



AI Competency Model for Penal System Staff



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Abstract

Introduction: digital transformation of the penal system as envisaged in the state strategic documents creates an objective need for employees having AI competencies. A scientifically validated competency model and corresponding assessment tools for penal system staff have not yet been developed in either domestic or foreign research. *Purpose:* to identify the essence of AI competence of a penal system employee, as well as conceptual approaches to developing its substantive model and assessment tools. *Methods:* the study is based on the dialectical approach to knowledge, system analysis, qualitative content analysis, and the comparative method. The empirical base consists of domestic and foreign scientific studies in the field of AI competencies, regulatory legal acts, as well as reports and guidance documents (UNESCO, OECD, Interpol) on the use of artificial intelligence in the field of public administration and law enforcement. *Results:* the terms of “AI literacy” and “AI competence” are conceptualized in relation to law enforcement personnel. A theoretical AI competence model for an employee of the penal system is developed, including six interrelated blocks (cognitive, regulatory-ethical, functional-activity, communicative-affective, and socio-cultural). A four-level structure for mastering competencies is substantiated (basic level, qualified user, strategic leader-customer, developer of AI systems). *Conclusions:* the proposed model can serve as a conceptual basis for transforming educational programs at departmental universities, the system of additional professional education, and professional service training. A promising direction for further research is the empirical verification of the model and the development of a validated diagnostic toolkit on a representative sample of the penal system employees.

Keywords: artificial intelligence; competencies in the field of artificial intelligence; AI competencies; AI literacy; penal system; AI competency model for a penal system employee.

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Introduction

The relevance of the research topic is substantiated not only by the rapidly developing artificial intelligence technologies that are influencing all spheres of society, but also by the existence of quite specific prerequisites for conducting comprehensive studies on the issues of developing competencies in the field of artificial intelligence (AI competencies) among civil servants in general and employees of the penal system in particular.

The National Strategy for the Development of Artificial Intelligence up to 2030, approved by the decree of the President of the Russian Federation No. 490 of October 10, 2019 (as amended on February 15, 2024), mandates the enhancement of AI competencies among citizens. This includes fostering practical skills in using AI technologies among university graduates, informing the public and organizations about AI principles, and developing solutions that enable AI systems to make specific decisions – including when public authorities are performing their functions. Consequently, this implies the development of AI competencies not only among developers but also among users, including civil servants.

The Concept for the Development of the Penal System up to 2030 identifies digital transformation of the penal system as one of its key areas, including the creation and development of data collection and processing systems, as well as decision-making based on the results of using artificial intelligence. The listed strategic documents imply — although they do not explicitly state this as a development direction — the development of competencies in the field of artificial intelligence among civil servants and employees of government bodies and institutions, primarily when using these technologies in professional activities.

Following the State Council meeting in December 2025, the Government of the Russian Federation was tasked with amending the Federal State Educational Standard for Higher Education and relevant professional standards. These amendments mandate the integration of AI into professional activities while ensuring due regard for ethical norms and safety requirements. Additionally, the instruction calls for developing continuing professional development programs focused on the application of artificial intelligence in the workplace [1].

The penal system, as part of the mechanism of public authority and the law enforcement system, imposes increased requirements for the competence of employees in the field of interaction with AI. The integration of artificial intelligence technologies – including computer vision, natural language processing, speech recognition, and intelligent decision-support systems – into penitentiary operations creates an inevitable demand for highly qualified personnel capable of developing and using these tools. Crucially, correctional staff should be viewed not merely as end-users of professional AI or general-purpose models, but as active guarantors of security and custodians of individual rights within the facility. This expanded role necessitates a dual competency: a rigorous understanding of technical safety protocols alongside a firm commitment to the ethical governance of algorithmic systems.

The analysis of the educational programs of departmental law enforcement universities in general and educational institutions of the penal system in particular has shown limited implementation of disciplines related to the development of AI competencies. Cadets of non-technical specialties typically do not have such courses. Equally critical is the upskilling of incumbent penal system personnel in artificial intelligence competencies. This applies specifically to employees who have already completed their initial professional training at educational institutions and must now update their skills through continuing professional development programs and on-the-job service training.

Thus, we can state a contradiction between the objective need of the penal system, as well as other law enforcement agencies, for qualified personnel with AI competencies, and the absence of a scientifically grounded AI competency model, as well as tools for assessing and developing these competencies within the system of departmental education and professional service training.

