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**Olha Kovalchuk,**

*Ph.D. in Physics and Mathematics, Associate Professor at the Department of Theory of Law and Constitutionalism, West Ukrainian National University, 11, Lvivska street, Ternopil, Ukraine, postal code 46009, olhakov@gmail.com*

**ORCID:** <https://orcid.org/0000-0001-6490-9633>

**Scopus Author ID:** 57782473100

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## DIGITALIZATION OF LAW ENFORCEMENT AGENCIES IN THE DIGITAL TRANSFORMATION OF THE JUDICIARY

**Abstract. Purpose.** The research aims to study the features of digitalization of law enforcement agencies as a component of the digital transformation of the judiciary and to develop an innovative information model (IM) for creating reliable information support (IS) for law enforcement agencies. The main objectives are to analyze the specifics of the digitalization of law enforcement activities and the application of innovations to create reliable IS, as well as to formulate recommendations for ensuring an appropriate level of digitalization of law enforcement agencies in the context of the digital transformation of the judiciary. **Research methods.** The study used a comprehensive interdisciplinary approach that integrated various scientific methods. Comparative analysis was used to review literature sources and existing developments on the digital transformation of law enforcement. Systems analysis allowed for a thorough study of the specifics of creating information systems for law enforcement agencies. Methods of data classification and structuring were used to analyze various types of information that support the activities of law enforcement officers during operational-investigative measures, investigative actions, crime analysis, and investigations. Modeling was used to develop an innovative IM for law enforcement agencies based on the synthesis of author's models proposed in previous studies. The synthesis method contributed to combining and integrating these solutions based on ML and big data technologies into a single innovative IM as part of the information system (IS) of law enforcement agencies. **Results.** To ensure an appropriate level of digitalization of law enforcement agencies in the context of the digital transformation of the judiciary, the following aspects need considering: I. ensure the digitalization of law enforcement activities and continuous improvement of IS; II. establish the development of new methods and non-stationary approaches to analyzing crime problems based on analytical methods and innovative technologies; III. develop reliable IS for law enforcement agencies for the proper administration of justice that will ensure effective interaction between courts and law enforcement agencies at various stages of the judicial process; IV. create applied IMs based on data analytics and advanced technologies such as ML, big data, and AI to formulate effective strategies for law enforcement agencies; V. improve existing cybersecurity IS to guarantee confidentiality and integrity of information, and protect against data leaks; VI. use big data technologies and predictive analytics to identify patterns and predict crime based on vast arrays of diverse information; VII. use innovative investigation tools and methods based on data analytics to overcome resource constraints of law enforcement agencies; VIII. develop innovative ISs for organizing, analyzing, storing, and presenting data; IX. improve the legal framework for the use of IT to support the information activities of law enforcement agencies by EU standards. **Conclusions.** The digital transformation of law enforcement agencies aims to ensure a rapid response to crime, quality of investigations, and transparency on the path to the e-judiciary. The main challenges for the formation of IS are data integration problems from various sources and the lack of innovative IMs for advanced data analytics. The implementation of advanced data processing technologies such as ML, AI, and big data analytics can help law enforcement agencies overcome resource constraints, uncover hidden connections between data, and accelerate crime detection. The proposed innovative comprehensive approach to the formation of IS can serve as a basis for increasing the efficiency of law enforcement agencies within the overall digitalization of the judiciary.

**Key words:** digital transformation, judiciary, law enforcement agencies, legal norms, information technologies, information system, information support, cybersecurity, court.

