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URBAN PLANNING CONCEPT OF THE TSARITSYN ENSEMBLE BY ARCHITECT V.I. BAZHENOV

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ГРАДОСТРОИТЕЛЬНАЯ КОНЦЕПЦИЯ ЦАРИЦЫНСКОГО АНСАМБЛЯ АРХИТЕКТОРА В.И. БАЖЕНОВА

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Abstract

More than two hundred years after the death of V.I. Bazhenov (1799) was a time of searching for heritage and determining its meaning, searching for truth, cutting off myths and unreliable opinions that accompanied and multi-layeredly concealed his work.

In the study of the architecture of V.I. Bazhenov, there were clashes of views of historians, art historians, architects and urban planners on many issues, demonstrating confusion in substantiating the historical heritage. This article provides the reasons for the historical misunderstanding of the novelty of V.I. Bazhenov's work.

This study reveals inconsistencies in definitions associated with Freemasonry, Gothic, Romanticism and eclecticism, but in reality, Bazhenov's architecture has gone far beyond these definitions and contains neoclassicism. New studies have confirmed a new level of development of urban planning and architecture of the Enlightenment of the 18th century, as they contain spirituality, Christian symbolization, the transformation of historical spiritual symbols into secular urban planning. The concept of the ensemble by V.I. Bazhenov contains an urban planning idealization of the imperial residence in the form of a model of a state that symbolizes the Divine Upper City, presented in the New Testament of the Bible (The Holy Bible, chapter 21).

Аннотация

Более двухсот лет после смерти В.И. Баженова (1799) было временем поиска наследия и определение его значения, поиска истины, отсечения мифов и недостоверных мнений, которые сопровождали и многослойно скрывали его творчество.

В исследовании архитектуры В.И. Баженова произошли столкновения, взглядов историков, искусствоведов, архитекторов и градостроителей по множеству вопросов, демонстрирующие растерянность в обосновании исторического наследия. В данной статье приводятся причины исторического непонимания новизны творчества В.И. Баженова.

В настоящем исследовании выявлены несоответствия определений, которые связаны с масонством, готикой, романтизмом и эклектикой, а в действительности баженовская архитектура далеко шагнула вперед за пределы этих определений и содержит неоклассику. Новые исследования подтвердили новый уровень развития градостроительства и архитектуры эпохи Просвещения XVIII века, так как содержат духовность, христианскую символизацию, трансформацию исторических духовных символов в светское градостроительство.

В концепции ансамбля В.И. Баженова содержится градостроительная идеализация императорской резиденции в виде модели государства, которое символизирует Божественный Горний Град, представленный в Новом Завете Библии (Библия, 21 глава).

Keywords: *architecture, urban development, concept, metropolis, state, cartography, geodesy, general plan, typology.*

Ключевые слова: *архитектура, градостроительство, концепция, мегаполис, государство, картография, геодезия, генплан, типология.*

Пояснительная записка по проекту Царицынского ансамбля архитектора В. И. Баженова не обнаружена. Однако о творческой идеи зодчего заказчица – Екатерина II была хорошо осведомлена. Императрица знала, что аналогом для генплана Царицынского ансамбля был взят генплан Др. Иерусалима I в. н. э. В обосновании этой идеи проявляется общее сходство генпланов по аналогии расположения одноименных объектов в градостроительном пространстве. В Царицынском ансамбле принят за основу не только генплан Древнего Иерусалима, но и конфигурация дворца Претории Др. Иерусалима I в. н. э. В проекте Царицынского ансамбля В.И. Баженов видоизменил его объём, разделив конфигурацию исторического древне иерусалимского дворца на две части: – одну, под дворец Екатерины II, а другую – под дворец Павла I.

Однако остался отдалённый намёк на сходство императорских дворцов с иерусалимским дворцом Претории времён Пилата, что, именно, и стало причиной отстранения В.И. Баженова от ведения всех проектных и строительных работ в Царицыне. Это обоснование находит подтверждение в указе Екатерина II: – «разобрать до основания все (именно) императорские дворцы».

По авторским генпланам XVIII в., а также материалов картографии и географических расчётов по привязке объектов на местности Царицынского ансамбля в XXI в. были выявлены специфические признаки топографии и картографии, характерные для Российского государства. В обосновании этой аналогии авторские генпланы 1775 г. и 1780 г. были приняты за опорный материал, на которых проявился творческий процесс зодчего. На генплане 1775 г. содержатся неопровержимые факты, свидетельствующие, что общая идея и развитие градостроительной композиции Царицынского ансамбля лично обсуждались В.И. Баженовом с заказчицей, так как сохранились пометки зодчего на графическом изображении плана Третьего Кавалерского корпуса: – «исправить по замечаниям И. В., здание перенести ниже». Результат исправления по замечаниям виден на другом генплане – 1780 г., где Третий Кавалерский корпус смещён: корпус выведен вперед за горизонтальную композиционную ось, проходящей по береговой линии пруда.

На плане 1780 г. следует отметить изменения, уточняется функция объектов, если на генплане 1775 года: – Первый Кавалерский корпус именуется зодчим «Управительским», то в последнем варианте – управительская функция переходит на здание, которое находится между Хлебным домом и императорским дворцом, выполненного по планировочной схеме храма базиликального типа.

На генплане 1780 г. Управительское здание: – небольшое здание, а по конфигурации и объёмной конструктивной структуре соответствует древнему типу базиликального храма. так что композиционные изменения не являются случайными. Как нам стало известно, что В.И. Баженов в Царицынском ансамбле принял градостроительную схему на основе генплана Др. Иерусалима I в. н. э. [Рис. 1].

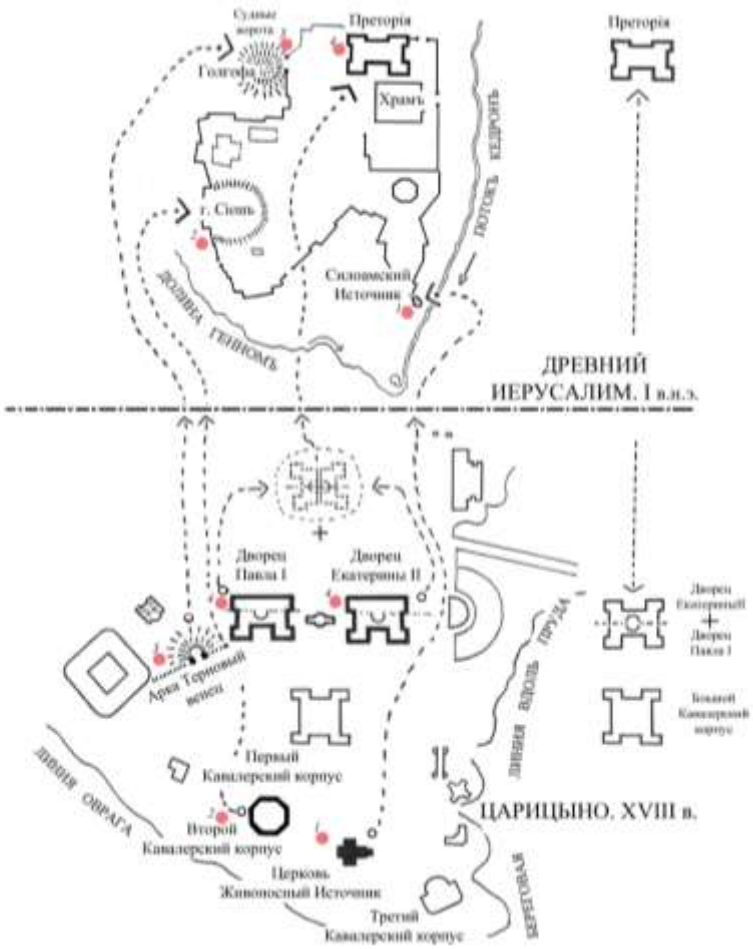

Рис. 1. Топографическая и типологическая идентификация по генпланам Древнего Иерусалима и Царицынского ансамбля

На генплане 1780 г. зодчий фиксирует и зону территории горы Голгофы, она выделена галерей, а, встроенная в галерею Игольчатая арка, символизирует собой Судные ворота Др. Иерусалима I в. н. э., и она выполнена в виде Тернового венца Спасителя. В этой зоне, за галереей зодчим построено здание, характерное для сакральных сооружений базиликального типа, что следует связывать с храмовой символизацией и зарождением христианства. На рассматриваемом генплане Царицынского ансамбля следует выделить основные изменения относительно генплана 1775 г.: – Первый Кавалерский корпус переориентирован на 180 градусов, а на Втором Кавалерском корпусе внутренний двор переорганизуется в круглый зал; между дворцом Павла I и Хлебным домом добавляется галерея с Игольчатой аркой, а также появление регулярного партера за Императорскими дворцами.

Творческий процесс зодчего не завершается на сходстве Царицынского ансамбля генплану Др. Иерусалима I в. н. э., а переводится по христианской тематике на библейский уровень: – осознания градостроительной Вселенской модели – Горнего Града. Таким образом, за время с 1775 г по 1780 г. в формировании Царицынского ансамбля структура градостроительной композиции усложняется, вводятся градостроительные иконографические каноны, которые проявляются в идеализированном Божественном Граде, изложенного в Новом Завете Библии (21 глава).

В развитии творческого процесса проявляется уникальная особенность, заключающаяся в переформировании тематическо-сюжетной концепции в градостроительный мегаполис, состоящий из: – «Древнего Иерусалима», «Горнего Града» и «Российского государства».

На генплане Царицыно 1780 г. архитектора В.И. Баженова в градостроительном пространстве императорской усадьбы Екатерины II проявились общие признаки Божественного Града. Удивительно, что более, чем через двести лет, на современных планах Москвы XXI в. ещё можно было прочесть творческий замысел зодчего, выделить сохранившиеся пограничные следы российского государства [Рис.2].

ТВОРЧЕСКАЯ КОНЦЕПЦИЯ В.И. БАЖЕНОВА

ЦАРИЦЫНО МОДЕЛЬ РОССИЙСКОГО ГОСУДАРСТВА

Территория Царицынского ансамбля содержит символические границы Российского государства. Ареалом обозначен Камчатский полуостров, представляющий характерную часть России

Рис. 2. Современная карта юго-западной части Москвы

На градостроительной схеме районной планировки Орехово-Борисово г. Москвы изображены границы застройки Царицынской усадьбы, соответствующие территории России XVIII в. На ней сохранились дальневосточные топографические черты Камчатского полуострова, а в европейской части российской территории – градостроительные символы иконы всех столичных городов: Первый Кавалерский корпус – Санкт-Петербург в виде носовой кормы корабля, как символ верфи Адмиралтейства, ориентированный на север России, указывающий своим направлением на действительное его место нахождения; Второй Кавалерский корпус –

Москву, изображённый в виде восьмигранной царской короны, в виде пантеона русских князей и первых царей России, расположенного на погосте церкви; Третий Кавалерский корпус – Древний Киев, который олицетворяет зарождение христианства на Руси, выполненный в виде базиликального и византийского типов храма [Рис.3].