Research

The object of the study is public relations that develop within the framework of professional training of employees of the penal system in the context of digital transformation of society and the state. The subject of the study is the content and structure of competencies in the field of artificial intelligence

among employees of the penal system as a reference point for the transformation of the system of departmental education and professional service training. The purpose of the study is to identify the essence of competencies in the field of artificial intelligence for penal system employees, to outline conceptual approaches to developing a substantive model and assessment tools for these competencies, and to substantiate the need to develop AI competencies not only among cadets at departmental universities, but also among employees who have completed their training through the system of additional professional education and professional service training.

The empirical and theoretical basis of the study consists of regulatory legal acts and official documents, domestic and foreign studies on the issues of developing AI competencies, and documents (instructions, guidelines, and programs) of foreign states and supranational organizations on the use of artificial intelligence in the professional activities of the police and other law enforcement agencies and services.

The study's methodological foundation rests on a dialectical approach to examining objects and phenomena. It draws on a combination of general and specific scientific methods for theoretical inquiry, including logical techniques, systemic analysis, qualitative content analysis, comparative analysis, and descriptive modeling, among others.

Review of research in the field of AI competencies

Research into AI competencies remains in its formative stages; notably, AI literacy has only recently emerged as a distinct object of scholarly inquiry. Despite its nascent nature, the field is developing dynamically – a trend clearly evidenced by the significant surge in scientific publications since 2020 [2; 3]. At the same time, this topic is poorly covered in domestic science, with the main focus being on problems of the impact of artificial intelligence on the education system as a whole, opportunities and risks of its application, and the experience and nature of its use by students of various specialties.

Among the identified studies, three main types of work are presented: systematic and exploratory reviews [4–7]; studies of AI literacy among specific categories of people; and studies devoted to meth-

ods for assessing (measuring) competencies in the field of AI [8–10]. The second group includes the following categories for study: schoolchildren [2], university students (the largest number of identified studies) [11–15], adults engaged in professional activities (the largest number of identified studies are devoted to teachers and medical workers) [16–19], and elderly people [20].

Studies in the first group most often are based on theoretical methods, while the second and third groups predominantly rely on empirical methods based on qualitative (interviews with students and experts, the reflective diary method, the case method, etc.) and quantitative (surveys, questionnaires, pedagogical testing, statistical methods for scale validation) research.

The key areas of research include conceptualization of AI competencies (definitions, structure, and content), development of assessment tools and their validation (measurement objectivity, psychometric qualities of existing scales), and the specifics of forming AI competencies among different population groups (competency structure, learning characteristics, pedagogical conditions, challenges, and problems). The scope of inquiry also encompasses ethical concerns regarding critical thinking – specifically, users' ability to identify algorithmic bias – alongside challenges to academic integrity, educational inequality, and the transformation of information behavior and cognitive processes.

As a separate area of focus, it is necessary to identify research into AI competencies for civil servants in general and law enforcement officers in particular.

For example, the authors of review studies identify several groups of works: those that examine attitudes to artificial intelligence among civil servants in general; studies on the application of AI in specific sectors of public administration; and works that focus on the specifics of using certain technologies in training civil servants [21; 22]. Researchers emphasize that the competencies in the field of AI for public officials go beyond simple technical and operational skills; for this category, it is also necessary to comply with ethical and legal norms, ensure accountability (including to the public), and understand the broader social consequences of the implementation of artificial intelligence [23].

A review of existing studies on AI competencies in the public sector suggests that some scholars do not treat these skills as an independent construct. Instead, they subsume them under broader frameworks of digital literacy and information-communication technology proficiency [24–26]. Artificial intelligence is considered as a factor that significantly transforms the requirements for the level of digital literacy and the set of digital competencies of civil servants [27, pp. 66–67].

Other researchers consider competencies in the field of artificial intelligence as independent, significantly different from general digital competencies, due to the challenges that artificial intelligence creates for the public administration sector [23]. It is emphasized that the complexity of artificial intelligence technology requires an interdisciplinary approach that goes beyond traditional digitalization [23].

A review of the existing literature reveals that empirical research has been carried out across several professional groups, including municipal employees [25], entry-level civil servants [26], HR specialists [28], and departmental managers [29]. There is research devoted to police officers' attitude towards robotic assistants [30]. Comprehensive studies of law enforcement officers and, in particular, employees of the penal system are not identified, which is a significant gap in the development of digital transformation of law enforcement services in the context of using AI systems.