## 1. Introduction

In today's digital society, the need for digitalization of the judicial system is becoming an increasingly urgent necessity. Information technologies have turned into an integral part of daily life for citizens and businesses. People expect the same level of digitalization from government agencies, including the judicial system. The digitalization of judicial processes allows for significantly accelerating the movement of cases and minimizing bureaucratic burdens on judges and participants through the automation of document flow and electronic data exchange. Electronic services improve the accessibility and convenience of justice (Teremetskyi et al., 2023). Digitalization ensures the efficiency and effectiveness of judicial proceedings. In modern cases, it is often necessary to process terabytes of digital evidence – electronic documents, multimedia, and geolocation data. The use of big data technologies – ML and AI – helps to structure and analyze such arrays. Online broadcasts of court hearings, publication of court decisions in electronic registers, and automated case distribution systems among judges contribute to openness and minimize corruption risks. Digitalization can ensure transparency and accountability of justice. Modern crime has also quickly adapted to new realities and now carries out its criminal intentions in the digital space. The growth of cyber-crime requires the judicial system to possess the latest digital forensics tools and the ability to work with electronic evidence (Djenna et al., 2023). The digitalization of judicial proceedings is an integral part of building a modern judicial system capable of meeting the challenges of the digital age and ensuring effective protection of citizens' rights and freedoms. Law enforcement agencies are one of the important components of the judicial system and are in urgent need of digital transformation. Ukraine is at the initial stage of this process (Teremetskyi et al., 2023). Therefore, it is relevant to conduct comprehensive multifaceted research on the relevant issue. Such research is multidisciplinary and touches not only the legal sphere but also information technologies – ML and AI.

Research on the digital transformation of law enforcement agencies in the context of the digitalization of the judicial system is rare. Academic circles paid poor attention to developing new methodologies aimed at forming reliable IS for the process concerned. Some scholars have examined the issues of smart policing. The term means intelligent policing activities based on the use of innovative technologies. P. Sarzaeim et al. studied the advantages and limitations of using ML methods in law enforcement agencies (Sarzaeim et al., 2023). Research-

ers S. Maliphol and C. Hamilton analyzed the potential of smart technologies to improve policing and ensure ethical norms (Maliphol & Hamilton, 2022). M.-S. Baek et al. developed a method for predicting crime type and risk level based on ML technology and tested its effectiveness (Baek et al., 2021). F. Yang found that predictive police analytics largely depends on data collection and integration technologies in both the physical environment and the digital world (Yang, 2019). S. Egbert argued that predictive policing has the potential to improve the processing of police-related data (Egbert, 2019). Researchers X. Zhang et al. concluded that crime prediction is of great importance for formulating policing strategies and crime prevention and control. Machine learning is the primary method for prediction (Zhang et al., 2020). Existing research on the digitalization of law enforcement activities is partial and concerns only certain aspects. In addition, the criminal environment is dynamic, IT is rapidly evolving, and the legislation of different countries has significant differences. Therefore, such research is a complex and multidisciplinary task that requires a multidisciplinary approach. It involves rethinking traditional methods and adopting new policing practices. A key strategy for their digital transformation is the rapid and effective exchange of information (Nicolau, 2023). Thus, it is relevant to develop new IMs for the formation of productive information support for law enforcement agencies.

The study applies a comprehensive approach that combines various methods. The comparison method was used to review the literature and analyze existing research on the digitalization of law enforcement agencies. The system analysis method was involved to study the specifics of creating IS for law enforcement agencies. Methods of data classification and structuring were used to analyze the types of information that support the activities of law enforcement agencies in carrying out operational-investigative and investigative actions, crime analysis, and investigations. The modeling method was applied to develop an innovative IM for providing law enforcement agencies based on a synthesis of the author's models proposed in previous studies. The synthesis method was used to combine and integrate these solutions based on ML and big data into a single innovative IM as part of the IS of law enforcement agencies. The purpose of the present work is to investigate the features of the digitalization of law enforcement agencies as a component of the digital transformation of the judiciary and to develop an innovative IM for the formation of reliable IS for law enforcement agencies.

## 2. Law Enforcement Agencies in the Judicial System: The Need for Digital Transformation

The judicial system is a complex mechanism that brings together various state institutions and legal procedures for the administration of justice. It consists of courts of different levels and specializations that directly consider cases and render decisions. An important component is law enforcement agencies responsible for investigating offenses, collecting evidence, and supporting prosecution in court, as well as ensuring the execution of rendered sentences. Equally important are the probation system aimed at resocializing offenders, the advocacy for protecting the rights of citizens, expert institutions for providing professional opinions, the system of free legal aid, and the enforcement service for the compulsory enforcement of court decisions.

Only the coordinated interaction of all these elements within the framework of procedures regulated by legislation can guarantee the complete, impartial, and effective administration of justice, the protection of human rights, and the rule of law. Proper legal regulation and quality information support for the activities of all branches of the judicial system are the keys to fair and timely consideration of cases.