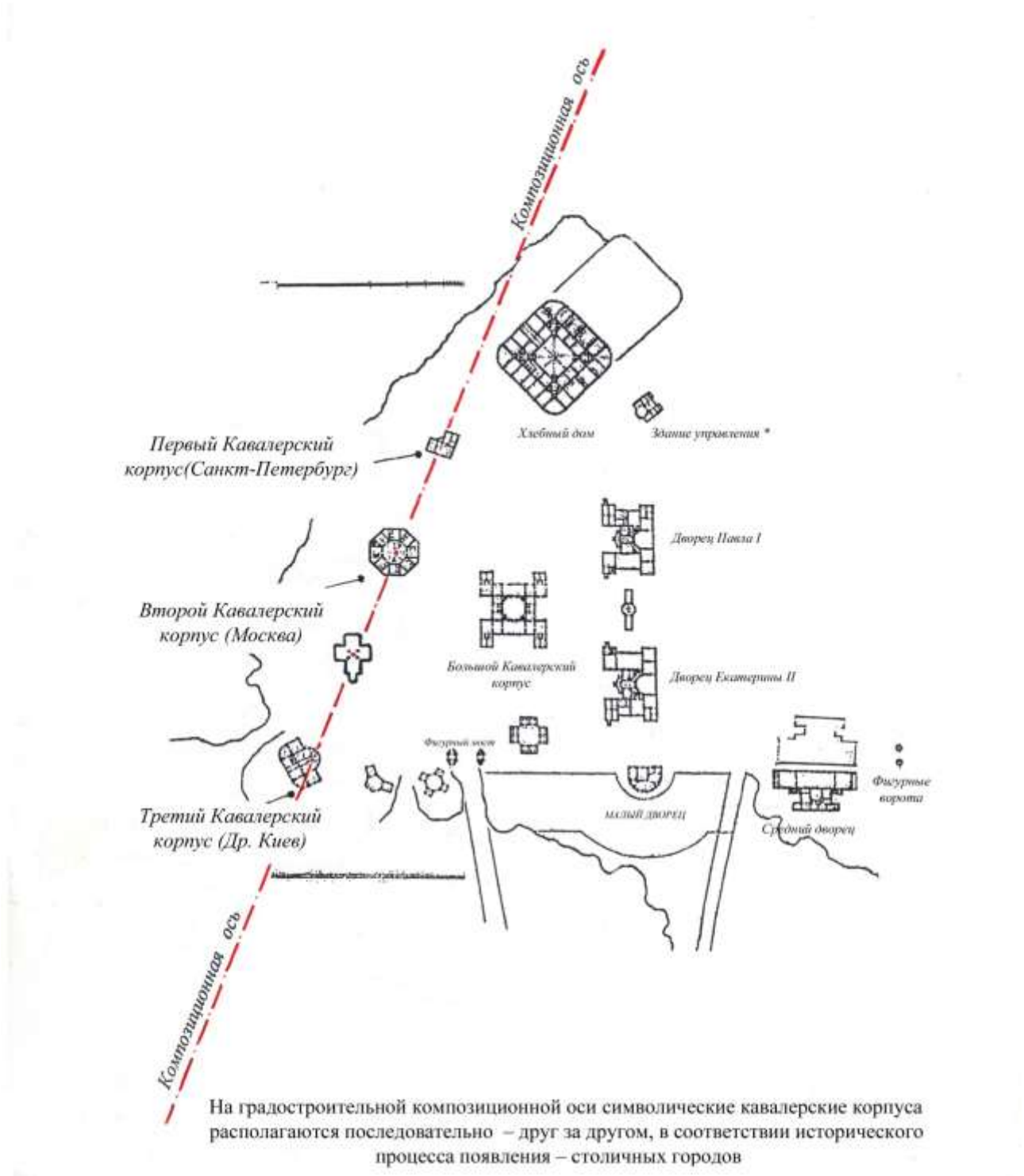

Рис. 3. Генплан Царицынского ансамбля

Градостроительный концепция В.И. Баженова имеет свое развитие в виде мегаполиса образован по плану Древнего Иерусалима I в. н. э., но с введением новых символических знаний и сооружений: Большого моста, соединяющего символически со Вселенной; Фигурного моста, в виде световоздушного храма; Малого дворца, в виде отдельно стоящего алтаря храма; Среднего дворца – иконостаса, основателей государства.

Каноны божественного Горнего Града, изложенные в Библии, реализуются с ведением в градостроительную структуру Царицынского ансамбля корпус Малого дворца – Дворца Солнца,

который расположен на крутом берегу пруда, со сверкающим солнечным диском и имитацией отраженных лучей по крутому склону холма. Дворец Солнца в виде зиккурата (места Бога на земле) в структуре Царицынского ансамбля стал проявлением нового уровня творческой концепции государственного мегаполиса: – Горнего Града [Библия, 21 глава].

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Economic sciences

IMPROVING THE FINANCIAL RESOURCE MANAGEMENT SYSTEM OF ENTERPRISES

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Introduction

In the conditions of the modern economy, effective management of financial resources is a key factor in the stable development of enterprises. Given the global challenges, enterprises are faced with the need to improve the mechanisms for the formation and use of resources, optimize sources of financing and ensure profitability.

Financial resources are the basis of the functioning of any enterprise. Rational management of these resources ensures stability, profitability and competitiveness in a dynamic market environment. It is especially important to optimize financial management in conditions of uncertainty, crisis or post-crisis economic recovery.

Theoretical aspects of financial resource management

Financial resources are funds necessary to ensure the production and investment activities of the enterprise. Their management includes planning, distribution, control and analysis of the effectiveness of the use of funds. The main tasks are to minimize costs, increase profitability, ensure solvency and financial stability.

Financial resources include the totality of the enterprise's funds, which are formed from internal and external sources and are used to support production and economic activities. The main internal sources include profit, depreciation, own savings, and external sources include loans, attracted investments, and share issuance.

Financial resource management involves the formation of a financial policy that takes into account the strategic goals of the enterprise, the level of risk, current financial needs, and market conditions.

The main methods of financial management include: budgeting, financial planning, cost control, investment efficiency analysis, and risk assessment. Tools such as SWOT analysis, financial forecasting methods, and economic and mathematical modeling also play a significant role.

The management system must take into account both internal factors (organizational structure, human resources, internal culture) and external factors (macroeconomic environment, changes in legislation, competition, investment climate).

To achieve effective management of financial resources, enterprises must develop a clear system for controlling their movement, implement management accounting tools, regularly conduct financial analysis, and ensure transparent reporting.

The result of this approach will be increased financial stability, the ability to attract investors, minimizing risks, and ensuring long-term profitability.

In addition to the above, an important role is played by the capital structure, which determines the ratio between own and borrowed funds. A rational ratio reduces financial risks and contributes to the stable functioning of the enterprise. That is why it is worth regularly assessing capital and reviewing financial strategies in accordance with changes in the external environment.

It is also advisable to implement a system of financial motivation for personnel, which would stimulate the achievement of set goals and the effective use of resources. The presence of a transparent bonus system based on financial results contributes to the growth of labor productivity and strengthens financial discipline.

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In today's digital era, it is necessary to implement automated financial management systems that allow for real-time monitoring of indicators, rapid response to deviations from planned values, and information support for management decisions.

No less important is the analysis of the company's cash flows. Liquidity and solvency management allows you to avoid cash gaps, ensures stable payment of current liabilities and contributes to the formation of a positive image among counterparties.

It is also worth noting that the investment attractiveness of an enterprise largely depends on the effectiveness of financial management. Potential investors pay attention to financial stability, development dynamics, and the ability to generate profit.

Modern approaches to financial resource management are based on a combination of strategic vision, analytical tools, and adaptability to change. The flexibility of financial strategy allows enterprises to quickly respond to external challenges and seize new opportunities.

Thus, improving the financial resources management system is a multifaceted process that encompasses both organizational and analytical aspects. Successful implementation of a financial strategy requires teamwork, a high level of financial literacy of personnel, and effective interaction between structural units.

To ensure high efficiency of the financial management system, it is recommended to conduct regular audits, introduce modern management accounting methods, and train personnel in the basics of financial analysis and control.

An effective financial management system not only ensures the economic stability of an enterprise, but also creates the basis for its sustainable development, innovative activity, and strengthening of its market position.

Enterprises that adapt their financial policy to environmental challenges in a timely manner have a higher chance of surviving in crisis conditions and operating successfully in the long term.

In today's globalized environment, enterprises operate in conditions of high uncertainty, which necessitates flexible and adaptive approaches to managing financial resources. Crisis phenomena, growing competition, unstable political situation and disruptions in supply chains force management to look for new ways to ensure financial stability. One of the main tasks is the formation of an effective management system that is able to provide a sufficient level of liquidity, profitability and financial flexibility. Rational financial management allows the enterprise not only to maintain stable operations, but also to ensure growth in the long term. The need to improve financial management is also associated with increased requirements from investors and creditors. They expect transparency, soundness of financial decisions and the ability of the enterprise to respond promptly to changes. Thus, effective management of financial resources is the key to economic security and business development. Managers must have not only basic knowledge of economics, but also modern methods of analysis and forecasting. Systematicity, integration, and dynamism are the features that should characterize a financial management system. Only under such conditions will an enterprise be able not only to survive, but also to become a leader in the market.

The theoretical basis of financial resources management is based on the fundamental concepts of finance, accounting, enterprise economics and strategic management. Understanding the essence of financial resources allows for a reasonable approach to their planning, distribution and use. Modern financial theory pays special attention to determining the optimal level of capital, its structure and value. The formation of financial resources is possible both at the expense of the enterprise's internal reserves and through external financing. Special attention should be paid to assessing the risks that may arise when raising funds from various sources. Financial resources management covers all areas of the enterprise's activity, from production to marketing and personnel management. The theoretical basis is the basis for developing an effective financial policy that takes into account the current market situation and future trends. In the context of sustainable development of the enterprise, theoretical approaches should be supplemented with practical tools for implementing strategies. Thus, theory and practice should be interconnected in order to achieve the highest efficiency in financial management. The use of a systems approach contributes to the integration of financial processes into the overall enterprise management system.

Basic principles of effective management

1. *Strategic planning of resources in accordance with the goals of the enterprise.*
2. *Optimal ratio of equity and debt capital.*
3. *Constant monitoring of financial indicators.*
4. *Involvement of innovative financial analysis tools.*

5. Flexible response to external changes.

The principle of strategic planning involves aligning financial goals with the overall goals of the enterprise. This allows for a long-term focus on development and efficiency. Optimization of the capital structure allows you to reduce the cost of financing and increase profitability. Constant monitoring of financial indicators allows you to quickly respond to changes in the business environment. The use of modern analysis tools, such as ratio estimation, budgeting and forecasting, allows you to more accurately plan future expenses and revenues. Flexibility in financial management means the ability to quickly adapt to changes without losing strategic focus. The principle of transparency is also important, ensuring trust from investors and partners. Financial management should be based on reliable information available to all stakeholders. The principle of efficiency requires achieving maximum results at minimal costs. All these principles should be implemented in a unified corporate management system of the enterprise.

Conclusions

Increasing the efficiency of financial resource management is possible with a comprehensive approach that takes into account both internal and external factors of influence. Creating an effective management system ensures sustainable development of the enterprise, increases its competitiveness and investment attractiveness.

Summarizing the above, it can be stated that financial resource management is a complex system that requires a professional approach. Complexity consists in taking into account many interrelated factors of an internal and external nature. Effective management contributes to achieving the strategic goals of the enterprise, increasing its value and ensuring financial security. A rational approach to planning, controlling and analyzing financial flows allows you to avoid a shortage of funds. In addition, the level of trust from banks, investors and partners increases. The implementation of modern financial management information systems ensures efficiency and accuracy of decision-making. Thus, enterprises should focus on improving the qualifications of financial managers. Successful companies today are already actively investing in the development of financial literacy of personnel. This allows you to form an internal culture of effective use of resources. In the future, only those enterprises that can effectively manage their finances will be able to achieve sustainable competitive advantages.

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Geological and mineralogical sciences

PROSPECTS FOR THE DISCOVERY AND STUDY OF JADE AT THE DZHETYGARIN DEPOSIT

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Abstract

This article discusses the prospects for the discovery and study of nephrite at a deposit associated with the development of a chrysotile asbestos deposit. Special attention is paid to the geological, structural and mineralogical conditions conducive to the formation of nephrites in association with serpentinite and ultrabasic rocks typical of the zones of development of asbestos deposits. The Zhetygarinsk nephrite deposit is located in the southern Urals, within the Zhitikara District of the Kostanay Region, approximately 5 km southeast of the district center, the town of Zhitikara. It lies within the overburden rocks of the active asbestos quarry at the Zhetygara deposit. The development of the mining industry in this region is primarily driven by the exploitation of the asbestos deposit, which is the basis for the operations of JSC "Kostanay Minerals." In addition to asbestos, varieties of other mineral resources are widespread in the area. Numerous deposits and occurrences of gold, cobalt-nickel ores, yttrium, rare earth elements, talc, kaolin, and other minerals have been identified. Some of these deposits have already been explored, and resource assessments have been conducted for several of them. Currently, exploration activities have resumed in the region for deposits of gold, rare earth metals, kaolin, and construction materials.