Modern approaches to understanding and structuring AI competencies

To begin with, it is necessary to identify key approaches to understanding competence in the field of artificial intelligence. It should be noted that the conceptual and categorical apparatus in this area of research has not been established yet. In many works addressing this nascent field of research [31, pp. 8–10], key terminology – such as “literacy”, “competence”, “AI readiness”, and “AI capabilities” – remains inconsistently defined. Furthermore, the conceptual distinction between closely related terms like “AI literacy”, “AI competence”, and “AI competency” continues to be a subject of active scientific debate. Some authors consider these concepts as synonyms, while others see differences in their content. For

example, some researchers point out that AI literacy is related to the category of “knowledge” (a person has an idea of artificial intelligence, the basic principles of its work, ethical and other limitations), while the second concept is associated with the category of “application”, i.e. not only understanding the principles of technology, but also self-efficacy, the ability to substantiate the impact of AI on society and, most importantly, the ability to use technology in an ethical, responsible and beneficial way to solve specific problems [32, p. 4].

Other authors establish a hierarchical relationship between the concepts under study, pointing out that AI literacy is the basic level of AI competency, its core [33, pp. 377–378]. AI literacy implies that a person has a basic understanding of the principles of using AI for solving routine tasks. AI competencies, in turn, imply the ability and readiness to use artificial intelligence to solve working tasks. We believe that the presented positions do not contradict each other: AI literacy can be considered the core of AI competency.

This concept is also relevant for employees of the penitentiary system, as well as for other law enforcement agencies: not every professional function in the penal system involves interaction with artificial intelligence or the automation of professional tasks using AI. Whether employees intend to or not, they're interacting with AI systems daily, that is why possessing basic AI literacy has become just as important.

Scientific literature has several approaches to understanding AI competency. It is often considered part of digital competencies, but it is substantively distinguished as an independent block. Based on the analysis of scientific research on the issue, several approaches to understanding competencies in the field of artificial intelligence can be identified:

1. The competency-based framework evaluates human-AI interaction through 17 specific skills within 5 key areas: identifying AI systems; understanding their potential, limits, and underlying principles; managing data; ensuring ethical and safe use; and gauging public perception of AI [34].
2. The structural-functional approach, according to which AI competencies are viewed as

a set of interrelated aspects of interaction with technology: functional, technical, and socio-critical [14].

3. The psychological and pedagogical approach, based on Bloom's taxonomy, is based on building AI literacy from simple cognitive skills to more complex ones: to know and understand (terminology, operation principles), to apply (use tools to solve practical problems), to evaluate (critical analysis of AI results), and to create (design solutions using AI) [8].

4. The approach based on affective-regulatory competencies highlights the importance of emotional and psychological aspects in AI literacy, which ensure the sustainable and effective use of artificial intelligence. It includes the skills of self-efficacy (self-reliance and the ability to cope with idiosyncrasies and problems in interaction with AI), emotional regulation (coping with anxiety in working with AI), persuasion literacy, which presupposes the ability to recognize and prevent the influence of AI on the decision-making process [35].

5. The contextual role approach is based on the idea that there are no universal AI competencies, they differ depending on the role and professional functions (schoolchildren, students and teachers, specialists in various fields, developers of AI solutions, etc.).

Research also highlights a specific approach to competencies in the field of generative artificial intelligence (GenAI literacy), which are considered a specialized type of AI competencies and focus on the knowledge and skills required to interact with systems capable of autonomously generating text, images, audio, video, or software code. These AI competencies call for an understanding of the probabilistic mechanisms behind content synthesis, as well as the ability to distinguish between outputs from generative and predictive models. There are also several approaches to understanding and structuring, as well as to assessment tools. The most comprehensive model consists of 12 competencies, including basic concepts of how AI works, knowledge of generative AI models, understanding of their capabilities and limitations, practical skills in using them, skills in detecting content, critically evaluating the results of generation, skills in prompt engineering, programming, and fine-tuning, an understanding of

the feasibility of using generative AI, ethical and legal aspects, as well as the willingness to engage in lifelong learning [36]. However, Russian researchers developing a model to assess higher education teachers' competencies in generative AI focus on the aforementioned regulatory-affective component. This includes behavioral aspects that determine readiness to use AI, user reactions and attitudes toward it, an awareness of the specifics of generative systems, and – within the PROK framework – the ability to contextualize tasks and solve them effectively using AI [37].

Competencies in the field of artificial intelligence for civil servants

It should be noted that the approaches presented above largely complement each other, focusing on different aspects of human interaction with AI systems. However, it should be emphasized that for civil servants in general and law enforcement officers in particular, the specifics of AI competencies are determined by the public-legal functions they perform, their role in society, and the perception of the public.

