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SOME ISSUES OF DIGITAL TRANSFORMATION AT THE STAGE OF PRE-TRIAL INVESTIGATION

Abstract. In accordance with the Strategic Development Plan of Kazakhstan, approved by the President of the Republic of Kazakhstan, law enforcement and judicial authorities have been tasked with ensuring a gradual transition of criminal cases to electronic format. Here, digitalization opens up new prospects for the development of criminal procedural legislation.

The transition to digital format for criminal proceedings contributes to saving financial resources, accelerates investigation timelines, reduces risks of falsification, and increases transparency in the process. The implementation of artificial intelligence at the stage of pre-trial investigation will help predict possible scenarios for crime development, reduce time spent on routine tasks, and focus on more complex aspects of investigations. The use of digital tools minimizes human errors. With a high degree of probability, we are inclined to believe that in the near future there will be a process of testing other investigative actions in a remote format.

The article analyzes the implementation of digital technologies in the pre-trial investigation process in the Republic of Kazakhstan. It covers various aspects, including the advantages and disadvantages of using remote investigative actions, as well as the role of artificial intelligence.

The article discusses some directions for optimizing criminal proceedings, identifies a number of problems, and proposes possible solutions.

Keywords: remote interrogation; artificial intelligence; modernization; Internet; pre-trial investigation; evidence; investigator; falsification.

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СОТҚА ДЕЙІНГІ ТЕРГЕУ САТЫСЫНДАҒЫ ЦИФРЛЫҚ ТРАНСФОРМАЦИЯНЫҢ КЕЙБІР МӘСЕЛЕЛЕРІ

Аннотация. Қазақстан Республикасының Президенті бекіткен Стратегиялық даму жоспарына сәйкес құқық қорғау және сот органдарына қылмыстық істерді электронды форматқа кезең-кезеңімен көшіру міндеті қойылды. Мұнда цифрландыру қылмыстық процестік заңнаманы дамыту үшін жаңа перспективалар ашады.

Қылмыстық процестің цифрлық форматқа көшуі қаржылық ресурстарды үнемдеуге, тергеу мерзімдерін жеделдетуге, жалғандық жасау тәуекелдерін азайтуға және процестің ашықтығын арттыруға ықпал етеді. Алдын ала тергеу кезеңінде жасанды интеллектіні енгізу қылмыстардың даму мүмкін сценарийлерін болжауға, рутиналық тапсырмаларға жұмсалатын уақытты қысқартуға және тергеудің күрделі аспектілеріне назар аударуға көмектеседі. Цифрлық құралдарды пайдалану адамдық қателерді минималды етуге мүмкіндік береді. Жоғары ықтималдықпен біз жақын болашақта басқа тергеу әрекеттерін қашықтан форматта сынақтан өткізу процесі болатынына сенімдіміз.

Мақалада Қазақстан Республикасында алдын ала тергеу процесіне цифрлық технологияларды енгізудің талдауы жүргізілген. Онда қашықтан тергеу әрекеттерін пайдаланудың артықшылықтары мен кемшіліктері, сондай-ақ жасанды интеллектінің рөлі қамтылған.

Мақалада қылмыстық процесті оңтайландырудың кейбір бағыттары қарастырылып, бірқатар проблемалар анықталып, олардың шешімдері ұсынылған.

Түйінді сөздер: қашықтықтан жауап алу; жасанды интеллект; модернизация; интернет; сотқа дейінгі



тергеу; дәлелдеу; тергеуші; бұрмалау.

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НЕКОТОРЫЕ ВОПРОСЫ ЦИФРОВОЙ ТРАНСФОРМАЦИИ НА СТАДИИ ДОСУДЕБНОГО РАССЛЕДОВАНИЯ

Аннотация. В соответствии со Стратегическим планом развития Казахстана, утвержденным Президентом Республики Казахстан, перед правоохрательными и судебными органами поставлена задача обеспечить постепенный переход уголовных дел в электронный формат. Здесь цифровизация открывает новые перспективы развития уголовно-процессуального законодательства.