Keywords: *chrysotile asbestos, nephrite, mining industry*

The nephrite deposit is located in the southern part of the ultramafic massif of the same name, within the quarry of the chrysotile-asbestos. Chrysotile and chrysotile-lizardite serpentinites are located in the central part of the quarry, between a peridotite core to the west and diorite porphyry and granite porphyry dikes to the east. The Zhetygarinsk nephrite deposit is confined to a mélange zone within the Eastern Fault Zone. This fault zone coincides with the Zhetygarinsk deep fault and represents the contact between ultramafic rocks of the Pritobol-Akkargin Complex (Silurian–Early Devonian age) and schists, conglomerates, marls, and limestones of the Alekseevskaya Formation (Upper Proterozoic). The fault zone is marked by a series of diorite porphyry and less commonly by plagiogranite porphyry intrusions into the serpentinite mélange. These dikes dip eastward at angles ranging from 35° to 75°. Diorite porphyries are macroscopically dark gray to gray with a porphyritic texture. Their mineral composition includes: plagioclase (28–62%), hornblende (9–23%), quartz (1–12%), biotite (1–6%), accessory minerals (up to 2%), and groundmass (34–51%). Plagiogranite-porphyries exhibit light gray to pinkish-gray coloration and are composed mainly of plagioclase (21–30%) and quartz (19–24%). Minor components include biotite (1.5–5.5%), microcline-perthite (1.5–3.0%), and accessory minerals (trace amounts), with the groundmass making up approximately 50%. These plagiogranite dikes are classified as late-stage intrusions of the Milyutino Complex, dated to the Lower–Middle Carboniferous, and are mainly developed outside the nephrite deposit area. Nephrite occurrences and lenses are closely associated with the diorite porphyry dikes, which are dated to the Late Paleozoic and, with a degree of conditionality, can be attributed to the roadside Late Carboniferous–Permian dike complex. The nephrites of the Zhetygarinsk deposit were formed through contact metasomatism and are genetically associated with quartz diorite porphyry bodies of Late Carboniferous or possibly Early Permian age. Due to the complexity of their geological structure, they are classified as the first geological-industrial type. The intrusion of these bodies likely occurred during a post-orogenic stage in the early development of new rift structures, as indicated by their subalkaline composition and tectonic position. Based on their composition, these bodies underwent intense post-magmatic high-temperature (600–700°C) metasomatism, essentially similar to skarn formation. As a result of calcium metasomatism, the diorite porphyries were partially, and in some places completely, rodingitized—transformed into grossular-diopside rocks containing vesuvianite. With decreasing temperature, calcium influx in the rodingitized diorite-porphyries is recorded in the form of

prehnite and calcite veins. During rodingitization, excess calcium, silica, and fluorine were leached from the substrate. These elements were subsequently deposited via infiltration-diffusion metasomatism in the exocontact zones of the quartz diorites, altering the surrounding serpentinites into nephrites of actinolite-tremolite composition. A characteristic feature is the presence of nemalite in the marginal zones of the nephrite bodies, indicating magnesium release from serpentinites during intense calcium metasomatism. The thickness of the contact metasomatic zone was relatively small—ranging from 0.1–0.2 meters in linear contact sections to 5.0–6.0 meters in folded zones. Beyond this zone, the contact processes were limited to thermal metamorphism of the serpentinites, which led to the development of extensive talc alteration zones (up to 100–150 m), and possibly listvenitization as well. Later tectonic movements, most strongly expressed along the contacts between dikes and talc-altered serpentinites, resulted in the intense schistosity of the latter and the formation of boudin-like structures in the denser, more rigid nephrite rocks. It is evident that the intrusion of the dikes and the formation of nephrite are later events than asbestos mineralization. The asbestos formation took place earlier, in the oceanic stage of crust development—before orogeny—approximately contemporaneous with the emplacement of the ultramafic rocks themselves. The intrusion of the diorite porphyry bodies, accompanied by intense contact thermal metamorphism, either destroyed existing asbestos mineralization or resulted in the formation of brittle, long asbestos fibers. The serpentinites underwent talc alteration and listvenitization. These processes ultimately led to the spatial separation of asbestos ores and nephrite occurrences observed at the deposit. Based on the above, the following exploration criteria for detecting nephrite in the region can be outlined:

- *Presence of ultramafic rocks along deep fault zones (suture lines) and serpentinite mélange;*
- *Occurrence of rodingitized diorite-porphyry dikes within serpentinites;*
- *Presence and manifestation of talc-altered serpentinites;*
- *Spatial separation of exploration areas from known asbestos occurrences.*

Within the Zhetygarinsk ultramafic massif, in addition to the currently operating quarry, nephrite may also be found on the western flank of the quarry along a deep fault that separates the small and large peridotite cores, where diorite-porphyry bodies have been mapped. Nephrite presence is also possible in the northern part of the massif, north of the Shortandy River, where serpentinites are talc-altered and intersected by linear diorite-porphyry bodies. Nephrite may also occur in other ultramafic massifs associated with the Zhetygarinsk deep fault—such as the Akkargin and Milyutin massifs—where disintegrated diorite-porphyry dikes have been found. Additionally, potential exists within ultramafic rocks in the zone of the Tobol deep fault. Notably, the first nephrite discovered within the Zhetygarinsk ore field was found in the Akkargin massif.

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Pedagogical sciences

THE SECONDARY GENERAL SCHOOL AS AN IMPORTANT SOCIAL INSTITUTION OF SOCIETY IN FORMING OF SOCIAL MATURITY OF TEENAGERS

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СРЕДНЯЯ ОБРАЗОВАТЕЛЬНАЯ ШКОЛА КАК ВАЖНЫЙ СОЦИАЛЬНЫЙ ИНСТИТУТ ОБЩЕСТВА В ФОРМИРОВАНИИ СОЦИАЛЬНОЙ ЗРЕЛОСТИ ПОДРОСТКОВ

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Abstract

The given article is dedicated to one of an actual problem of pedagogues – to forming of social maturity of teenagers. In the article is analyzed a role of the secondary general school in this process. An article examines opportunities of secondary school as an important social institution of society the process of forming of social maturity of teenagers. In the article is talking that in process of forming of social maturity of teenagers an important role plays a high level of professional training of pedagogical collective of school. An article gives necessary recommendations to improve of process of forming of social maturity of teenagers.

Аннотация

В статье рассматриваются вопросы формирования социальной зрелости подростков. Особое внимание уделяется важной роли таких социальных институтов, как средняя общеобразовательная школа. Подчеркивается, что высокий профессиональный уровень педагогического коллектива оказывает значительное влияние на развитие социальной зрелости учащихся. Анализируется сущность данного феномена, а также предлагаются рекомендации, направленные на повышение эффективности деятельности школы в этом направлении.

Keywords: *teenagers, social maturity, secondary general school, professional training, social institutions of society, social activity of teenagers*

Ключевые слова: *подростки, социальная зрелость, общеобразовательная школа, профессиональная подготовка, социальные институты общества, социальная активность подростков.*

В работе по формированию социальной зрелости подростков с высоким уровнем развития духовно-интеллектуального потенциала задействованы практически все социальные институтов общества. Именно от их слаженной работы, консолидации воспитательно-формирующего потенциала зависит позитивное решение поставленных обществом задач в области наиболее полной и эффективной социализации молодого подрастающего поколения. В нашей работе мы будем рассматривать вопросы социализации молодых людей подросткового возраста. Тому есть веские причины – именно подростковая молодёжь выступает активным авангардом всего молодёжного движения страны, неся в себе огромный потенциал конструктивно-созидающей силы, так необходимой в дальнейшем развитии демократического общества. Среди всех социальных институтов общества, проводящих работу с подростками, средняя общеобразовательная школа занимает особое место. «Средняя школа является первой организованной средой воздействующей на молодых людей в различных областях учебно-воспитательной работы» (3, 17). Конечно же, и такой важный социальный институт общества, как семья тоже играет огромную роль в вопросах воспитания и формирования личности. Все первичные навыки, определённый духовно-интеллектуальный потенциал

молодых людей, их социальная позиция, выступая важным фундаментом дальнейшего личностно-социального самоопределения личности, закладывается именно в семье. Однако, следует особо подчеркнуть, не всякая семья располагает научными знаниями, большим социальным и педагогическим опытом, чтобы процесс формирования социальной зрелости детей проходил в любой ситуации однозначно успешно. Вот именно такой взгляд на огромный потенциал образовательного учреждения способствует тому, чтобы можно было смело утверждать, что сама специфика работы средней школы не похожа на хаотичность применяемых в семейном воспитании различных моделей воспитательно-формирующих воздействий. Педагогический коллектив средней школы, укомплектованный специалистами педагогического, психологического и социального труда, способствует формированию той самой внутренней позитивной обстановки, которая в высшей степени эффективности воздействует на сознание и модель поведения подростков. Работающий в средней школе различные кружки, объединения по интересам, проводимая учителями-предметниками дополнительная работа, охватывающая широкий круг личностно-социальных интересов подростков, и проводимая на достаточно высоком эмоциональном уровне, пробуждает у подростков большой интерес не только к учебной деятельности, но также и к общественной деятельности средней школы.

Весь огромный потенциал средней школы максимально тесно согласован с социальными процессами, происходящими в обществе на различных этапах его развития. Сам характер учебно-воспитательной работы способствует тому, что учащиеся практически всех возрастных групп, в той или иной степени активности задействованы в социальных процессах общества. Такое постоянное участие молодых людей в различных вопросах общества, очень благотворно действует на них и способствует дальнейшей детализации молодых людей своей социальной позиции в обществе. Практика показывает, что такая тесная работа средней школы с социальными институтами общества, даёт прекрасный результат. Такое явление как девиантное поведение, делинквентная модель практической деятельности практически сводится к нулю и помогают подросткам в их дальнейшей эффективной личностно-социальный самореализации. Вопросы формирования социальной зрелости подростков, их эффективное разрешение зависит, в первую очередь, от социально-психологической атмосферы учебного заведения, помноженное на высокий профессиональный уровень подготовки всего педагогического коллектива. Если проводимая в школе учебно-воспитательная работа целенаправленно воздействует на сознание учащихся, одновременно формируя у них алгоритм социально позитивного ориентированного поведения, то можно сказать, что такой средней школе по плечу самые высокие требования со стороны общества, которые будут не на высоком профессиональном уровне реализованы в среде ученического коллектива. Нельзя не отметить роль семьи, школьного психолога, которые оказывают содействие в данном вопросе, так как своевременное выявление негативного эмоционального состояния, взаимоотношения в коллективе является важным фактором, влияющим на формировании социальной зрелости подростков (1).

Следует особо заметить, что даже такой огромный потенциал педагогической работы средней школы может испытывать определенные трудности, если получаемые учащимися знания, не находят своего практического применения в различных трудовых коллективах страны. «Одна внеклассная работа, даже если она будет прекрасно организована, не в полной мере может удовлетворить широкие запросы учащихся-подростков, исходящие из круга их личностно-социальных интересов» (6, 29). Было бы очень хорошо если учащиеся-подростки могли применять свои знания на посильных работах различных трудовых объединений. К примеру, полученные подростками научные знания в области физики, химии могли бы иметь своё практическое продолжение в научных лабораториях различных вузов, в организациях, занимающихся сбором статистической информации, в редакциях различных СМИ, жилищно-коммунальных конторах по месту жительства. Почему это так важно, потому что социальная зрелость молодых людей эффективно формируется исключительно в ситуации, когда теоретические знания находят своё практическое продолжение в жизни. Такая система работы однозначно вызывает у учащихся-подростков высокий дух энтузиазма, своей нужности обществу, молодые люди испытывают гордость, что и они, являясь ещё практически школьниками, вносят свою лепту в дело развития страны. Педагогический коллектив средней школы, особенно её руководство должно всегда помнить об этом и заключать договора с

различными организациями, чтобы учащиеся-подростки всегда имели какую-то перспективную базу применение своего духовно интеллектуального потенциала.

