 2019). If crime is not random, it can be studied and modelled as patterns, including a spatial component. For example, environmental criminology is an important theoretical framework for studying and understanding the spatial spread of crime (Bruinsma & Johnson, 2018). The expression 'opportunities make thieves' is a basic approach among environmental criminologists. It is believed that as opportunities increase, so does crime. The environment defines the objectives available, the activities people can engage in, and who manages the location. Environmental detection provides an opportunity to compare environments where there is a problem with environments where there are none (Klarks, Eks, 2011). One shares the view that certain situations and places are more favourable to commit a crime, for example, isolated rooms, because in them there are fewer opportunities for the offender and also for the victim to escape from the offender. The level of risk may vary depending on the time of day, day of the week and other

factors. On the other hand, certain places are considered to be higher risk places, because they have specific objects or are where specific activities take place, which provide the offender with a potentially greater benefit or makes it easier to commit a criminal offence (Landmane, Rinkevičs, Eināts, 2019). One can mention, for example, thieves who specialise in picking pockets and purses (which in practice are often called 'pickpockets'), and shoplifters who look for crowds of people, while other offenders pay more attention to the absence of people. Thus, there are different activity nodes. As already mentioned, the concept of 'activity node' is the main concept of the crime pattern theory developed by Canadian environmental criminologists Patricia and Paul Brantingham. Those criminologists used this concept to describe how criminals find targets in the routine. They believed that offenders operate in a triangle using the home, then the workplace and finally the place of recreation. In each of these three places and along each of these three paths, except for the buffer zone where they might be recognised, offenders consider everything, looking for opportunities to commit a crime. They can find them a little further off the path, but they usually do not go far from an area they are familiar with. This is because it is easier to commit crimes in the usual way rather than taking additional steps to do so. This theory is used to explain why crime occurs in certain areas; it shows that crime is not random and that it may be organised or opportunistic. In particular, it shows that when the victim's activity node intersects with the offender's activity node, there is a higher likelihood of crimes (Klarks, Eks, 2011).

As a result of the routine activity theory, the problem analysis triangle, also known as the crime triangle, emerged. It contains different elements on each side: **the offender; the victim/target; and place where the offence was committed.** The most recent wording has been extended with the outer triangle, where each of these elements is supplemented by one element – the offender with the handler; the target/victim with the guardian; and the place with the manager to obstruct the commission of a criminal offence. Using the problem analysis triangle, the police can conduct a comprehensive analysis of the offence by focussing on all the key elements of the offence. Such a complex approach makes it possible to more precisely define the mechanism of formation and repetition of the offence, as well as to more precisely predict preventive measures (Landmane, Rinkevičs, Eināts, 2019). Michael R. Gottfredson and Travis Hirschi pointed out that criminal behaviour can be explained by the content of self-control or the lack of it. James Q. Wilson's only response to these issues is to suggest that some people are less governed by 'internal restraints' on criminal behaviour than others and, thus, their crimes are a function of a lack of self-control (Wilson, 1983). According to Hirschi and Gottfredson (1983), crime is thought to occur through the following process: '(1



an impulsive personality to (2) lack of self-control to (3) the withering of social bonds to (4) the opportunity to commit crime and delinquency to (5) deviant behaviour'. According to the general theory of crime, crime is considered a means of achieving immediate satisfaction and the ability to delay such short-term desires is related to self-control. Thus it is considered that those who are prone to commit a criminal offence lack self-control. This lack of self-control can be traced back to childhood, where, according to theorists, the initial signs of deviant behaviour appear. For those with limited self-control, deviant behaviour continues for life (Lilly et al., 1995).

Such objectives of crime planning are mentioned in the special literature: (1) prediction of first-time criminal offence (a criminal offence committed for the first time); (2) forecasting of certain types of criminal offences; and (3) prediction of the recidivism of a criminal offence (divided in more detail – women, minors and men). It is reasonable to point out that the forecasts can be complemented by strategic measures for improving the legal system and increasing the efficiency of crime collection (Vilks, 1998). For example, crime risks cannot be eliminated, but they can be managed. Crime risk assessment and management can be defined as 'a method of carefully, accurately identifying risks and any potential risks of impact to protect person/persons and/or organisations, minimising the potential level of risk, proper implementation of measures to address risk elements' (Fennelly, 2012).