Analyzing the Broadband Commission's 2022 report "Artificial Intelligence and Digital Transformation Competencies for Civil Servants" [38], prepared by its working group on AI capacity building, is crucial for understanding AI competencies in the public sector. The document structures competencies into three groups: digital planning and design (systems thinking, problem management and solutions, strategic foresight, agile strategy); data use and governance (digital literacy, data-driven decision making, open data and open government, privacy and security); digital management and execution (people-centricity, agile execution, digital leadership). Each group is supplemented with a specific AI level and five attitudes (trust, creativity, adaptability, curiosity, experimentation).

In modern scientific research, AI competencies of civil servants are considered not only as technical skills but also as a set of personal qualities that include attitudes and value systems. The most thoroughly developed approach is presented within the framework of the AI4Gov Canvas project. Competencies in the field of artificial intelligence are examined through three dimensions (technology, management, and policy/legal/ethical) and several clusters: attitude (attitudes, values, and motivation

to use AI), operational skills (practical skills in applying and managing technologies), and literacy (factual knowledge about the principles of how systems work) [23].

The pyramid model of AI competencies includes knowledge of the fundamentals of AI, data work, process automation, understanding of the ethics and legal regulation of artificial intelligence, project management in the field of AI implementation, and digital leadership [39, p. 110].

Russian researchers I.V. Yanchenko and N.A. Ekler consider AI competency as an integrative quality of personality, including motivational, cognitive, activity, ethical, legal and reflexive-evaluative components [23]. E.A. Panova and E.Yu. Tarasova define the ability of civil servants to operate in AI-mediated environments as a core component of AI competency. They describe the “digital civil servant” as working under the direction and mentorship of the official [27, p. 69].

The qualitative analysis of the studies above demonstrates the necessity of applying a multi-level, context-based role-based approach to develop a model of AI competencies for law enforcement officers. Taking into account the professional status and role of the penitentiary system in society, competence in the field of artificial intelligence should be considered as the ability and willingness to effectively and responsibly use AI technologies in professional activities as a tool for solving professional tasks, taking into account legal and ethical requirements, and information security.

AI competency model for penal system employees

Resting on scientific literature and a limited number of guidelines for civil servants in general and law enforcement agencies in particular (UNESCO, OECD, Interpol&UNICRI, UK National Police Chiefs' Council, etc.), we have developed a theoretical AI competency model for an employee of the penal system. It is a complex interdisciplinary construct comprising several key elements (blocks), such as cognitive, technical, functional-activity, regulatory-ethical, communicative-affective, and socio-cultural.

The first block covers the *cognitive aspects* of interacting with AI technologies, specifically:

- understanding the specifics of data analysis

and the operating algorithms of publicly available AI models and specialized AI systems used in professional practice;

- comprehending how information is analyzed across public and specialized AI platforms, managing the full data life cycle, and overseeing storage infrastructure for professional AI systems.

- grasping core machine learning principles, basic cybersecurity for AI, and the limitations and risks associated with its professional use. This also includes assessing how AI integration transforms departmental workflows.

The *regulatory-ethical component* of the AI competency model encompasses several key areas. These include understanding legal requirements and ethical principles for professional AI use; acknowledging responsibility for both AI-generated results and human decisions based on them; ensuring meaningful human oversight (“human-in-the-loop”) for critical decision-making; and implementing information security protocols in daily operations.

The above-mentioned components correspond to the “knowledge” and “comprehension” levels according to Bloom’s taxonomy. However, modern approaches to AI competencies also require skills and readiness to interact with AI, which forms the so-called functional and activity-based block. It includes:

- the ability to identify professional tasks that can be solved using AI;
- readiness to integrate AI tools into professional and everyday activities;
- prompt engineering skills;
- readiness to critically evaluate the results of AI systems’ work;
- skills in operational security and control when working with AI;
- willingness to document the specifics of how AI systems operate.

The *communicative-affective block* of AI competencies should be identified as a separate component. It covers skills for effective human-machine communication in professional settings. It also includes self-efficacy, specifically, the confidence, interest, and motivation to master new AI tools. Furthermore, it requires the ability to regulate one’s own emotions and assess how AI influences them in both work and daily life. Finally, it demands criti-

cal thinking skills to identify and evaluate attempts at manipulation via AI technologies, such as deep-fakes.

Given the social significance of penal bodies and institutions as part of the state law enforcement system, we believe that the AI competency model should also include a socio-cultural component. This includes understanding how the use of artificial intelligence can affect public trust in law enforcement agencies, awareness of the risks of algorithmic bias and discrimination against certain population groups, and understanding of how the use of AI systems affects individual rights in the context of law enforcement activities.