Вопросы формирования социальной зрелости подростков нашли своё отражение в научных трудах учёных-исследователей и практических работников высокого уровня профессиональной подготовки (И.А. Донцов, Г.Г. Дилигенский, А.В. Зосимовский, А.В. Лутошкин, В.М. Соколов, И.Т. Фролов, В.Н. Шульгин, Т.Н. Мальковская, А.Г. Громцева, Л.И. Новикова и др.). В работах вышеперечисленных авторов однозначно утверждаются, что какой-бы высокий уровень учебного труда им просматривался бы в деятельности средней школы, обязательным элементом организации эффективного процесса формирования социальной зрелости подростков будет выступать их разносторонняя социальная работа. «Некоторые пилотные средние школы задействуют учащихся-подростков в различных формах социальной работы по месту жительства» (7, 33). К примеру, активное участие и посильная помощь Совету Ветеранов по месту жительства, участие в различных волонтёрских проектах, предполагаемых исполнительными комитетами района, оказание помощи педагога и воспитателям и т. д.

При подготовке этой статье мы проводили многочисленные беседы с учащимся-подростками и учителями средней школы по вопросам социальной зрелости молодых людей, задавали им различные вопросы, чтобы понять как вообще с их стороны (педагогического коллектива) организуется процесс формирования социальной зрелости подростков. Ответы, полученные на наши вопросы, показали, что несмотря на имеющиеся серьёзные успехи в этом деле, ставить окончательную точку в этих вопросах было бы явно преждевременным. К примеру, подростки представляли себе феномен социальной зрелости исключительно только как участие в различных мероприятиях, организованных школой. Прослеживался такой аспект в ответах подростков: «Если я принимаю участие в мероприятиях школы, то я могу считаться социально зрелым человеком». Конечно, определённая доля истины в таком ответе есть, но как мы видим, налицо явно узкая осведомлённость молодых людей о сущности социальной зрелости вообще. Ответы, полученные нами от учителей средней школы, также продемонстрировали то, что не все учителя в полной мере понимают сущность феномена социальной зрелости. К примеру, некоторые учителя ответили таким образом: «Если подростки не являются носителями девиантного поведения, то их уже можно считать социально зрелым, вполне оформившимся социально молодыми людьми. В этом случае мы вынуждены повториться, конечно же, определённая истина в таком рассуждении имеется, однако оно совершенно не в полной мере определяет сущность феномена социальной зрелости. Справедливости ради, мы должны отметить, что такие ответы были получены со стороны практикантов школы и со стороны молодых специалистов, которые только влились педагогический коллектив школы. Среди явных недоработок педагогического коллектива средней школы в работе по формированию социальной зрелости подростков, выступает то, что участие этих молодых людей в различных формах социальной работы осуществляется очень часто принудительными методами. Это совершенно недопустимо и если при этом говорить молодым людям, что различные мероприятия и кое-какие участия в их работе и подготовке даже организованное против их воли в дальнейшем позволит считать их молодыми людьми весьма высокого уровня социальной зрелости. Такой факт имеет место в жизни многих учебных заведений и ставит проблему формирования социализации подростков в весьма невыгодное положение. На наш вопрос учителям «Почему такое происходит, Ваши ученики, особенно подросткового возраста, стараются не принимать участие в школьных мероприятиях, если и принимают какое-либо участие, то только лишь для формальности, чтобы не быть объектом осуждения со стороны учителей и руководство школы». Ответ, полученные нами, несколько удивили нас и еще раз убедили нас, что работа среди учителей средней школы по систематическому совершенствованию уровня их профессиональной подготовки должно проходить на более высоком организаторском уровне. Нас удивил такой ответ: «Современные подростки вообще ничем не интересуются и мероприятия, организованные школой для них, часто становятся просто ненужной тратой времени. Следует заметить, что интерес, который должно вызывать какое-либо школьные мероприятие, должно, прежде всего, исходить из личностно-социального интереса весьма широкого круга учащихся» (5, 47). Если мероприятие организовано средней школой только лишь ради отчётности вышестоящих органов, то никакой пользы от таких мероприятий нет и быть не может. В беседах с представителями педагогического коллектива средней школы, комментируя такую сложившуюся ситуацию с посещением

школьных мероприятий, мы попытались убедить учителей (и нам это удалось) что такое пассивное посещение мероприятий подростками не является их виной, а прежде всего выступает как система педагогических, психологических, социальных недоработок со стороны именно учительского состава. Если мероприятие организовано на профессиональном уровне и очень интересны подросткам, то они будут очень активно посещать их. Мы считаем, что такой большой погрешностью в работе учителей средней школы выступает то, что они думают, что феномен социальной зрелости подростков будет формироваться исключительно только лишь в процессе подготовки и проведения каких-то школьных мероприятий. Это очень и очень узкий подход к сущности понятия «социальная зрелость». Социальная зрелость личности проявляется не только лишь участием в каких-либо мероприятиях, социальная зрелость личности проявляет себя в многоаспектных фактах реальной жизни. Разве можно считать подростка, активно помогающего по хозяйству ветерану войск и труда (без напоминания ему об этом школой) человеком, который должен восприниматься обществом как личность недостаточно социально зрелая. Наоборот, такая деятельность со стороны подростков должна только лишь приветствоваться, высоко оцениваться со стороны общества и способствовать тому, чтобы такие факты проявления социальной зрелости молодых людей не были бы единичными случаями и превратились бы целенаправленную систему.

Иногда можно встретиться с такими откровенно непонятными фактами работы средней школы, когда учителя искусственным образом запрещают учащимся-подросткам интересоваться каким-либо материалом СМИ, аргументируя это тем, что этот материал негативно может повлиять на него. Конечно, разговор идёт о материалах, которые пропагандируют садизм, жестокость, половую распущенность, терроризм, конформистский образ жизни и т. д. Здесь с учителем средней школы можно согласиться и то с небольшой оговоркой. «Одними запретами социальную зрелость личности сформировать невозможно» (2, 48). Другое дело, как же была организована работа педагогического коллектива школы, на каком-таком низком уровне, если учащиеся-подростки совершенно не умеют анализировать события и очень легко попадают под влияние информации негативной направленности. Социальная зрелость личности как раз-таки и заключается в том, что несмотря на определённые материалы СМИ негативного характера, их уровень развития социальной зрелости и самовыражения позволит им очень легко избежать деструктивного влияния какого-либо блока информация на себя. Достигнутый и воочию наблюдаемый уровень социальной зрелости личности предполагает, что она, это личность, в течение жизни будет встречаться с многочисленными фактами и негативного, и позитивного характера и в этом случае выберет исключительно верное решение.

В процессе своей профессиональной педагогической деятельности мы встречались также с таким неоднозначным отношением учителей средней школы к таким фактам, как позиционирование себя как нейтральной личности в социальных процессах по месту жительства. Есть группа молодых учителей (особенно осторожных), которые учат своих воспитанников тому, что если они видят какой-либо вопиющий факт нарушения этических норм со стороны других людей, то проявление их социальной зрелости будет подтверждаться тем, что они вообще не будут зацикливаться на этом событии, пройдут мимо и избегут каких-либо ответных физических действий. Достаточно неверная, на наш взгляд, позиция молодых учителей, которые, по сути, извращает сущность феномена социальной зрелости. О какой социальной зрелости личности можно говорить, если на его глазах группа хулиганов отбирает пенсию у пожилого человека, а он совершенно не реагирует на этот факт и считает его просто не своим делом. Если такой факт имеет место, и подросток средней школы не вмешивается в это, то это в высшей степени не сформировавшаяся личность с большими проблемами в области воспитания. И, конечно же, говорить о каком-либо позитивном уровне его социальной зрелости было бы в высшей степени заблуждением. Иногда можно в средней школе встретиться и с таким неверным утверждением учителей, к примеру классного руководителя, который настраивает своих учащихся на то, что если сами хотят, чтобы их класс всегда в школе был на примерном счету, то нельзя делать и тем более распространять по школе различные факты девиантного поведения своих одноклассников. К примеру, в классе пропадает деньги и какие-либо личные вещи, то ни в коем случае нельзя говорить об этом открыто, чтобы вся школа тебя осуждала. И если подросток, видя такую ситуацию, продолжает делать вид, что в классе все благоприятно, потому что классный руководитель так велел, такой подросток становится где-то пассивным соучастником такого девиантного процесса. Не

афишируя такое положение и думая, что в этом случае он соблюдает интересы классного коллектива и этим самым проявляют уровень своей социальной зрелости, то это очень большая ошибка. Соответственно, классный руководитель, который таким образом формируют личность своих учащихся и всячески содействуют обретению ими позитивного уровня социальной зрелости, должен серьёзным образом задуматься о дальнейшем занятии педагогической деятельности. Если такие факты вовремя не пресекать, то сущность понятия «социальная зрелость подростков» будет автоматически извращена и вместо социально активной личности с правильно ориентированной социальной позицией молодых людей, к большому сожалению, можно быть свидетелем определённого количества конформистски ориентированных личностей.

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Philological sciences

RECENT TRENDS IN THE CONSONANT INVENTORY OF MODERN ENGLISH

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Abstract

İn the articulation of consonants an obstruction is formed by the active and passive organs of speech. Phonetically, they are divided into types according to the vibration of the vocal cords (voiced, voiceless), the active member and the way of pronunciation.

There are no special differences in the pronunciation of individual consonants in traditional pronunciation and literary pronunciation norms. Consonants, the twenty-four phoneme inventory remains the same. This is one of the characteristic features of consonant sounds in many languages. Three issues stand out as distinguishing traditional phonology from modern trends in English pronunciation: glottalization, merging or dropping of the conjunctive intrusive /r/ and /j/-.

Keywords: *glottalization, intrusive, elision, communication, labialized, linking.*

Introduction.

In the last few years, a new trend /t/-glottalization, which includes non-standard features, is spreading among young people who speak according to the norm of literary pronunciation. Glottalization is the complete or partial closure of the glottis (the passage between the vocal cords) during pronunciation. When a plosive is completely replaced by a glottal stop, such as it was /iʔ wəz/ and butter /'bʌʔə/, this is called glottal substitution. Thus, /t/-glottalization is the plosive /ʔ/ pronunciation of the consonant /t/. The glottal stop is not a new variant, it has been used in various British dialects for a long time, but for many years this consonant was considered "lazy".

It was believed that its influence came from the Cockney dialect and should not interfere with the norm of literary pronunciation. Later this stereotype was considered wrong. Today, the use of the glottal stop is widespread. It is important to mention one fact that the glottal displacement was already noted by D. Jones in the 1920s. He showed that this fashion will be popular in the next century and everyone will pronounce certain words with an explosion in the larynx. According to D. Jones, when the glottal stop is pronounced, the glottis, which connects the vocal cords, is completely closed, compressed by the air pressure from the lungs, then the glottis opens and the air suddenly escapes. It is neither voiceless nor voiced, but if the voiceless plosive is realized and the glottal stop is pronounced at the same time, it is called front glottalization, eg /mæʔtrəs/.

Such a question arises: "Where is the source of glottalization?" Although there is no general agreement among linguists, three areas are considered its source: East Anglia, Glasgow and London. According to P.Tradgil, the main center of glottalization in modern English is East England[7, p. 132].. P. Tradgil believes that /t/-glottalization in southern British dialects and the Cockney dialect is due to the influence of the Scottish dialect. J. Mair goes further and shows that the source of the glottal stop is Glasgow. London and Cockney English is considered another geographical source of the spread of final /t/-glottalization[5, p. 34]. P. Tradgil explains his opinion as follows: intervocal and word-ending /t/ is the fastest and most widespread change of British English in recent times[1, p. 293]..