Переход на цифровой формат уголовного процесса способствует экономии финансовых ресурсов, ускоряет сроки расследования, снижает риски фальсификации и повышает прозрачность процесса. Внедрение искусственного интеллекта на стадии досудебного расследования поможет прогнозировать возможные сценарии развития преступлений, сократить время на рутинные задачи и сосредоточиться на более сложных аспектах расследования. Использование цифровых инструментов позволяет минимизировать человеческие ошибки. С высокой долей вероятности, мы склонны полагать, что в ближайшем будущем произойдет процесс апробация иных следственных действий в дистанционном формате.

В статье проведен анализ внедрения цифровых технологий в процесс досудебного расследования в Республике Казахстан. Он охватывает множество аспектов, включая преимущества и недостатки использования дистанционных следственных действий, а также роль искусственного интеллекта.

В статье рассмотрены некоторые направления оптимизации уголовного процесса, установлен ряд проблем и предложены возможные пути их решения.

Ключевые слова: дистанционный допрос; искусственный интеллект; модернизация; интернет; досудебное расследование; доказательство; следователь; фальсификация.

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Introduction. Transformation, in a general sense, implies a process of significant change or transformation of a particular activity. Furthermore, it involves aligning existing norms with international standards and striving to adapt the legal system to new conditions. Transformation makes norms “workable”, based on the demands of modernity.

From the message by the Head of State Kassym-Jomart Tokayev to the people of Kazakhstan titled “New Kazakhstan: The Path of Renewal and Modernization”, it follows that transformations are forthcoming in the state¹. This means that changes will affect all spheres of citizens' lives.

Materials and methods. During the writing of this article, the methods of analysis, synthesis, and comparative and other method were used.

For example, using the comparative method, the legislation of foreign countries on the issue under consideration was reviewed and compared with national legislation.

The criminal procedural codes of the Republic of Kazakhstan, as well as a number of foreign countries for online investigative actions, are considered.

The works of scientists such as S.A. Sumin, A.S. Fomin, A.A. Davletov, K.A. Kiselyov, D.A. Zykov, N.G. Kadnikov, A.A. Vasiliev, as well as foreign scientists – Taylor D.A., Dando S.J. were studied.

Today, it is impossible to imagine a person who does not benefit from digitalization. For example, let us consider the level of digital literacy among the population (the share of users who possess skills in using personal

¹ Новый Казахстан: путь обновления и модернизации: Послание Главы государства Касым-Жомарта Токаева народу Казахстана от 16 марта 2022 г. [Electronic resource] – Access mode: https://adilet.zan.kz/rus/docs/K22002022_1 (Access date: 20.07.2025).



computers, smartphones, tablets, laptops; resources via the Internet)². standard programs; obtaining services and

Level of Digital Literacy of the Population (in percentage)

	Level of digital literacy of the population (the share of users who possess skills in using personal computers, smartphones, tablets, laptops; standard software; obtaining services and resources via the Internet)											
	of the total population											
	of the total population aged 6 years and older	aged 6-74	aged 6 years and older	aged 6-74	aged 6 years and older	aged 6-74	aged 6 years and older	aged 6-74	aged 6 years and older	aged 6-74	aged 6 years and older	aged 6-74
	2018		2019		2020		2021		2022		2023	
Republic of Kazakhstan	77,3	79,6	79,9	82,1	82,0	84,1	85,3	87,3	86,3	88,3	88,3	90,2
Astana	84,0	85,4	87,8	88,7	90,4	91,3	94,6	94,7	93,7	95,2	95,1	97,0
Almaty	84,4	87,2	86,3	89,0	88,7	91,4	88,9	91,5	91,0	93,8	92,9	95,5
Shymkent	79,2	80,8	80,0	81,5	80,9	82,3	86,1	87,5	86,1	87,5	88,5	89,9

Table 1. Level of Digital Literacy of the Population

According to data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of Kazakhstan, by 2023 there is widespread access to services and resources remotely via the Internet. Each year, the level of use of innovative technologies and scientific-technical means grows at an arithmetic progression.