The proposed theoretical AI competency model for penal system employees should be further developed by defining distinct proficiency levels. The presence of several levels is due to the functional diversity of positions in the penal system: not all of them involve the implementation of AI-based technologies, but this does not mean that basic AI literacy skills should be abandoned. Consequently, there should be at least two levels: basic and professional. However, the analysis of current research in the field of corporate AI (for example, the Corporate AI Outlook Study, 2026) shows that a modern specialist is required not so much to have skills in interacting with AI as to understand how, within what scope, and to what extent artificial intelligence can be integrated into existing organizational processes, how approaches to professional activities may change with the use of AI, as well as to comprehend risks and limitations of such integration. Furthermore, taking into account the specifics of law enforcement activities in general and certain specializations within them, developers of specialized AI systems are needed.

Based on the above, the following tiered structure of competencies in the field of artificial intelligence is proposed: basic level, qualified user, strategic leader-customer (qualified customer in the terminology of the AI competency model proposed by the ITMO University [40]), developer of AI systems).

For employees of the penal system whose professional functions do not involve the use of artificial intelligence, it is necessary to acquire basic AI literacy: general understanding of the technology, the basics of ethical interaction with generative artificial

intelligence, and skills in ensuring information security when interacting with AI systems in daily work.

Employees whose professional duties involve or may involve the use of AI, including specialized systems developed for the penal system, must acquire AI competencies at the level of a qualified user (the relevant knowledge, skills, and readiness for work are outlined above in the structural blocks).

Employees or the penal system who are heads of departments (or groups of departments) where AI-based systems are used or may be used, potentially participate in developing strategies for transforming the department's operations based on AI. They identify and formalize the functions whose implementation requires the use of artificial intelligence, define the requirements for the concept and class of AI-based solutions (professional AI systems), establish quality metrics, rules for application and assessment, develop technical requirements and tasks, and test the quality of the system with AI elements. The above corresponds to the competency development level "strategic leader-customer".

The independent level of AI competencies (developer of AI systems) is provided for employees of organizations or departments developing professional systems based on artificial intelligence for the penal system. This level can also be elaborated upon with regard to the professional and role-based AI competency model (data analyst, data processing engineer, data architect, machine learning engineer, artificial intelligence security engineer, etc.).

This model can be used as a reference point when developing educational programs at departmental universities (core educational programs, retraining and professional development programs, and elective courses), as well as when designing professional service training programs. It is already evident that all personnel within the penitentiary system, including current employees, staff, cadets, and students at departmental universities, should develop AI competencies, at minimum, at a basic level. Joint efforts of experienced users, qualified developers, and customers of professional AI systems promote digital transformation of the department.

The proposed model can serve as a guide for developing tools to assess (diagnose) the AI com-

petencies of employees of the penitentiary system. The key methodological line in AI literacy research for 2022–2026 is the shift from self-assessment tools to objective tests. Consequently, it is necessary to take into account all the blocks of the AI competency model presented above and combine various measurement methods: knowledge tests, situational cases, psychometric scales, and reflective tasks, taking into account the specifics of the penal system. Designed as an entry/exit assessment, this diagnostic tool should serve both university curricula and additional training courses. The diagnostic toolkit should be multi-level, context-specific for the penal system, and validated on a departmental sample. A single universal test for all categories of employees will not ensure either measurement accuracy or practical applicability of the results.

Conclusions

In conclusion, we reiterate the fact that digital transformation of the public administration system and the penal system requires qualified personnel, including those with competencies in the field of artificial intelligence, and, consequently, a scientifically grounded model of such competencies tailored to the specific activities of the penal system. No comprehensive studies on AI competencies specifically tailored to law enforcement personnel in general, or the penal system in particular, are identified. This represents a significant gap that impedes, among other things, practical implementation of AI systems.

Based on the analysis of scientific research and practical guidelines for implementing AI in the public administration sector, the author's definition of competencies in the field of artificial intelligence for employees of the penal system is developed. A multidimensional AI competency model is proposed. It is a multi-level, context-role construct reflecting the specifics of public-legal functions of a penal system employee, which is reflected in the presence of specific blocks –regulatory-ethical and socio-cultural ones – that distinguish it from models for other professions. In addition, the AI competency model includes four levels of mastery: basic literacy, a qualified user working with professional AI systems, a strategic customer leader, and a developer. It should be noted that the basic level of mastering competencies in the field of artificial intelligence is relevant for all employees, even if their professional functions are not related to the potential use of AI systems.

The proposed model can be used to develop educational programs in departmental universities and to improve professional service training programs, as well as to develop diagnostic tools for assessing AI competencies of penal system employees. Consequently, in the future, research on this topic will involve analyzing existing scales for assessing AI competencies, as well as developing and validating diagnostic tools using a sample of employees in the penal system.

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