Law enforcement agencies play a crucial role in the judicial system. They are entrusted with the functions of pre-trial investigation of crimes: collecting evidence, establishing circumstances, and identifying suspects for further court proceedings. Effective interaction between courts and law enforcement at different stages is a necessary condition for the proper administration of justice, the protection of the legal rights of citizens, and the establishment of the rule of law in the country.

In the field of correctional services and criminology, a new approach has emerged – the criminology of conviction. It examines the problems of crime and correctional institutions differently from the traditional views of researchers, politicians, and officials. This direction arose due to scholars' concern with the existing understanding of crime and its control. The criminology of conviction analyzes issues regarding the definition of the crime problem; proposed solutions; the destructive consequences of these solutions for those labeled as criminals, imprisoned, alienated from loved ones, and not integrated into society; high incarceration rates, overcrowded prisons without meaningful rehabilitation programs; structural obstacles to successful reintegration, leading to recidivism (Yu et al., 2020).

The search for effective strategies for law enforcement agencies that will reduce the num-

ber of prisoners and the cost of keeping them, while ensuring the safety of citizens and society, is becoming increasingly important (Berezka et al., 2022). This requires the development of reliable information and analytical support. In a developed smart society, any systemic changes are impossible without prior risk assessment and forecasting of future system states. The most effective means for this are mathematical, statistical methods, and information technologies.

The digitalization of legal proceedings is becoming an urgent necessity in the modern conditions of increasing volumes of information that need to be processed for making judicial decisions. With the development of society and the increasing complexity of legal relations, the number of court cases and the burden on courts is growing. Paper document flow is becoming increasingly cumbersome and inefficient. In the era of digital technologies, the number of electronic evidence has significantly increased. These are huge arrays of evidentiary information – audio/video recordings, electronic documents, geolocation data, etc. Analyzing them manually is becoming extremely labor-intensive. To make balanced decisions, judges need to study a vast number of regulations and court practices in various instances. Electronic databases significantly simplify this process (Teremetskyi et al., 2023). There is also a need for prompt access to precedents and legislation. Today, there is an increased need for analytical tools. Modern technologies of ML and natural language processing can help identify relevant precedents, structure the evidence base, and identify risks to accelerate case processing. Electronic services, online broadcasts of court hearings, and publication of court decisions increase the openness of the judicial system to citizens. The digitalization of legal proceedings allows coping with growing information flows, ensures the efficiency, objectivity, and quality of police investigations and the reasonableness of judicial decisions, as well as increases public trust in justice.

In the context of the overall digital transformation of the judiciary, the digitalization of law enforcement activities is critically necessary (Gkoukoudis et al., 2022). With the increasing volume of digital evidence (electronic documents, multimedia files, metadata, etc.), ensuring the proper quality of pre-trial investigation is impossible without the application of advanced technologies for data collection, storage, and analysis. The digitalization of law enforcement agencies can accelerate the formation of indictments and the transfer of materials to the court. Electronic document flow and integrated information systems of law enforcement

agencies and courts can significantly reduce the time for the exchange of procedural documents. The growth of cybercrime requires law enforcement to have new digital forensics tools, the ability to record electronic traces, and search for and identify cybercriminals. The use of big data technologies and ML allows for identifying trends, and predicting crime based on vast arrays of diverse information (Ho et al., 2020). The digitalization of processes ensures the prompt exchange of evidence with courts and accelerates the transfer of relevant digital evidence to court instances in a secure mode. Electronic registers provide the ability to track the progress of cases online, and the publication of reports increases openness and public trust. The use of big data technologies and predictive analytics enables the identification of patterns and prediction of crime based on vast arrays of diverse information (Kovalchuk et al., 2022). Law enforcement agencies are increasingly using operational investigation databases, covert surveillance tools, and evidence collection tools to counter-terrorism, cybercrime, and more. Video surveillance systems and facial and fingerprint recognition simplify the identification of offenders and enhance public safety. Cryptography and digital signature tools are used to ensure cybersecurity for the confidentiality and integrity of information and protection against data leaks. The digital transformation of law enforcement agencies is an integral part of the digitalization of the judiciary, aimed at ensuring a rapid response to crime, the quality of investigations, and transparency on the path to e-judiciary.