The processes of digitalization and informatization could not help but touch upon law enforcement. One key stage where it plays an important role is the pre-trial investigation phase. This article aims to examine the main aspects of using digital technologies at this stage.

Electronic document management, remote interrogation, and automated systems assisting investigations have become commonplace in the pre-trial investigation phase with the adoption of a new Criminal Procedure Code in Kazakhstan.

Currently, remote interrogation is regulated by law in Kazakhstan. The adoption of a new Criminal Procedure Code has created a legal basis for using remote investigative actions, which is an important step towards digitalization.

The interrogation of victims or witnesses can be conducted using scientific-technical means via video communication by summoning them to the pre-trial investigation authority in their location or residence.

The grounds for remote interrogation include:

- a) impossibility for a person to appear directly at the authority conducting criminal proceedings due to health reasons or other valid reasons;
- b) need to ensure the safety of a person;
- c) conducting an interrogation of a minor or underage witness or victim;
- d) necessity to ensure compliance with deadlines for pre-trial investigations and court proceedings;
- e) presence of reasons suggesting that interrogation would be difficult or associated with excessive costs³.

Results, discussion. The implementation of digital tools minimizes human errors. With high probability, we tend to believe that in the near future there will be a process for testing other investigative actions in an online format based on scientific research.

Thus, conducting interrogations,

² Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics [Electronic resource] – Access mode: <https://stat.gov.kz/en/> (Access date: 22.08.2025).

³ Уголовно-процессуальный кодекс Республики Казахстан: от 4 июля 2014 г. № 231-V ЗПК [Electronic resource] – Access mode: <https://adilet.zan.kz/rus/docs/K140000231> (Access date: 01.03.2025).



confrontations, and identifications can be recognized as feasible in an online format. Investigative actions such as investigative experiments and verification of testimonies at

the scene require perception of the environment; therefore, their conduct in a remote format is impractical.

Classification of Remote Investigative Actions (According to Current Legislation)	Classification of Remote Investigative Actions (According to Article Concept)
Interrogation of Witnesses	Interrogation of Witnesses/ of Victims
Interrogation of Victims	Identification

Referring to international experience, we observe a trend towards developing and utilizing innovative technologies in law enforcement. For instance, “in Switzerland, if a participant in criminal proceedings cannot appear before the prosecutor due to illness or significant expenses, remote interrogation using video conferencing systems is also permitted. It is noteworthy that accepting an oral statement from a person by the prosecutor eliminates the need for signing protocols” [1].

“In Swiss courts, this method is used to interrogate law enforcement agents for their protection” [2]. In Belarus, video conferencing is used during interrogations, confrontations, and identifications (Article 224.1 of the Criminal Procedure Code)⁴.

“Since 2005, Belgium has had an electronic justice system “Phenix”. The issue of authentication is resolved through the use of an electronic passport. The aim of the “Phenix” system project was to transform the various computer systems of crime investigation bodies and the judicial system into a structured and coherent single information space”.

“In Norway, where a special body was formed in 1995 with responsibility for implementing an integrated information system. This system was aimed at coordinating criminal justice activities, with courts and police initially included”.

“In the US, each source of information must meet specified criteria. In particular, the audio recording is evaluated by the court for “audibility” and “intelligibility” [3]. “Currently, the following audio recording requirements are taken into account by the US legislator:

- the technical device must have the appropriate characteristics;
- the voice on the audio recording must be identified;
- confirmation is required that the recording was made voluntarily, without coercion;
- proof of preservation of the record and its protection against changes and additions are required”⁵.

As the authors rightly point out: “As of today, the situation in the field of personal data protection has become one of the key factors of social concern in Kazakhstan, affecting the effectiveness of ensuring the information security of the state” [4].

The article examines digitalization through the lens of current legislation and international experience (USA). However, a qualitative leap requires conceptually new approaches.

New Approach 1: Implementing Blockchain for Evidence Authentication. The authors mention risks of falsification. Proposal: Integrating a private blockchain into the architecture of the Unified Registry of Pre-trial Investigations (ERDR). Every piece of digital evidence (interrogation videos, protocols, crime scene photos) should be hashed and recorded in a distributed ledger. This would make it mathematically impossible to alter a file (video recording or protocol) unnoticed after upload. This addresses the issue of trust in digital evidence raised in the SWOT analysis.