Crime forecasting, on the other hand, is aimed at solving the following challenges:

- (1) Clarification the common indicators that describe changes in crime in perspective;
- (2) Collecting information that is important for the development of complex plans;
- (3) Development of crime response tactics and strategy;
- (4) Identification of the causes and contributing conditions of crime;
- (5) Preventive effect on illegal behaviour;
- (6) Execution of criminological studies aimed at crime prevention.

Stages of forecasting are as follows: (1) obtaining and gathering necessary information; (2) processing and analysis of the information obtained; (3) development of scenarios; (4) data assessment and updating; and (5) forecast correction. Predicting criminal behaviour can be done in pre-criminal, criminal and post-criminal situations (Kriminologija, 2010).

Criminological forecasting by scale can be global, regional, national and local. The scales of criminological forecasting may vary depending on the objects of forecasting – they may refer to the possible state and structure of crime in the future in an enterprise, economic sector, administrative territorial unit, etc. For example, in the review of the implementation of the measures provided for in the plan 'Plan for the Prevention

and Combating of Organized Crime 2018–2020', it is indicated that in 2019–2020, as a result of the implementation of the project, 17 prototypes of different analytical tools or a set of analytical tools has been developed for crime analysis at the strategic and operational levels and for crime forecasting. At the same time, a platform (HMI) has been developed within the framework of the project, which is intended for different users when performing strategic and operational analysis. Analytical tools developed within the project are integrated into this platform (Informatīvais ziņojums par plānā "Organizētās noziedzības novēršanas un apkarošanas plāns 2018. – 2020. gadam" paredzēto pasākumu izpildi Pārskats par plānā "Organizētās noziedzības novēršanas un apkarošanas plāns 2018. – 2020. gadam" paredzēto pasākumu izpildi).

Depending on the nature of the forecasting tasks needed, the deployment of these tools can be carried out on an operational, tactical or strategic basis. Concerning deadlines, one speaks of short-term forecasts (up to 1 year), medium-term forecasts (up to 5 years) and long-term forecasts (up to 10–20 years). There are individual criminological forecasts when not only social factors characterising the particular person, but also psychological factors, are taken into account. The identification of risk factors related to the recidivism of a criminal offence is essential for the forecasting of a criminal offence. Some of the most recognised approaches to assessing recidivism are the Big Four and the Central Eight Factors (Landmane, Rinkevics, Eināts, 2019).

In the scientific and educational literature, the following types of forecasting are distinguished: (a) forecasting of criminogenic processes and the operational situation; (b) forecasting of certain types of crime. Cybercrimes, which involve the use of computer technology or online networks to commit a crime, include frauds and identity thefts, as well as, more generally, unauthorized accesses that unjustly empower the perpetrator to seek some reward or gratification from the victim; and pursuant to such malevolent digital intervention, committed most likely without the involvement of physical access to the victim's computing resources, the victims might subsequently face threats and intimidation, which are themselves typically delivered through the online mode. Cybercrimes and their many manifestations have clearly increased over the past 20 years. For example, the cost of cybercrimes rose from approximately \$3 trillion in 2015 to over \$6 trillion in 2021 and is expected to reach over \$6 trillion in 2025. They will grow to over \$10.5 trillion (Morgan, 2020); (c) forecasting of individual criminal behaviour; (d) victimological forecasting. In this respect, one can naturally point out that when developing crime prevention programmes, whereas the focus might tend to be on a set of criminal offences and offenders, on ensuring that the latter are provided with human rights protection and a dignified life (especially for those who are sentenced to incarceration), one should also ensure that much more care