### **3. The Information Component of Organizational and Legal Support for the Digitalization of Law Enforcement Agencies**

An integral part of the organizational and legal support for the digitalization of legal proceedings is the information support of law enforcement agencies, which plays a key role in improving the efficiency and transparency of justice. The development of technologies is transforming society, creating more opportunities for offenders and complicating the work of the police. Crime is increasingly using the information space. Even if a crime is not committed online, its participants (both criminals and victims) leave various electronic traces in the digital space: recordings of telephone conversations, online correspondence, browsing history, media information, geolocation data, etc. The task of law enforcement agencies is to identify criminal schemes based on the electronic traces of the offender and provide operational intelligence information. Effective processing of crime data requires the use of high-quality IS by law enforcement agencies. The concept of "information support" has

many different definitions. In law enforcement, this concept refers to the processes of collecting and processing tactical and operational information to support the management process in law enforcement agencies and shaping the consciousness of citizens and society as a whole. It is used to conduct operational and tactical activities and analyze crimes and investigations (Hollywood & Winkelman, 2018).

Table 1 presents the types of information used by law enforcement for IS in the performance of tactical tasks.

Table 2 presents the types of information used by law enforcement for information support in the performance of operational tasks.

Table 3 shows the types of information used by law enforcement for information support in the analysis of crimes and investigations.

Information about crime comes from two main sources: responses from victims to surveys about crimes committed against them, and administrative data from law enforcement agencies regarding reported crimes. Responses from victim surveys contain information about crimes that were reported to the police, as well as crimes that were not reported. Crime data from law enforcement agencies reflects information about crimes that were reported and recorded by the police.

Individual persons, groups of persons, and organizations involved in criminal and illegal activities are becoming increasingly sophisticated. Offenders are using the power of new technologies as quickly as they are invented. However, technological progress can also improve the investigative methods of law enforcement agencies. In particular, it has become possible today to conduct blood group analysis at the crime scene, the results of which can be used for rapid identification of both the victim and the perpetrator, facilitating their search.

These advantages create new challenges. The digital world stores extremely large volumes of information. For example, in just one year during a single FBI investigation, six Petabytes of data were collected (Santos et al. 2019). Law enforcement agencies must process data from various new and unfamiliar sources and improve the use of already accumulated data. Without effective information analysis, law enforcement agencies will struggle to counter the offenders they accuse of committing crimes.

Establishing information support is not an easy task for law enforcement agencies, as their resources are mostly intended for performing the core functions of law enforcement agencies in ensuring public safety. Most law enforcement officers do not have training in

Table 1

**Types of information required for the performance of tactical tasks  
by law enforcement agencies**

Activity	Type of information	The function provided by the information
Collection of evidence	Records of testimony. Electronic evidence. Photo/video. Biometric data.	Information support
Formation of inquiries about previous offenses	Information about police calls. Accompanying information: data on persons, locations, and items used.	
Response to a crime report	The initial response to the challenge. Reporting a crime. Report according to the standard template. Information for distribution (reports, alerts).	
Responding to phone calls	Call information. Accompanying information: data on persons and places of crime.	Patrol
Study of the situation	Current crimes and suspicious activity. Locations where other police patrols work. Places with the highest risk of committing crimes. Information from alerts and police reports. Places that require increased attention Information for the public.	
Consolidation of information and formation of reports	Field interviews/reconnaissance reports. Information for distribution (reports, alerts). Reports/documents.	
Definition of key points	Crime scene investigation materials. Responses to crime reports.	Investigation
Object ID identification	ID information from the state register Biometric data.	
Evaluation of the object	Threat identification information. Information to determine actions (arrest/warrant).	

Table 2

**Types of information required for the performance of operational tasks  
by law enforcement agencies**

Activity	Type of information	The function provided by the information
Communications with the public	Alerts and criminal records. Crime maps / basic crime information. Information on crime prevention and police contacts. Citizens' requests for help. Recommendations for citizens.	Information support
Management of the police unit	Information about current crimes. Information about the current activity of the unit. Information about cases conducted by the unit	Operational management
Detailing the specifics of the case	General information on the case. Investigation data.	
HR	Information about activities and staff development. Information about management decisions made.	Development of opportunities
Education and training	Data on online training. Link to the repository of educational resources.	
Coordination of regional responses	Offense databases. Information about regional crimes.	
Communication with society	Notification of offenses, and instructions for citizens.	