New Approach 2: A «Hybrid» Format for Investigative Actions. The article states that investigative actions can be conducted both in-person and remotely, noting that remote

⁴ Code of the Republic of Belarus No. 295-Z (Code of the Republic of Belarus of July 16, 1999 No. 295-Z “Criminal Procedure Code of the Republic of Belarus”) [Electronic resource] – Access mode: <https://cis-legislation.com/document.fwx?rgn=2002> (Access date: 27.08.2025).

⁵ Steve M. Solomon, Jr., Inc. v. Edgar // Court of Appeals of Georgia [Electronic resource] – Access mode: <https://www.courtlistener.com/opinion/1334884/solomon-inc-v-edgar/> (Access date: 12.08.2025).



crime scene inspections are impractical. Proposal: Utilizing Augmented Reality (AR) and «Digital Twins» of the crime scene. An investigator can use 3D scanning to create an exact virtual replica of the scene. This allows for repeated «virtual inspections» involving experts and witnesses located in different cities, without the need for physical travel or the risk of disturbing the original scene environment.

New Approach 3: AI-Driven Testimony Validation. The authors touched upon the use of AI for forecasting. Proposal: Implementing systems that analyze facial micro-expressions and voice patterns (similar to a polygraph, but contactless) during remote interrogations. The software can flag moments where the interviewee experiences stress or uncertainty, suggesting which points the investigator should clarify.

These examples demonstrate successful applications of video conferencing for conducting various investigative actions.

A.A. Davletov points out that “written-protocol form cannot ensure accuracy and completeness of information fully; on the other hand, using technical means enhances informative value during investigative actions” [5]. Indeed, information recorded by scientific-technical means eliminates protocol loss and captures the entire process of investigative action.

The situation with coronavirus infection has shown us both effectiveness and necessity for alternative methods for conducting investigative actions such as online interrogations and confrontations. Court processes were conducted online. “Although over time strict restrictive measures have eased somewhat, issues regarding conducting court sessions and certain preliminary investigation procedures using new information technologies-including video conferencing systems-remain highly relevant” [6].

It should be emphasized that one advantageous aspect is increased discipline among employees conducting investigative actions. The presence of cameras documenting processes enhances investigators' accountability while minimizing violations against citizens' rights. There exists an opportunity to assess compliance with ethical norms by law enforcement personnel during

interrogations. In this context, N.G. Kadnikov's statement holds true: “norms of criminal procedure discipline investigators” [7].

Many experiments have been carried out regarding the issue under consideration. “Eyewitness accounts can be much more reliable if they are led by a virtual police officer rather than real one” the respondents claim. Witnesses to simulated car theft provided 60% more information when conducting interviews in context “avatar avatar” compared to a personal interview. Testimony with the police can cause stress and fear. Previous research has shown that several factors, including an unfamiliar environment, a police officer, or a desire to “perform well”, can reduce the accuracy of a witness's testimony. A study conducted by the University of Westminster has so far found that witnesses provide 60% more information when they are interviewed by a virtual avatar rather than by a person. “Witnesses may be distracted from the task of remembering during interviews because they pay attention to the social behavior of the interviewer, such as facial expressions. This behavior can negatively impact the memory of witnesses”, said Professor Coral Dando of the University of Westminster at London. “My research focuses on interviewing in non-traditional contexts to support complex cognition such as long-term memor-reducing task requirements by managing the environment so that people can focus on one task at a time”. Dando C. and her colleague Donna Taylor developed an experiment to minimize the impact of these factors using an immersive virtual environment. “It is clear that all over the world people do not necessarily communicate face to face, rather they prefer to communicate in a synthetic environment” [8].

Alongside this point, widespread use of artificial intelligence (AI) comes as no surprise today; AI is actively employed for processing large volumes of data.