D. Jones's opinion is confirmed by J. Wells, who shows that some forms of glottalization are not considered as Cockney dialect, for example, bottle /bɒʔl/, but there are pronunciation forms where glottalization is inevitable. For example, quite good /kwaiʔgʊd/, quite likely /kwaiʔlaikli/, curtsey /kɜ:ʔsi/ or quite easy /kwaiʔi:zi/. Two years later, he also accepts that the intervocalic glottal stop (/ʔ/) replacing /t/ belongs to a certain class or area. Forms like bitter /biʔə/ are not geographically limited to London[9, p. 261]..

Glottalization of word endings before a vowel, eg take i/ʔ/ away, noʃʔ| interested can be heard in all social classes, both in the north and in the south. He claims that /t/-glottalization before a consonant (both in the middle and at the end of a word) is a characteristic feature of the literary pronunciation

norm. He also goes further and says that young people use the glottal stop in positions before a vowel at the end of the word.

According to A. Crutenden, young people replace /t/ with a glottal stop when the word starts with a consonant sound at the end of the word. For example, that table /ðəʔ ˈteɪbl/, get down /gɛʔ daʊn

S. Ramzaran also notes that /ʔ/, which replaces the phoneme /t/ before consonants, is used not only before noisy sounds, but also before sonorous ones. For example, fruit yoghurt /fruːʔ jɒget/, what now? /wɒʔ naʊ/[6, p. 34]..

The unpronounceable form of /j/ is /ˈtuːn, ˈduːn, əˈsuːm, prɪˈzuːm/ or softened /ʧuːn, ʤuːn, əʃuːm, prɪˈʒuːm/. This phenomenon is usually called iodization or iodization in linguistics. The realization of /j/ depends on the phonetic environment, the lexical unit itself and the variety of the English language.

Dropping (elision) of /j/ and merging of /j/ is a continuation of the historical process and results in linguistic change. /j/ began to drop after mediolingual consonants (including palatal-alveolar), as well as /r/ and /l/. For example, chew /ʧuː/, juice /ʤuːs/, rude /ruːd/, crew /kruː/, blue /bluː/, flue /fluː/. Apparently, the main reason was the strange pronunciation of /j/. This event was early in the falling of /j/. Thus, /j/ is preceded by palatal consonants, as well as /r/ and /l/, and when /u/ is followed by this consonant is dropped.

Many modern English dialects have undergone early /j/ dropping. The phenomenon of recent /j/-dropping is attributed to the American innovation and occurs in words such as tune /tuːn/, student /ˈstuːdənt/, dune /ˈduːn/, new /ˈnuː/, numerous /ˈnuːмəres/, enthusiasm /ɪnˈθuːziazəm/, suit /suːt/, presume /prɪˈzuːm/, lewd /luːd/, allude /əˈluːd/ gives, however, /j/ is not elisioned after consonants /f, v/ with lip, dilarx and groove. For example, beauty /ˈbjuːtɪ/, cute /ˈkjuːt/, few /ˈfjuː/, view /ˈvjuː/ . We come to the conclusion that /j/ falls after consonants /t, d, s, z, r, l/.

A number of dialects show differences, including the literary pronunciation norm. A. Krutunden shows that absolutely, lute, salute, revolution, enthusiasm, pursuit, assume, suit, suitable, superstition, supermarket, consume, presume, etc. both /uː/ and /juː/ are heard in sounds like The variant /juː/ is predominant after the consonants /θ, z/. Since it belongs to different dialects, this event is considered a variant elision event of /j/.

In addition, elision of /j/ can occur before all consonants.

Conjugation of /j/ in the sequence of /tju/ and /dju/ – during the combination of /j/, the sound /j/ which is filtered (di-middle) merges with the sounds /t, d/ that precede it, and as a result, the affricates /ʧ, ʤ/ are formed. For example, gradually /ˈgradjʊli/→/graʤʊli/. This phenomenon is called coalescence. Assimilation is the similar or identical pronunciation of sounds as a result of the influence of one sound on another.

Coalition is the interaction of sounds and becoming one element. This phenomenon is sometimes called palatalization, but this term is somewhat incorrect, since only the first consonant, the alveolar consonant, becomes palatal. The constrictive medial /j/ is already a palatal consonant and its pronunciation does not change towards the hard palate. On the other hand, the pronunciation of forelingual /t/ and /d/ is pronounced with the tongue relatively pulled back.

The words Nature /ˈneɪʧə/ and actually /ˈæktʃʊəli/ were also subjected to the /j/ combination event and were considered a novelty at the time. In his article, J. Wells takes a diachronic approach to this event and defines 3 stages.

J. Wells believes that the English have long tended to change /tj/→/ʧ/, /dj/→/ʤ/, for example, as in the word nature. [10, p. 19].

Softening (palatalization) of /j/ in the sequence /sju/ and /zju/ – /j/ form /ˈɪsjuː, əˈsjuːm/ in the words issue and assume is more conservative and traditional. This feature, considered typical for unstressed syllables, is a novelty for stressed syllables. In this process, the phonemes /s/-/j/ and /z/-/j/ blend, resulting in the segments /ʃ/ and /ʒ/. Softening of /j/ is more common among young people. For example /ˈʃu/ (unstressed case), assume, presume /əʃuːm, prɪˈʒuːm/ (stressed case). J. Wells, in his dictionary, does not consider it a standard pronunciation and writes that English language learners should not use this form.

. Thus,in British English, phoneme combinations in the sequence /tju, dju/ are more common. The combination of /sju, zju/ or softening of the consonant occurs very rarely. It is possible that /j/ will affect stressed syllables as well, and /sju, zju/ will eventually affect stressed syllables, but this form may not be widespread as /j/ dropping occurs on stressed syllables in British English.

Softening is also rare in American English. The most common form is the dropping of /j/, which almost always occurs in North America. Considering other English-speaking countries, the softening of /sju, zju/ is not as widespread as the combination of /dju, dju/. P. Tradgil and J. Hannah show that this is especially noticeable in the Australian version.

In fact, the main disappearing sound in the mentioned cases is /j/, which tends to be either dropped or softened. Both events are based on the principle of saving. The tendency to this principle is the fundamental basis of language change: all languages wear out over the years. Assimilation is also based on the principle of economy and is a result of the tendency of people to articulate. This is also called simplified articulation. Thus /j/ is pronounced as a simple segment after variation. In the case of softening, the sound is simplified according to the place and method of production. Thus, two articulation positions in /tj/ move to one position /ʧ/, and according to the method of formation, a segmental affricate /ʧ/ is pronounced with an explosive /t/ and a mediolingual /j/.

Thus, the disappearance of /j/ in the sequence /tju, dju, sju, zju/ has developed in unstressed syllables and is developing in stressed syllables. This process is a continuation of the historical event. If the process continues like this, /j/ will almost completely disappear in this position. The reason for this is the emergence of lexical diffusions and the phonological principle covering less frequently used words. Another reason is the principle of communication between languages and varieties[8, p. 24].. As D. Crystal showed, a new era in the development of the English language begins with its globalization[3, p.12]. Undoubtedly, globalization does not bypass the pronunciation of the English language.

In the act of speaking, the pronunciation of each word undergoes a change due to the influence of neighboring phonemes. Conjunctions are used to bridge the gap between two words during pronunciation. During this process, the connecting sound removes the pause and makes the pronunciation easier. Variants of the English language can be divided into two large groups in terms of the processing of the /r/ phoneme: rhotic and non-rhotic variants. In rhotic varieties, such as American and Scottish, /r/ is always pronounced regardless of its position in the syllable.

For example, red /ɹɛd/, bar /bɑːɹ/, barn /bɑːɹn/. In non-rhotic variants, for example, it has historically disappeared in the accepted pronunciation norm. For example, bar /bɑː/, barn /bɑːn/, can only be heard at the end of a word and before a word that begins with a vowel (a bar in London /ə 'baː(ɹ) in 'lʌndən/ linguists call this phenomenon the connective-/r/.

In general, the connective -r has been one of the most prominent means of linking and has always been in the focus of linguistics. As we mentioned, this phenomenon occurs only in non-rhotic dialects (literary pronunciation norm, estuary English dialect, dialects of Norfolk, Yorkshire, etc.) and not in rhotic dialects (American dialects, Scots and Irish and a few other British dialects). The process of emergence of /r/ in intervocalic position led to the emergence of two systematically similar, but historically and orthographically (diachronically) different phenomena: connective-r and intrusive-r.

D. Counz studied the pronunciation of /r/ extensively and observed its pronunciation in non-r words /idea of /ɑɪdɪə (r) əv /. His attitude towards the non-etymological connecting segment was formed throughout his career. At first, he identified himself with the great majority who did not pronounce the intrusive r and considered it a feature of London speech. Later, the author himself used intrusive r and noted that there are very few people who do not use it[4, p. 196]..

The fact that the linking r is common, the intrusive /r/ is free in postword position is denied by some phonologists. According to them, whoever avoids the intrusive r and tries to use the conjunctive r sparingly does not understand the difference between them. Linguists believe that intrusive /r/ is a more innovative variant that arose in word-final position. Thus, A.Hugh, P.Tradgill believe that intrusiveness is involuntarily so widespread in Southern England that if someone does not use it, especially after vowels /ə/ and /ɪə/, they are probably not native speakers.

The authors also point out that many native speakers do not pronounce the intrusive /r/ at the lexical level, for example drawing /drɔː(ɹ)ɪŋ/. Similarly, J. Wells notes in his research that the post-word intervention is active in non-existent variants of /r/. Intrusiveness is productive and also applies to words from foreign languages. For example, viva /ɹ/ Espana. Intrusive /r/- is pronounced after schwa sounds, tomato and /təmɑːtəɹəʊ/, lexical form tomato /tə'mɑːtəʊ/. J. Wells claims that sandhi /r/ is used in the same way in accepted pronunciation norms and other non-rhotic accents[3, p.12].

The intrusive /r/, despite its negation, is very widespread and dominates the accepted pronunciation norm. In addition, sociolinguistic and stylistic factors in the processing of binding and intrusive /r/ have not been recorded. J. Wells points out that all social classes everywhere in England use the intrusive /r/. The description of /r/-sandhi has been given wide attention in accepted pronunciation norms, but empirical research is in the minority.

L. Bauer was one of the systematic empirical researchers of binding and intrusive r. He studied 37 tapes of pronunciation norms accepted between1949-1966 and social factors such as age, gender, etc. recorded. And S. Ramzaran shows that it is typical for all speech styles[6, p. 171].. Conjunctive-/r/ variability depends on a number of linguistic factors. Many linguists agree that the frequency of processing of

the intrusive /r/ depends on the quality of the preceding vowel, so that the intrusion of /r/ occurs less after the vowels /ɑ:, ɔ:/, and more intensively after the vowel /ə/.

The reason is stronger after the intrusive /r/ /ɑ:, ɔ:/ vowels, because there are not many words ending with these vowels either. The intrusive /r/ is more prominent after the long vowel /ɔ:/. The most interesting is the processing of /r/ within the word (draw(r)ing)/

Another phonological factor that prevents the connective /r/ is the presence of a consonant /r/ in the preceding syllable. Binding and intrusive /r/ error, nearer, roar, straw, era, etc. In words like Also, the connective /r/- is not used if the connective syllable is unstressed and begins with a consonant combination beginning with /r/. For example, extra, zebra, orchestra, etc.

Prosody and syntax also affect the processing of r-sandhi. Thus, the conjunction /r/ is used before the stressed syllable (act your 'age). It can be found more often before indefinite articles and unstressed pronouns. D. Counz[4],, L. Bauer [2], show that if there is a possible pause between the words, the intervention of /r/ does not occur. He opened the door and walked in.

As we mentioned earlier, the conjunction -r covers two different events. We often find the use of connective-r, and intrusive-r is also accepted as formal. A. Kruttenden describes this phenomenon as follows: "We can add the consonant /r/ after /ə, ɜ:, ɪə, ɛə, ʊə/ after words ending in vowels /ɑ:, ɔ:/ or simple or complex vowels with schwa sound, for example, far off, four aces, answer it, fur inside, near it, wear out, secure everything. Prescriptivists want to limit the conjunction /r/ to the presence of r in the spelling of the word, while there are a number of examples where the "r" is absent in the spelling but heard in the pronunciation. This is called intrusive /r/".