Table 3

**Types of information required for the analysis of crimes and investigations  
by law enforcement agencies**

Activity	Type of information	The function provided by the information
Assessment of places with a high risk of committing crimes	Information about addresses with the highest number of offenses. Predictive information based on current crime data. Predictive information based on historical crime data. Predictive information based on geospatial crime data.	Assessment of persons and places with a high risk of committing crimes
Assessment of persons with a high risk of committing crimes	Information about persons at high risk of general violence. Information about persons with a high risk of committing crimes. Information about persons at high risk of gang violence. Information about persons at high risk of domestic violence. Information from social media related to threats of violence.	
Collection and evaluation of evidence in the case	Video/photo from the crime scene. Photos of known suspects. Data on biological materials from the crime scene. Information about the weapon used to commit the crime. Information from the stolen property database. Information about suspects, victims, and other participants in the crime. Information on stolen items).	Provision of prosecution evidence
Analysis for the identification of criminals	GPS data for tracking offenders. Photo information for recognizing people Vehicle database. Information about connections with similar previous crimes. Information about suspects and other participants in the crime. Crime information obtained from social media.	

data processing and digital technologies, which are typically required for performing advanced analytics (Bennett, 2018). The judiciary needs access to data-driven information, but resource constraints may limit their ability to effectively search for relevant information for investigations, even with huge amounts of data available.

Innovative investigative tools and methods can help law enforcement agencies overcome resource constraints and analyze large volumes of digital data as part of criminal proceedings. AI, open-source data management tools, predictive analytics solutions, and social media capabilities can help uncover previously unobvious connections between information and identify key dependencies. New data sources can provide access to large information repositories, and new technologies can create new opportunities for data utilization. These capabilities can reduce manual work for analysts and lower costs by 70 percent (Mitchell, 2018). Using these tools and approaches can help investigators reduce time spent searching and analyzing data and increase time spent tracking criminals and ensure community safety.

In establishing law enforcement information support, the main problem is not the data

itself, but rather the approach to data collection, storage, and analytics. There are often critical data sources (missing, too difficult to access, or too complex to analyze), resulting in blind spots in investigations. The first step in addressing the data overload problem is often to create an even larger data pool (data that carries the same information). Law enforcement agencies have enormous amounts of data but cannot use it effectively due to computation and integration issues. Outdated and insufficient computing power and platforms hinder advanced analysis. Siloed data prevents quality access to integrated data that could aid investigations (Trendall, 2019).

Analysts can sort and manage an integrated data set, combining data sources to simplify understanding of available information. Important data sources include internal data stored by law enforcement agencies, commercial data sources, and open sources such as social media activity, property records, criminal histories, professional licenses, medical databases, and countless other sources.

A goal or problem-oriented approach to establishing information support can provide a selection of useful information from a large

data pool to create a comprehensive view of persons, places, and objects relevant to a specific criminal case. Such a comprehensive view can reveal significant gaps in the analysis, for example, about known associate relationships or email correspondence. Awareness of these gaps can aid in further collection and monitoring of needed information in the criminal case.

#### 4. Implementation of Information Technologies in Law Enforcement Activities

Technology is not just new, interesting tools that improve existing processes. It can open up entirely new ways of conducting investigations. Today, many analysts spend a lot of time searching for the necessary data, potentially leaving only a short period for analyzing and aggregating it. In the future, investigators will be able to rely on new data processing tools to quickly find the necessary information. This will allow them to spend more of their time on data analysis. 80 percent of law enforcement officers' time is spent on tasks directly related to crimes, the rest on administrative tasks (Santos, 2019).

By using the latest data processing tools, law enforcement agencies can assess available data sources by performing an audit that includes storage, management, access, and use of information. Data analysts conduct exploratory analysis to understand the quality and completeness of the data. If there is no continuous access to critically important data, including communications, instructions, and business data with geolocation, a compilation of publicly available sources and social media data from nearby locations is conducted. Unit managers then coordinate a plan for obtaining, processing, and storing data in the cloud, providing instant access to the latest computing systems and eliminating data redundancy. By using effective data processing tools and methods, investigators can focus on the criminal network and achieve investigation goals faster.