Regarding defining AI, we adhere to A.V. Ponkina's and A.I. Redkin's position: “artificial intelligence is an artificial complex cybernetic computer-program-hardware system (electronic including virtual electronic-mechanical bio-electronic-mechanical or hybrid) with cognitive-functional architecture and its own or relevantly



accessible computational capacities necessary for volume and speed” [9].

In our view, possessing these characteristics at the pre-trial investigation stage allows AI to:

- analyze data enabling reconstruction timelines;
- automatically analyze video recordings from surveillance cameras recognizing faces, vehicle numbers, suspicious activities while responding promptly;
- process textual information revealing connections between event participants;
- simplify information exchange while accelerating investigation processes;
- predict possible scenarios for crime developments.

Utilizing AI allows reducing time spent on routine tasks while focusing on more complex aspects during investigations.

However, alongside advantages presented by AI at this stage come challenges arising during its application such as cybersecurity and data protection issues.

With digitalization comes necessity for ensuring information security.

Cybersecurity plays a key role in preventing information leaks, hacks, and data falsification. Employing modern encryption methods along with two-factor authentication becomes essential when working with digital evidence. A successful example can be seen in Unified Register for Pre-Trial Investigations (URPTI). Information security within URPTI is ensured through technical protection measures; thus authorization into system occurs via multi-factor authentication through secure key storage along with biometric fingerprint readers.

On network level URPTI system remains accessible solely within unified transport environment contours among state bodies while data transmission occurs through encryption.

Insufficient qualifications among law enforcement personnel regarding digital technologies necessitate periodic training courses based within departmental educational institutions.

Legislative regulation issues concerning usage rights over digital data as evidence arise.

Despite significant potential regarding AI utilization across various life domains ethical/

legal aspects remain poorly studied concerning its application. “Without exaggeration one can assert current legal systems lag hopelessly behind advancements made within AI technology realm; moreover practical applications lack adequate international legal/national regulatory frameworks” [10].

“Minimizing potential challenges involves:

Necessitating correct training protocols ensuring algorithms adequately interpret legal concepts without distorting meanings behind legal norms requiring deep understanding regarding criminal law markers alongside their proper integration into algorithms;

It’s crucial considering ethical/legal questions tied into implementing AI within criminal law sphere including depersonalization resulting from annotating judicial acts” [11].

Identifying strengths/weaknesses alongside risks/trends will enable understanding current state/prospects concerning integrating digital technologies into criminal procedures thus based upon conducted analysis we performed SWOT-analysis addressing optimization matters within criminal process.

The article presents a SWOT analysis in tabular form. Below is a detailed interpretation linking each quadrant to the final conclusions and the realities of the Kazakhstan legal system.

S (Strengths): From Automation to Procedural Economy.

The authors highlight a reduction in timeframes and material costs. Thus, the strength lies not merely in “acceleration” but in the practical application of the principle of procedural economy. The digital format eliminates “dead” time intervals (time for conveying, waiting in hallways, or physical mail delivery). The implementation of systems such as ERDR (Unified Register of Pre-trial Investigations) creates a “digital footprint” for every action taken by an investigator. This prevents the backdating or deletion of documents, as mentioned in the section on transparency. This serves as the foundation for the anti-corruption component referenced in the abstract.

W (Weaknesses): The Crisis of Direct Perception.

The primary weakness is the loss of the non-



verbal component of evidence gathering. An experienced investigator reads micro-reactions that video conferencing especially with low-quality connections in regional areas can smooth over or distort (e.g., audio-visual desync).

O (Opportunities): AI as an Assistant, Not a Replacement.

The article mentions the use of AI algorithms for data analysis. However, the opportunities extend beyond simple analysis; they represent a transition toward predictive justice. AI can do more than analyze; it can suggest the legal classification of an offense based on the case facts and automatically generate drafts of procedural documents, freeing up time for cognitive tasks. Furthermore, there is the potential for integration

with the “Sergek” database and banking systems to obtain authorized data instantaneously.

T (Threats): Digital Vulnerability.