Since many linguists consider intrusive-r to be non-standard and inappropriate, teaching it to foreign students is controversial. From the phonological point of view, the tendency to use intrusive r is analogously natural. For example, the words law and lore (both transcribed as /lɔ:/) are homophones for speakers of the literary pronunciation norm. Therefore, applying the connecting r to both is analogously possible. Thus, bearers of the literary pronunciation norm will subconsciously add the connector -/r/ to both words, despite the fact that they have different spellings.

Thus, the attitude towards intrusive /r/ is currently positive. The main reason for its inclusion in the updated version of the literary pronunciation norm is that it helps to pronounce the connective /r/. English, like any other language, adapts to changing circumstances and is constantly evolving. The results obtained from theoretical considerations during the research help to determine its development trend. Here we have discussed new trends in vowel and consonant inventory. The main changes were quantitative and qualitative changes of cardinal vowels.

We have also witnessed a tectonic shift in the English vowel sign system. For example /æ/>/a/, /e/>/ɛ/. Also, we mentioned phonetic tendencies such as /t/-glottalization, merging or dropping of /j/, connecting and intrusive /r/ in the consonant inventory. Modern English has a global status because it has a special role in each country. English is the dominant language, both as a mother tongue, as a second language, and as a foreign language.

The content of the accepted pronunciation norm has changed, because language is a dynamic system of communication and is subject to some degree of modification. We also agree with this idea that the accepted concept of pronunciation norm is outdated and this concept should be adapted to the new reality. The modern accepted pronunciation norm should reflect the linguistic innovations that people use.

The spread of the English language on the earth led to the emergence of variants in different areas. These variants came to be known as "New English".

The English language has 2 main functions in the world: it is the main mediating language of international communication and the main base in the formation of cultural individuality. There is no reason to believe that in 50 years there will be another language that will replace English as the global lingua franca. It is likely that this language will retain its special position in the 21st century multilingual society, it will be the only language that appears anywhere in the world, and there will be no other language that can repeat it in the 21st century.

In phonetics, we often come across cases of replacement or change of some phonemes. Our language adapts to changing circumstances. It is constantly changing slowly. While observing, we understand its tendency to flow and develop. Periodic observations can even tell us about all kinds of changes that will happen in the coming centuries.

Conclusion

The article helps us to come to the following conclusions:

In the last few years, a new trend of T-glottalization, which includes non-standard features, has become widespread among young people who speak the norm of literary pronunciation. Glottalization is the complete or partial closure of the glottis (the space between the vocal cords) during pronunciation. T-glottalization is the pronunciation of consonant /t/ with glottal explosion /ʔ/. Glottalization is part of the modern literary pronunciation norm, and teachers should make students aware of this phenomenon so that they have a better understanding and a more authentic pronunciation.

. Dropping (elision) of /j/ and merging of /j/ is a continuation of the historical process and results in linguistic change. Two dialects are mainly referred to literary pronunciation norm (Received Pronunciation) and general American English (General American English). The phenomenon of recent /j/-dropping is attributed to the American trend. /j/ falls after consonants /t, d, s, z, r, l/. During the /j/ combination, the approximant (middle) /j/ sound is combined with the preceding /t, d/ sounds, and as a result, the affricates /ʧ, ʤ/ are formed. This event has been consolidated and included in dictionaries. /j/ combination cannot be found in stressed syllables gradually /'gradjʊli/→/graʤʊli/. Dropping of /j/, on the other hand, occurs in stressed situations.

Softening (palatalization) of /j/ in the sequence /sju/ and /zju/ – the form /j/ in the words issue and assume /'ɪsju:, ə'sju:m/ is more conservative and traditional. This feature, which is considered typical for unstressed syllables, is a novelty for stressed syllables. In the process of assimilation, /s/-/j/ and /z/-/j/ sounds are mixed and /ʃ/ and /ʒ/ segments are formed. Softening of /j/ is more common among young people. For example /'ʃu/ (unstressed case), assume, presume /ə ʃu:m, prɪ'ʒu:m/ (stressed case). In British English, /sju, zju/ is rarely merged or softened. The connective -r is one of the most prominent means of linking and is constantly at the center of attention in linguistics. This phenomenon occurs only in non-rhotic dialects (Accepted Pronunciation, Estuary English, Norfolk, Yorkshire, etc.) and not in rhotic dialects (American dialects, Scots and Irish, and several British dialects).

The intrusive /r/ is now common in modern English. The main reason for its inclusion in the updated version of the literary pronunciation norm is that it helps to pronounce the connective /r/. K. Upton claims that speakers do not pronounce according to the rules of literary pronunciation, they eliminate the created gap by speaking fluently and fluently. Although we do not find this rule in ELT dictionaries, K. Upton included the intrusive /r/ in The Oxford Dictionary of Pronunciation for Current English.

T-glottalization phenomenon is the pronunciation of consonant /t/ with glottal explosion /ʔ/.

/j/ falls after the consonants /t, d, s, z, r, l/ in the accented environment, in unstressed syllables the sound /j/ is combined with the preceding sounds /t, d/ and as a result, affricates /ʧ, ʤ/ are formed.

Softening (palatalization) of /j/ in the sequence /sju/ and /zju/ is typical for unstressed syllables. In the process of assimilation, /s/-/j/ and /z/-/j/ sounds are mixed and /ʃ/ and /ʒ/ segments are formed. Softening of /j/ is more common among young people. The linking / r / is one of the most prominent means of linking. Intrusive /r/ is now common in modern English.

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GREAT PERSON HAYDAR ALİYEV

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Abstract

When evaluating great historical figures objectively, it is essential to assess what they were able to achieve in comparison to the opportunities available during their time. From this perspective, when assessing the periods in which Heydar Aliyev led Azerbaijan, as well as the times he was not formally in office, it can be stated unequivocally that he maximally utilized the conditions and opportunities presented by his era in the interests and advancement of his people. In Azerbaijan, the political legacy of Heydar Aliyev and his state-building doctrine will undoubtedly continue, as this policy is essential for ensuring the country's future development. Heydar Aliyev's political approach is a balanced one—it represents the interests of all strata of society, fosters harmony, protects citizens' rights and freedoms, and upholds the national-state interests as well as the core values of an open society. The average Azerbaijani saw in Heydar Aliyev all the traits of a true national leader—rationalism and wisdom, determination, political foresight, realism, and innovation. Most importantly, Heydar Aliyev's political vision is not confined to the present—it is a forward-looking strategy. There exists a new generation of leadership, a tested team of state professionals, and a clear strategic vision capable of continuing this policy successfully into the future.

Keywords: *Leadership, independence, patriotism, great personality, wisdom, innovation, foresight.*

Introduction

Everyone lives the life given by God in their own way — some for themselves, some for their loved ones, and some for their nation, people, homeland, and state. The National Leader of the Azerbaijani people, Heydar Aliyev, dedicated his meaningful and rich life entirely to his nation, his people, his homeland, and his state. The secret of the people's boundless love for this great leader lies precisely in this devotion. As the founder of independent Azerbaijan, this great son of the Azerbaijani nation, Heydar Aliyev, accomplished so many significant innovations and achievements in the country's state-building history that they are too numerous to count. As Victor Hugo once said, "Half of a true man's duty is to serve his homeland, the other half to serve his people." Heydar Aliyev's ultimate goal was to transform Azerbaijan into a strong, democratic state and to provide his people with a prosperous and independent life.

Heydar Aliyev played a pivotal role in the establishment of the Azerbaijani language as the official state language. With his profound intellect, foresight, and deep love for his people, the National Leader prioritized language policy in national state-building, elevating the Azerbaijani language to its highest stage of development. In his own words: "As with all peoples, the native language of the Azerbaijani people is one of the fundamental factors determining their national identity… A people with a developed and rich linguistic culture is unbreakable, immortal, and destined for a great future."

From the early years of his leadership of the Azerbaijani state, Heydar Aliyev personally addressed the socio-political and ideological issues of the native language, initiating numerous reforms in this area:

1. The Azerbaijani language was officially recognized as the state language in the laws of the Azerbaijan SSR (especially the Constitution), and despite Moscow's objections, it was granted equal status alongside Russian in the republic.

2. Special attention was given to the development of Azerbaijani-language education, and unlike some other Soviet republics, priority was given to educating the youth in their mother tongue in Azerbaijan.

3. The government supported the advancement of science and press in the Azerbaijani language, and most prominent Azerbaijani writers wrote exclusively in their native language. Leading literary publications such as the journals Azərbaycan, Ulduz, and the newspaper Ədəbiyyat və incəsənət were all published in Azerbaijani.

4. The history of the Azerbaijani language was studied with unprecedented consistency, and multi-volume works on "Modern Azerbaijani Language" were produced. One such volume, a textbook for higher education, was awarded the State Prize of Azerbaijan. The work of scholars studying the Azerbaijani language was highly appreciated, reinforcing the prestige of the mother tongue.

5. In both official and informal meetings and gatherings, the republic's leader spoke in Azerbaijani without hesitation, thereby directly contributing to the rise of the language's socio-political status and serving as a role model for others.

All of this demonstrates that the language policy developed and implemented by the National Leader of the Azerbaijani people, Heydar Aliyev, serves the advancement of his broader state-building strategy.

Research reesults

The awarding of the "Modern Azerbaijani Language" textbooks, written for higher education institutions, with the State Prize of the Republic was a direct result of the favorable conditions created for the development of native-language literature and the promotion of the classics of Azerbaijani literature. These achievements stem from the comprehensive language policy of the National Leader, who was also the caring founder of modern Azerbaijani education.

As a testament to his enduring commitment to education, the National Leader Heydar Aliyev signed the Decree "On Strengthening the Material and Technical Base of General Education Schools of the Republic of Azerbaijan" on October 4, 2002. As part of this decree, a special state program was launched that initiated the construction of modern school buildings across the country, built in accordance with international standards. Stressing that "The field of education is the most important sector for our people today, and for the future of our nation and our state," Heydar Aliyev signed a series of pivotal documents that ensured the dynamic development of education in Azerbaijan.

Among these were:

- *The Decree "On the Improvement of the Education System of the Republic of Azerbaijan" (June 13, 2000);*
- *The Decree "On the Improvement of the Use of the State Language" (June 18, 2001);*
- *The Decree "On the Establishment of the Day of the Azerbaijani Alphabet and Language (August 1)" (August 9, 2001);*
- *And the Presidential Order "On the Enforcement of the Law on the State Language of the Republic of Azerbaijan" (January 2, 2003).*

These legislative initiatives played a vital role in bringing Azerbaijani education in line with global standards. Alongside these reforms, increased attention was given to the teaching of Azerbaijani history, literature, and geography, as well as to the development of high-quality textbooks and the promotion of the Azerbaijani language, particularly in its capacity as the official state language.

Heydar Aliyev carried out numerous reforms in the field of education. Upon assuming leadership, he immediately prioritized educational issues. Within a short period, a new generation of highly qualified national personnel was formed, and the foundations of several academic schools were laid.

During the 1970s and 1980s, in order to meet the need for highly qualified specialists in the field of construction and infrastructure, the Azerbaijan Institute of Civil Engineers (now Azerbaijan University of Architecture and Construction) was established. In the same period, several important institutions were founded or expanded, including the Ganja Pedagogical Institute, the Azerbaijan Pedagogical Institute of Russian Language and Literature (now Baku Slavic University), the N. Tusi Azerbaijan State Pedagogical Institute, the C. Nakhchivanski Military School, and new academic buildings for the Faculty of Oriental Studies of Baku State University were constructed and commissioned.

Our National Leader Heydar Aliyev always held the work of teachers in the highest regard. "I know of no title higher on earth than that of teacher," he once said. Heydar Aliyev consistently showed great care and attention to children. He did everything in his power to ensure that children in Azerbaijan grew up healthy and vigorous, received a quality education, and became worthy citizens of the homeland. He considered Azerbaijani children his most cherished treasure and once declared: "The most precious wealth to me is the children of Azerbaijan. The great future of Azerbaijan depends on its youth and children."