Setting up systems for analytical data processing begins with understanding the spectrum of available data sources – from internal data sources to social media activity data. Next, data sharing between different sources needs to be organized. This requires developing a system that accessibly organizes, formats, and stores data. For example, having the ability to format records so that names, dates, and locations are easy to search for. This enables law enforcement officers to span dozens of data sources for automatic compilation of criminal histories, profiles, and criminal activities.

Data from different sources can be structured into a single result query. Input data includes unstructured information such as scanned documents; semi-structured data such as websites and social media; and structured

data including property records, professional skills, and convictions. The result is a single, multidimensional profile of the person suspected of committing a crime (Santos, 2019).

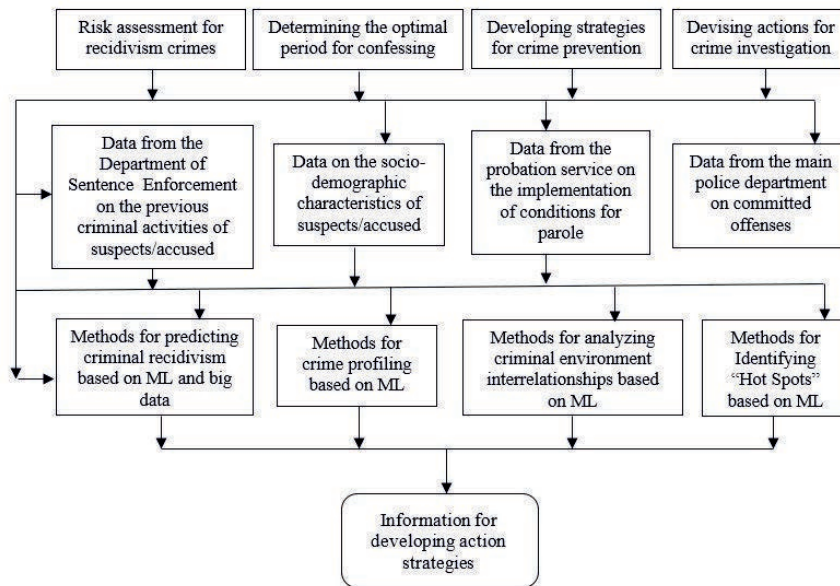
However, investigators typically don't need just one person's profile. They need to understand various forms of connections – personal relationships or even social media communication. By using automated data analysis to search for links between multiple structured result profiles, law enforcement can create criminal networks and understand group actions and behaviors. In particular, natural language processing can perform so-called named entity recognition – AI can use contextual clues to distinguish, for example, a suspect from an innocent citizen by name (Jehangir et al., 2023).

All these tools increase the accuracy of investigation results and help the police find the right solutions faster. Instead of spending weeks or months developing a detailed diagram of relationships, they can use both stored data and real-time data streams and develop consolidated data for analysis, allowing them to get results faster. That's how investigative units use natural language processing to study incident reports and identify patterns of criminal activity. With this information, they can identify areas with high rates of specific types of crimes, allowing them to take proactive actions in those areas in advance (Jehangir et al., 2023). The ultimate result of applying the latest tools in law enforcement information and analytical activities should be a reduction in crime rates. Criminals are becoming increasingly sophisticated, so to successfully solve criminal cases, law enforcement officers have to use all available data, innovative solutions, tools, and methods. Today, innovative solutions based on modern IT tools and data analytics are needed to ensure the quality and speed of processing large information arrays related to the prevention, detection, and prevention of crimes.

In this work, the author proposes an innovative comprehensive approach to the formation of law enforcement information support based on the use of analytics, ML, and AI methods. An IM is built to provide operational and tactical information to law enforcement agencies based on the synthesis of models proposed in previous works (Kovalchuk, 2022; Kovalchuk et al., 2022; Berezka et al., 2022; Kovalchuk, 2023; Kovalchuk et al., 2023).

Figure 1 shows a scheme of an IM for the formation of an effective IP for law enforcement agencies. The presented model is based on the use of various data obtained from official sources.