Risks of data leaks and legal uncertainty. A key threat is Deepfake technology. During remote investigative actions, criminals may use generative neural networks to spoof faces or voices. Current Republic of Kazakhstan legislation does not yet have clear technical verification protocols to ensure that the person on the screen is a real individual rather than a digital avatar. Another threat is the digital divide: the disparity in internet quality between major cities and remote villages may violate the right to defense (for instance, due to the inability to participate effectively in the proceedings).

SWOT Analysis		
Strengths	Weaknesses	
<p>Automation of processes significantly reduces investigation time.</p> <p>Use of algorithms and data analysis minimizes human errors.</p> <p>Elimination of territorial barriers facilitates more effective interaction between various law enforcement agencies.</p> <p>Ability to capture the entire investigative process to establish ethical relationships among participants.</p> <p>Operational efficiency in conducting investigative actions.</p> <p>Reduction of pre-trial investigation timelines through the use of digital technologies.</p> <p>Reduction of material costs for employee travel, as many actions can be performed remotely.</p> <p>Transparency of investigations, which increases public trust in law enforcement agencies.</p> <p>Use of AI algorithms for analyzing complex data, allowing for the identification of patterns and connections that may not be obvious with traditional approaches</p>	<p>Lack of “live” contact between the investigator and the interrogated, which may negatively affect the quality of the interrogation and the establishment of trustful relationships.</p> <p>Insufficient qualifications of law enforcement personnel in digital technologies, which may lead to ineffective use of new tools.</p>	
	Risks	
		<p>Lack of clear legal frameworks for using digital data as evidence, which may lead to disputes over the admissibility of such evidence in court.</p> <p>Risk of data leaks or system breaches, which could jeopardize the confidentiality of information and the safety of investigation participants.</p>
	Trends	
	<p>Implementation of the Legal Policy Concept of the Republic of Kazakhstan until 2030, which envisions further development of digitization in the legal sphere.</p> <p>Development of new methods for protecting digital evidence to ensure its reliability and security.</p> <p>Integration of virtual and augmented reality technologies for event reconstruction, which can significantly improve the quality of investigative actions.</p>	

Table 2. SWOT Analysis



Conclusion. Practical Recommendations

1. Development of a Regulatory Framework for Biometric Identification. It is proposed to establish a specific regulatory legal act governing identification procedures in remote court proceedings. The utilization of biometric data (specifically, Face ID technologies and fingerprint scanners integrated into smartphones) should be legislatively mandated as a measure to mitigate the risks of personal data forgery and prevent the unauthorized substitution of participants.

2. Establishment of a Secure National Videoconferencing Platform. The necessity of creating a dedicated videoconferencing platform for law enforcement and judicial authorities is substantiated. In contrast to commercial solutions, the proposed system should operate on local server infrastructure (within the “Government for Citizens” framework), ensuring integration with the national biometric database of the Republic of Kazakhstan, thereby guaranteeing the required level of information security.

3. Integration of Digital Competencies into Professional Training. It is considered appropriate to introduce a specialized course, “Fundamentals of Digital Forensics and Cybersecurity”, into the curricula of the Academy of Law Enforcement Agencies. This measure aims to equip personnel with practical skills for

handling digital evidence and a foundational understanding of information systems.

4. Standardization of Protocols for Technical Failures. To ensure the procedural admissibility of evidence obtained during remote investigative actions, the approval of an official protocol for investigators to follow in the event of technical malfunctions (e.g., communication loss) is required. Standardizing procedures in such scenarios will mitigate the risks of evidence being deemed inadmissible in court.

Conclusions of the Study

In summary, it can be stated that the evolution of criminal investigation methods is driven by the rapid advancement of digital technologies. Traditional forensic methodologies are undergoing a transformation, being supplemented by innovative tools, which contributes to the optimization of crime detection.

The implementation of digital solutions opens new prospects for enhancing the efficiency of pre-trial proceedings. Further technological progress, anticipated in the foreseeable future, will contribute to greater accuracy, promptness, and transparency of investigations. However, the successful integration of modern technologies and the use of scientific and technical means are impossible without the concomitant modernization of professional training systems, which is a prerequisite for fully harnessing the potential of digital tools.

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