is taken to sustain the well-being of the victims of a criminal offence. It is necessary to identify and predict how many victims of criminal threats there are now and how many there may be in the future. By drawing up, on the basis of forecasts, concrete and effective programmes for crime prevention and, above all, by implementing them, the number of victims can be reduced (Vilks, 1998); and (e) normative forecasting (criminal legal forecasting). When predicting criminal liability for an offence, the legislator abstractly predicts the harmfulness of this offence. As professor Valentija Liholaja has pointed out, when adopting laws, the state tries to regulate economic, social and political relations in a certain way with their help. Thus, the creation of legal regulations and implementation thereof are based on specific tasks (goals), the degree of achievement of which indicates the utility, as well as the actual feasibility, of these legal provisions, i.e. their effectiveness (Liholaja, 1997). The methodological requirements of criminological planning, which result from the nature of crime itself, require the application of complex economic, organisational, educational, legal and other measures (Kriminoloģija, 2004). For example, close cooperation between the designers and the working group is desirable when developing a large or complex project in order to reach a consensus on the entire process. Outdoor environment projects include both private and public infrastructure, such as streets, squares, parking lots, landscapes and green areas, as well as other structures, either individually or together. An outdoor environment project can consist of new and existing structures. Projects of technical structures (e.g. cables, pipes) are less important for the development of a secure environment, but may include elements underground, which also play a certain role. When designing outdoor environment elements and structures, it is recommended for security purposes that careful consideration be given to boundaries between private and public areas, lighting, visibility and more generally any element likely to pose a risk. Such an approach would be useful for the prediction of the speed of traffic, the movement of people and the risks of crime, as well as the possibilities for the prevention of crime (Levalds, Sibula, Prāsa, Kleina, Lehtovuri, Van Somerens, Vīkmā, Pāver).

Qualitative numerical assumption of changes in crime trends and regularities in the foreseeable future may be obtained by several methods. In the scientific literature, one can find an impressive number of methods, amounting to more than 150. The most common methods are extrapolation, expert assessment, modelling, mathematical models, etc. AI is used by law enforcement authorities for criminological forecasting and analysis of crime hotspots, but in the resolution of the European Parliament of 6 October 2021 on artificial intelligence in criminal law and its use by the police and judicial authorities in criminal matters (2020/2016(INI)), the following warning is issued: 'Although criminological forecasting can analyse data

sets to identify patterns and correlations, it cannot answer the question of causation and cannot make reliable predictions about individual behaviour, and thus it cannot be the sole basis for intervention.'

## Conclusions

- (1) The authors point out that the development of full, comprehensive and highly reliable crime forecasts is a labour-intensive and complex process. Although the future crime development can be well anticipated after the past, it cannot provide perfect forecasts yet. However, it must be acknowledged that quite often, due to the effects of a variety of reasons and factors, forecasts do not come true. The social, economic, legal and other factors and contributing factors of crime are too dynamic and changing. Moreover, it should be recognised that the development of forecasts does not always determine the preparation and implementation of a set of measures that would contribute to the prevention of adverse social phenomena.
- (2) Forecasting measures should be established in a pre-emptive manner – with prior reporting, indicating changes in the overall structure of crime, as well as dangerous trends of a particular type of crime. There must therefore be a warning effect so that possible adverse trends can be prevented.
- (3) Crime as a complex social and legal phenomenon is linked to various societal developments. In line with this, measures for forecasting a criminal offence must be diverse and a prognostic approach of complex cognition must be developed:
  - (a) Necessity to deepen the study of crime and its causes;
  - (b) Predicting the places most likely to become crime scenes and then intervening in the activities that take place in those places;
  - (c) Criminal offence is an illegal act of a particular individual, and thus one cannot do without the investigation of the offender;
  - (d) Prediction of victimological issues in time;
  - (e) Development of a scientifically based and effective crime prevention plan.
- (4) In the authors' opinion, this will improve the state of criminological security. Criminological security is a complex exposure process focussing on the protection of the individual, public and state interests from criminal threats. It is closely linked to criminal policy. Ensuring criminological security is to protect against threats and dangers of a criminal offence, as well as to act on the source of the threat, reducing its negative and harmful effects.
- (5) Finally, the authors emphasise the importance of the science of criminology. One can prevent, predict and combat the phenomenon studied. In the authors' opinion, it points out to a deeper and wider research work on crime, guaranteeing

that security in the broad sense is unconceivable without the existence of the science of criminology, recognition of its importance and associated development perspectives. The authors point out that in the modern information society, criminology must develop as a mission to ensure public security, as well as to establish a subsequent criminal policy and implement it.

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