The declaration of 2009 as the "Year of the Child" by a presidential decree was a concrete step aimed at improving the social welfare of children in the country.

One of Heydar Aliyev's invaluable contributions was the promotion of Azerbaijani culture and rich historical heritage on the global stage. Thanks to his far-sighted policies, Azerbaijan is now recognized

worldwide as a civil, legal, democratic, and secular republic, and is regarded as a country with great potential.

Among the most effective tools for ensuring the unity of Azerbaijanis worldwide is the presence of a common ideology. Fully understanding this need, the National Leader chose "Azerbaijanism" as the unifying ideological platform around which to rally the people. Ideology is one of the core markers of a nation's spiritual and moral identity. It is a system of thought, traditions, and beliefs that reflects the essence of national consciousness.

Language, territory, religion, and ideological unity are fundamental attributes of the historical existence of a people, a nation, and a state.

Conclusion

At the beginning of the years of independence — during that period of turmoil and chaos — a striking statement made by Heydar Aliyev accurately characterizes the essence of his political course: "We must treat our science, culture, and moral values with great caution and attention. These matters cannot be left to the mercy of the market economy."

The National Leader Heydar Aliyev saved the Azerbaijani people, the nation, and our homeland as a whole from crises and laid the foundation for rapid development in all areas of the country. He created the necessary conditions for progress and ensured the comprehensive advancement of Azerbaijan across various sectors.

Our people are indebted to the Great Leader Heydar Aliyev for these extraordinary achievements. It must also be emphasized that the Azerbaijani people are fortunate to have a leader like Ilham Aliyev, a worthy successor and disciple of Heydar Aliyev, who has successfully carried forward his legacy and ideas. Under his leadership, Azerbaijan has become one of the most recognized and respected states not only in the South Caucasus but also on the global stage.

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Philosophical sciences

WORLDVİEW BASİCS: HOW TO RAİSE YOUR STATUS İN THE 21ST CENTURY

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ОСНОВЫ МИРОВОЗЗРЕНИЯ. КАК ПОВЫСИТЬ СТАТУС В 21-М ВЕКЕ

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Abstract

Open new horizons for the development of man, society and the world in modern realities. Reading and understanding the essence of the article will instantly raise the level of your capabilities and bring many achievements. To achieve this goal, the method of cognition of the philosophy of the new universe is used, namely, system analysis from three sides and at three levels of complexity. The article will be interesting and useful for all people, as well as all those who are concerned about issues of personal development and solving the problems of the modern world.

Аннотация

Открыть новые горизонты для развития человека, общества и мира в современных реалиях. Прочтение и понимание сути статьи мгновенно подымет уровень ваших возможностей и принесет множество достижений. Для осуществления этой цели применяется метод познания философии нового мироздания, а именно, системный анализ с трех сторон и на трех уровнях сложности. Статья будет интересной и полезной для всех людей, а также всех тех, кого волнуют вопросы личного развития и проблемы современного мира.

Keywords: *man, personality, subpersonalities, development, dualism, illusions, maya, ideas, image, theater, games, status.*

Ключевые слова: *человек, личность, субличности, развитие, иллюзии, майя, представления, образ, театр, игры, статус.*

Предисловие.

Как и всё, что связано с развитием нашей цивилизации, вопрос природы человека и человечества решается с уклоном на его материальную составляющую. Например, изучая мозг ученых волнует его механистическая составляющая. Конечно, успехи в этом направлении играют важную роль в жизни многих людей. Появление и развитие новых учений, связанных с логикой души, компенсирует перевес развития технологий в сторону развития социальных наук. Практическую пользу от этого также получают миллионы людей. Мы все «всё знаем» и с каждым днём узнаем всё больше, но качество жизни не улучшается. Странно, а почему? Причиной тому является то, что мы никогда практически не видели и не прочувствовали наши знания. Мы принимаем их на веру от тысяч ученых, а внутри нас они не состыковываются, противоречат друг другу. Точно также мы знаем много умных слов, но пользуемся ими чисто интуитивно, не вникаем в их смысл. Считается, что мы не видим мир таким, какой он есть в реальности, и именно искаженные представления являются причиной всех наших проблем. Якобы, чтоб избавиться, например, от какой-то болезни достаточно исправить соответствующее представление и можно спокойно жить. Проблема в том, что представлений слишком много. Их сумма представляет собой понятие мировоззрения человека. Обычное мировоззрение всех людей не сформировано, в нем нет цельности, поэтому мы условно принимаем, что оно есть. Главным его недостатком является изначальное принятие как должное, что человек по природе склонен к болезням, страданиям и в конце концов смертен. Вопрос в том, чтоб используя новый научный метод познания абстрагироваться от такой практической привязанности, и вывести такую форму современного мировоззрения, идеальные представления которого будут определять философию, физиологию, психологию и все

остальные аспекты жизни нового поколения. Понятие современное употребляется в смысле знания отвечающего требованиям данного нам времени с хорошим исходом. Оно откроет человеку возможности на порядок выше существующих, по принципу здесь и сейчас. Практическая задача статьи: распутать весь клубок этих вопросов и дать каждому желающему возможность на порядок 10х повысить свой статус, со всеми сопутствующими привилегиями. Другими словами, можно самостоятельно подняться на такой уровень развития, когда в корне не будет причин, приводящих человека к трагедиям и страданиям. По завершении чтения, вы получите новые уникальные мыслительные способности. Применив их в любой сфере жизнедеятельности вы станете личностью мирового уровня. Статья претендует стать основой «Мировоззрения Современного Человека» как новой науки.

1. Образная картина.

Для решения данного вопроса мы будем отталкиваться не от частного к общему, а наоборот. Как сказано в предыдущих статьях, все в этом мире основано на дуальности. Человек везде и во всем, ежеминутно мечется в двух крайностях, "да" или "нет", выбирает лучшее "да" и, тем не менее, в конце концов всё теряет, далее смерть. Например, из двух девушек парень по множеству двойственных шаблонов выбирает красивую, богатую, стройную, добрую, заботливую и начинает с ней совместную жизнь. В его представлениях она идеальный образ. Однако, выбрав одну крайность, со временем образ блекнет, начинает тянуть к другой. Он понимает, что ему нравится другая, для которой он красивый, богатый, стройный, добрый, заботливый. Он решает изменить выбор, меняет декорации, и со временем опять разочаровывается, потому что дуальность многоуровневая, существуют другие люди, а кроме того, жизнь короткая. Проблема выбора касается всех сфер и уровней деятельности любого человека. Ошибки — это не вина человека, а недостаток мыслительного процесса с его дуальным описанием действительности. Например, если человеку не нравится работа, то большая часть его жизненной энергии, силы тратится на ежеминутную прокрутку в голове мысли работать-не работать. Чтобы остановить этот диалог он выбирает один ответ, судорожно держится за него, готов болеть, страдать до тех пор, пока не случится обратное. Выбирая работу, он работает до тех пор, пока не уволят. Проблема игромании состоит в круглосуточном круговороте мыслей и последующим крахом. Риторический вопрос: почему люди не читают? Нет сил даже на это. Любое изменение требует дополнительного вложения сил, а их нет.

Общий пример: в автомобиле с автоматической коробкой передач две педали, у человека две ноги, но вопреки логике и возможностям управление происходит одной ногой. При попытке изменить положение, все запутывается. К управлению с тремя педалями человек легко приспосабливается. В жизненных ситуациях человек также склонен все упрощать, по принципу есть только одна нога и она упорно давит только одну педаль. Однако, со временем появляется уравновешивающая сила обстоятельств, пренебрежение которыми приводит к появлению иллюзий вседозволенности, и в конце концов закономерный крах. Где мы это видим? Например, трудно найти вещь, хотя она перед глазами, потому что в нашем представлении она другая по форме, цвету, местоположению. Упорство в поиске, самоуверенность никогда не позволят её найти, но мозг все равно её ищет и держит неправильный образ перед глазами. Потерянное в один из дней вдруг появляется перед глазами, появляется тогда, когда о ней забыли. Это пример первоклетки веры людей в чудеса, того, как иллюзии на миг исчезают, пелена с глаз спадает и открывается реальность. Аналогично, представители других рас, веры, пола, профессий (начальники, врачи, полицейские, учителя...) в наших представлениях поначалу все на одно лицо, а характер и сценарии нашего отношения к ним одинаков. Иллюзия по отношению к ним состоит в чувстве их превосходства: они красивее, выше, опрятнее, будто видят все насквозь, а значит больше знают, лучше и правильно думают. На самом же деле, наоборот, мы все для них, как на одно лицо, и даже говорим одними и теми же словами, жестами, взглядами, чувствами. Отсюда выражение «где-то я вас видел». На самом деле это навязчивая иллюзия, которую мы пытаемся навязать кому-то. Общение людей одного уровня состоит в отзеркаливании друг друга шаблонами поведения, поэтому как в физике однозарядные полюса, люди отталкивают друг друга и отдаляются. Причиной всех конфликтов является постоянное желание преодолеть магнетизм силы отталкивания, проломить стену отчуждения, навязываемся, но получаем жесткий отпор. Вызываемое неудачами постоянное недовольство, как бы само притягивает неприятности. Первоклеткой трагедий, аварий является неожиданное изменение привычной ситуации, точно так же как при ослаблении внимания,

потерянная вещь вдруг неожиданно появляется из воздуха и человека как бы подбрасывает. Например, в тихо едущей машине, на дороге без машин, водитель позволяет себе отвлекаться, расслабляется. Однако, ситуация на любой дороге меняется каждые 5 секунд. Если на перекрестке, неожиданно перед машиной окажется другая, человек инстинктивно до упора нажмет педаль газа, и машины столкнутся. При испуге наоборот, несмотря на полное внимание на дорогу, человек вместо газа до упора жмет тормоз, и машину уносит. В первом случае человек не успел испугаться, поэтому нажал на газ, во втором наоборот, а во всех случаях ошибается. Ошибка в том, что внимание мгновенно раздваивается. Как в театре, занавес резко приподнимается, человек дёргается и инстинктивно пытается повернуть события вспять, вернуть беззаботность (былой рай). Там, где включаются инстинкты не бывает полу-нажатий, полу-движений или половинчатых мер. Когда маятник эмоций запускается, он вовлекает в водоворот событий всё больше и больше людей. Эмоции раскручиваются волнообразно, а крушение происходит ступенчато. Поначалу как бы ничего не происходит, всем кажется что есть время на размышления, споры. На самом же деле мозг незаметно переключился в режим инстинктов. Точно также игромана не останавливают серии неудач, он думает, старается и становится банкротом. Люди порой как обезьяны не отпускают свой апельсин и охотник забирает их голыми руками. Тот, кто в критической ситуации начинает думать, терпит тотальный крах. Например, в футболе команда начинает проигрывать как только начинает думать о том, что надо собраться, время ещё есть, надо победить. В шашках и шахматах вечно не хватает одного хода. А всё начинается с бытовых мелочей при пробуждении, потом люди не выспавшись, заторможенными идут на работу. Усталость может накапливаться годами, а отвлечь всего один раз, всего за секунду с вышеуказанными последствиями.

Вывод: Ключевая проблема дуального мира, в котором мы живем, это невозможность удержаться в двух крайностях. Мозг быстро устает, энергетика падает, поэтому люди не любят думать. Даже физиология против нас. Например, если зачесалось правое ухо, сначала дергается левая рука, потом правая рука как бы ее перехватывает, возвращает на место, и сама направляется к правому уху. То есть в мозгу есть базовый центр управления и надстройка из шаблонов, где все решения принимаются от обратного. Если попытаться что-то повернуть на 180 градусов, мозг очень быстро подстроится. Ярким и конкретным примером тому является первая удача в казино и все последующие неудачи. Удачный опыт мгновенно превращается в алгоритм мозга. Его никак не удалить и не обойти, и тем не менее человек пытается повторить, надеется, верит. Таким образом, одно хорошее событие становится как поврежденный сектор жесткого диска, или поврежденная дорожка виниловой пластинки. Один арбуз в одной руке удержать легко, два очень трудно, а пытаться еще что-то добавить губительно. Поэтому по-большому счету, чтоб выжить человек откатывается на шаг назад, упрощает, чтоб потом быстро сделать множество шагов вперед. Образно выражаясь, упрощая в голове, искажается картина мира, поэтому все усложняется для рук и ног. Например, в обычных и научных книгах то, что можно изложить на одном листе, печатают на тысячах страниц. Другими словами, современное мировоззрение благодаря трёхуровневости позволяет сократить объем информации в 1000 раз. Прочтение данной статьи, каким бы тяжелым оно ни было, в конце концов увеличит вашу эффективность в 1000 раз и даст ощущение, будто вы всегда были таким.