In particular, this is data from the Department of Sentence Enforcement on the previous criminal activities of suspects/accused; data on



**Fig. 1. Information model based on ML and big data for providing operational and tactical information to law enforcement agencies**

the socio-demographic characteristics of suspects/accused; data from the probation service on the implementation of conditions for parole; data from the main police department on committed criminal offenses. Such information is used to solve the following tactical and operational tasks of law enforcement agencies: risk assessment for crime recidivism; determining the optimal period for confessing to an offense; developing strategies for crime prevention; and devising actions for crime investigation.

The proposed IM is designed to provide relevant information to ensure the effective operation of law enforcement agencies. It is based on applied solutions developed by the author in previous works: methods for predicting criminal recidivism based on ML and big data; methods for crime profiling based on ML; methods for analyzing criminal environment interrelationships; methods for identifying "hot spots" based on ML (Kovalchuk, 2022; Kovalchuk et al., 2022; Berezka et al., 2022; Kovalchuk, 2023; Kovalchuk et al., 2023). The methods used have demonstrated high accuracy and quality of results on real crime data. The created IM is based on the use of ML and big data methods, which are also applicable to new datasets on crime. Such an IM can be easily implemented in the unified judicial information system of Ukraine and adapted to the operating standards of similar judicial IS of the EU.

The digitalization of justice is not just a modernization of processes, but also ensur-

ing fairness and security in society. The proposed innovative comprehensive approach to the formation of an IP for law enforcement agencies using analytics, machine learning, and artificial intelligence methods can become the basis for the formation of an effective IP for the activities of law enforcement agencies. The developed IM based on ML and big data for providing operational and tactical information to law enforcement agencies can be easily implemented in the unified judicial information system of Ukraine and adapted to the operating standards of similar judicial IS of the EU. The implementation of such a model will help to increase the effectiveness of police investigations and improve the functioning of the justice system as a whole.

### 5. Conclusions.

The article considers the need for digitalization of the judiciary and the activities of law enforcement agencies as an integral part of it. Proper IP is a key factor in the digital transformation of the activities of law enforcement agencies in the field of justice. It allows effective processing of huge volumes of digital evidence, identifying patterns of crime by analyzing big data, as well as applying the latest tools of digital forensics.

The analysis of the features of digitalization of law enforcement agencies in the context of the digital transformation of the judiciary gives grounds to draw the following conclusions: I. The variability and technological nature of the criminal



environment necessitate the digitalization of law enforcement agencies and continuous improvement of IP; II. There is an urgent need to develop new methods and non-stationary approaches to analyze crime problems based on analytical methods and innovative technologies; III. To ensure proper justice, a reliable IP for law enforcement agencies must be developed to ensure effective interaction between courts and law enforcement agencies at various stages of legal proceedings; IV. To form effective strategies for law enforcement actions, applied IMs based on data analytics and new technologies such as ML, big data and AI should be developed; V. It is advisable to improve the existing IP of cyber defense to guarantee confidentiality and integrity of information, protection against data leaks; VI. The use of big data technologies and predictive analytics ensures the detection of patterns and prediction of crime based on huge arrays of diverse information; VII. To overcome resource constraints, law enforcement agencies should use innovative investigation tools and methods based on data analytics; VIII. Modern law enforcement agencies require the development of innovative IS for organizing, analyzing, storing, and presenting data; IX. The informatization of the justice system requires the improvement of legal norms for the use of IT to ensure the information activities of law enforcement agencies by EU standards.

The digitalization of the judiciary, and proper IP for the activities of law enforcement officers with the use of the latest technologies is a prerequisite for building a modern justice system capable of effectively protecting the rights and freedoms of citizens in the era of digital transformation of society. The transition from paper to digital processes will allow law enforcement officers not to lag behind legislative changes and increase the productivity and speed of investigations of offenses. With the proper implementation of high technologies, law enforcement officers will be able to more effectively combat crime, better allocating time and resources. A further direction of research will be the adaptation of the proposed IM for providing operational and tactical information to law enforcement agencies to the standards, requirements and context of Ukraine and the EU to integrate it into a unified judicial information system.

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### Ольга Ковальчук,

кандидат фізико-математичних наук, доцент, доцент кафедри теорії права та конституціоналізму, Західноукраїнський національний університет, вул. Львівська, 11, м. Тернопіль, Україна, 46009, [olhakov@gmail.com](mailto:olhakov@gmail.com)

ORCID: <https://orcid.org/0000-0001-6490-9633>

Scopus Author ID: 57782473100

## ДІДЖИТАЛІЗАЦІЯ ПРАВООХОРОННИХ ОРГАНІВ У ЦИФРОВІЙ ТРАНСФОРМАЦІЇ СУДОЧИНСТВА

**Анотація. Мета.** Дослідження спрямовано на вивчення особливостей цифровізації правоохоронних органів як складника цифрової трансформації судочинства та розроблення інноваційної інформаційної моделі (ІМ) для формування надійного інформаційного забезпечення (ІЗ) правоохоронних органів. Основними завданнями є аналіз особливостей цифровізації діяльності правоохоронних органів та застосування інновацій для створення надійного ІЗ, а також формулювання рекомендацій щодо забезпечення належного рівня цифровізації правоохоронних органів у контексті цифрової трансформації судочинства. **Методи дослідження.** У дослідженні було використано комплексний міждисциплінарний підхід, що інтегрував різноманітні наукові методи. Компаративний аналіз застосовувався для огляду літературних джерел та наявних напрацювань із питань цифрової трансформації правоохоронної сфери. Системний аналіз дозволив ретельно вивчити специфіку створення інформаційних систем для органів правопорядку. Методи класифікації та структурування даних були залучені для аналізу різних видів інформації, що забезпечує діяльність правоохоронців під час проведення оперативно-розшукових заходів, слідчих дій, аналізу злочинів і розслідувань. Моделювання використовувалося для розроблення інноваційної ІМ для правоохоронних органів на основі синтезу авторських моделей, запропонованих у попередніх дослідженнях. Метод синтезу дозволив поєднати та інтегрувати ці рішення, засновані на ML та технологіях великих даних, в єдину інноваційну ІМ у складі інформаційної системи (ІС) правоохоронних органів. **Результати.** Для забезпечення належного рівня цифровізації правоохоронних органів у контексті цифрової трансформації судочинства необхідно врахувати такі аспекти: I. Забезпечити діджиталізацію діяльності правоохоронних органів та постійне вдосконалення ІЗ; II. Налогодити розроблення нових методів та нестационарних підходів до аналізу проблем злочинності на основі аналітичних методів та інноваційних технологій; III. Для здійснення належного правосуддя розробити надійне ІЗ правоохоронних органів, що забезпечить ефективну взаємодію судів і правоохоронних органів на різних стадіях судочинства; IV. Для формування ефективних стратегій дій правоохоронних органів належить створити прикладні ІМ на основі аналітики даних та новітніх технологій, таких як ML, big data and AI; V. Вдосконалити наявне ІЗ кіберзахисту для гарантування конфіденційності й ціліс-

ності інформації, захисту від витоків даних; VI. Використовувати технології великих даних та предиктивної аналітики для виявлення закономірностей і прогнозування злочинності на основі величезних масивів різноманітної інформації; VII. Використовувати інноваційні інструменти та методи розслідування на основі аналітики даних для подолання обмежень ресурсів правоохоронних органів; VIII. Розробити інноваційні ІС для організації, аналізу, зберігання та представлення даних; IX. Удосконалити правові норми використання ІТ для забезпечення інформаційної діяльності правоохоронних органів відповідно до стандартів ЄС. **Висновки.** Цифрова трансформація правоохоронних органів покликана забезпечити оперативність реагування на злочинність, якість розслідувань і прозорість на шляху до електронного судочинства. Основними викликами для формування ІЗ є проблеми з інтеграцією даних із різних джерел та відсутність інноваційних ІМ для розширеної аналітики даних. Впровадження новітніх технологій оброблення даних, як-от ML, AI та аналітики великих даних, може допомогти правоохоронним органам подолати обмеження ресурсів, виявляти приховані зв'язки між даними та прискорити розкриття злочинів. Запропонований інноваційний комплексний підхід до формування ІЗ може стати основою для підвищення ефективності діяльності правоохоронних органів у межах загальної цифровізації судочинства.

**Ключові слова:** цифрова трансформація, судочинство, правоохоронні органи, правові норми, інформаційні технології, інформаційна система, інформаційне забезпечення, кібербезпека, суд.

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