Итак, суть вещей и событий, наши поступки основаны на наших готовых иллюзорных представлениях, образах - майи. Мы неосознанно придаем всему значимость и закрепляем в соответственных словах, точнее слова сами собой нанизываются на непроверенные представления. В реальности майя это совокупность представлений-слов-поступков, одновременно она является основой нашего идеального образа, демоверсии. Другими словами, наши представления рисуют нам красивые картинки мира и рисуют наш красивый образ для мира. Весь опыт жизни состоит только в совершенствовании своего образа, лексикона и умении извлекать из этого пользу. Что за всем этим прячется особенно не волнует, поэтому принимая извне умные и хорошие слова, никто не видит какой образ, смысл и программа для действий стоят за ними. В мыслях мы считаем, что есть идеалы, мечты, вера в чудеса! А практически это обычные иллюзии, фантазии, эмоции, от получения новых вещей, дома, машины. Приток есть, значит наш образ цветет. Если новых приобретений нет, наш образ блекнет, в лексиконе сами собой появляются плохие слова, а за ними плохие дела. Люди часто говорят одними и теми же словами, на одни и те же темы, но при этом их представления, цели и последующие действия

абсолютно противоположны. Как правило, любой среднестатистический разговор, любые отношения 2-х людей в итоге превращаются в столкновение волка и овцы.

Крайняя форма дуализма мира, это с одной стороны демонизм (нет выбора), с другой стороны, выражаясь по аналогии, демократизм (есть выбор). Выражаясь философски, в единстве и борьбе этих противоположностей происходит развитие. Дуализм везде, он в рамках устройства всех стран, и мира в целом. В рамках личности, с одной стороны, это зомби. На примере авто, образно, зомби — это человек с одной ногой и одной педалью. С другой стороны, это продвинутый человек: он знает о наличии второй педали и ноги, иногда переключается, но при попытке использовать одновременно, включается матрица и опасное развитие событий. Чтобы выжить, люди объединяются, точно также, как в природе молекулы компенсируют недостаток атомов путем образования ковалентных связей. В зеркале приобретенной полноценности, каждый член данной общности начинает реально видеть порочность и опасность всех чужих. При постройке благополучия своей жизни и жизни своей общины это позволяет не обращать внимание на гуманность, нравственность, совесть в отношениях с чужими. Внешне это отношения, на самом же деле это скрытая борьба за доминирование. В ковалентной реальности (ярко выражено в сектах, мафиях, в малых народностях, в расовых и других меньшинствах, странах с государственной идеологией) личные иллюзии перерастают, кристаллизируются в общественные догмы, мифы, лидеры превращаются в идолов с действительно магическими способностями. Мнимая магия в том, что в их присутствии сила взаимного отталкивания между людьми реально превращается в притяжение. При пастыре разрозненное стадо превращается в паству. В науке есть эксперимент о влиянии присутствия наблюдателя на движение частиц. Ковалентная реальность есть удобная почва для рождения и распространения различных всепланетных конспиративных теорий заговоров, мифов, популизма и лжи. Поэтому в любом обществе работает принцип отрицательного отбора, когда с каждым последующим днем всё более бездарные диктуют власть одаренным. Далее противоречия вырастают до мировых, свидетелем которых мы и являемся. Здесь всё предначертано, а именно, крушение дуализма в устройстве стран и переход к более совершенному триальному способу существования.

Выход для нас – не ждать плохих событий или хороших слов, а учиться говорить и не просто слова. Вкладывая в слова новый смысл, можно выстраивать «действия-слова-представления», нового более совершенного уровня, когда все от этого выигрывают. Задача: искать средства, возможности, чтоб жить осознанно и получить судьбу. Судьба — это не то, что предначертано. Предначертаны роли и сценарии в театре. В глобальном смысле, выход в том, чтобы не отступить от двойственности к одномерному мышлению, а сделать шаг вперед к тройственности. Тогда, выражаясь в предыдущих терминах, получится, что, усложняя теорию в "голове" мы упрощаем практику для "рук и ног". Третьим искомым элементом является поиск и внедрение смысла везде и во всем.

В данном контексте искусственный интеллект работает по принципу «упростить всё в голове». Значит дальнейшее развитие технологий в этом направлении увеличит проблемы в жизни обычных людей. Вспомните какие надежды возлагались на развитие информационных технологий, начатое во второй половине 20-го века. И что?

2. Логика событий.

Самое главное свойство большинства людей — это следование обстоятельствам. При этом все действия подчиняются жесткой логике. Например, человек нарушил правило, любое нарушение наказуемо, значит человека следует наказать (A=B, B=C, значит A=C). Упрощенная версия, человек равно наказанию, A=C. Часто, даже если ничего не произошло, производится наказание C=A, потому что A=C. То есть, если человек ведет себя как преступник, то его надо наказать, потому что он совершил нарушение. Согласитесь, ведь нормальный человек не ведёт себя как преступник, и никто кроме преступников не совершает нарушений. Если доказать, что он ведет себя как преступник, то все со стороны согласятся с тем, что его следует наказать и в жизни реально наказывают. В софизме про полупустой и полуполный стакан, "так как равны половинки, то равны целые части, значит полное равно пустому" ложь утверждения видна, потому что нет действия, нет шкалы времени. Софизмы на первый взгляд видны, понятны, наивны и легко распознаваемы. В неконкретных вещах и понятиях всё наоборот, поэтому можно доказать и внушить что угодно. Например, считается что у закона есть буква и дух, то есть буква закона нас карает, а дух защищает. Практически же, закон склонен к карательной

функции. Закон - буква, так как народ сам по себе бездушен и склонен к терпению. Значит, закон карает, народ терпит, и, согласно декларации независимости Америки, власть узурпируется.

Получается, жизнь, это многоуровневый театр, в котором все играют какие-то роли по какому-то сценарию. Понятие матрица — это подиум данного театра. Будь-то один наедине с собой и миром, будь то в отношениях с кем-то, будь то в обществе или на мировой арене, правила касаются всех одинаково, и проявляется одновременно во всём, как в малом, в мелочах, так и в великом. Так как все сценарии плохо заканчиваются, значит всем предначертана роль жертвы. Значит, Жизнь — это театр, где мы играем роли жертвы. Однозначный, односторонний взгляд на вещи, события провоцирует инстинктивные попытки вырваться из матрицы. Осторожные попытки что-то изменить приводят к травмам, поэтому у большинства вырабатывается рефлекс ожидания. Человек проживает жизнь в ожиданиях, что вот-вот сейчас с новой властью заживем, вот сейчас точно будет победа, вот она настоящая любовь. У тех кто не хочет мириться появляется непреодолимая тяга ко всем известным зависимостям, порокам. В дуальном мире, где все основано на борьбе за свой выбор, нет хорошего финала. Единственный выход в том, чтоб поменять суть – статус личности.

Кто такой успешный статусный человек в новых реалиях? Тот, кто знает правила, пользуется ими и выстраивает свою актерскую игру, на ее основе выписывает свой сценарий, далее строит свой театр, в котором проигрывается его пьеса жизни. Он как шахматист, в кем-то проигранной ситуации, видит и может выстраивать выигрышные комбинации. Способность видеть то, что стоит за этими словами, что их определяет, влиять на то, что их порождает, дает нам возможность за одно мгновение менять ход любых событий. Точно также, как майя, пелена иллюзии сама случайно спадает с глаз, можно сделать это сознательно. Точно также, как пастырь совершает чудеса для других, можно стать пастырем своей жизни. Как? Как известно, знание некоторых принципов компенсирует незнание многих вещей. Это называется "Понимание знаний" - разумность, мудрость. К категории «Ум» добавляем категорию «Разум». В дуальной цивилизации главное «Ум», все хотят всё знать, а всё знать невозможно. Разумность дает возможность всё перекроить в свою пользу: стараться всё знать бессмысленно, а понять всё вполне возможно. Умный в лужу не войдет, умный лужу обойдет, а разумный ходит там, где нет луж.

Итак, всё относительно, поэтому важно приучать себя видеть суть слов, вещей, событий с трех сторон и на трех уровнях. Например, всем известные неконкретные понятия, такие как красота, харизма, влияние, способности, богатство принимаются как непоколебимая статическая данность от рождения, подобно принципу А=С, но еще короче. Фактически это обычные ярлыки с буквами или словечками. Людям свойственно вешать друг на друга ярлыки и забывать кто за ними стоит. Яркий пример тому как дети и подростки обзывают друг друга. Отсюда выражение «что написано на лбу». Условно, «К» - красота, считается, что это личное, приобретенное с рождения свойство. На самом деле это совокупное мнение общества о красоте, сконцентрированное на одной личности. Поэтому важна не красота, не важен сам человек, важно «что написано на лбу». Когда обладаешь красивым человеком, тогда обладаешь властью над всеми теми, в чьих глазах тот красив. Инстинктивно чувствуя этот подвох, люди пытаются избегать отношений и самовольно оказываются в одиночестве, то есть добровольно становятся жертвой. Это конкретный пример того, как изначальное упрощение приводит последующей деградации личности и общества.

Аналогично, вопреки всеобщему мнению, человек не есть личность, а взаимосвязь 3-х субличностей. Обратите внимание, в одиночестве (1) он ведет себя не так, как в контакте с другими (2), и тем более не так, как в массе (3) людей. Точно также отношение одного и того же человека к одной и той же вещи, событию, другим людям в разных средах часто полностью противоречиво, но сам человек этого не видит. Можно быть искренним противником предательства, при этом предавать и искренне верить в свою преданность. Никто не может относиться к нам однозначно, всё зависит от ситуации. Вас могут искренне любить, но независимо от себя, ненавидеть, при этом неосознанно поступать хуже чем враги. Можно душить в объятьях заботы, благими намерениями провожать в ад и всё прекрасно прятать за красивыми словами. Даже предъявляя факты в лицо, эти факты категорически отметаются, поэтому следует быть крайне осторожным, это очень опасно. Да, на лицо можно одеть множество масок, но это не все. Есть ещё одна степень сложности, которая всё объясняет -за масками прячется не одна личность, а три, и у каждой своя память, уровень энергетики, вибраций, режимов работы мозга, потребности. Образно выражаясь, это похоже на то, как

если бы у человека было 3 абсолютно одинаковых автомобиля. На одном он разбился об рекламный билборд, сдал в сервис, пересел на другой. Подмена происходит мгновенно, человек сам этого не замечает, поэтому в его глазах всё честно. Даже со стороны полиции ему невозможно предъявить обвинение, потому что на этой конкретной машине нет ни царапины, а двух одинаковых автомобилей с одинаковыми номерами в природе не существует. В материальном мире даже конкретные преступления доказать трудно. Теперь представьте, насколько это сложно в неконкретных вещах и тем более в самом себе. Поэтому людям проще всё упрощать, приукрашивать, а невыгодное отбрасывать. Следует учиться видеть реальное, начиная с мелочей, везде и во всём. Тогда появятся правильные слова, выгодные события.

Алгоритм: если есть что-то одно, значит есть другое, на основе обоих выстраивается третья, и тогда в их совокупности проявляется истинная картина. Как смотреть на материальные объекты с 3-х сторон учит начертательная геометрия. В жизни сложнее, например на улицах мы видим людей такими какими мы хотим их видеть. В отношениях всплывает их сухая реальность, исходный материал, а истинное лицо раскрывается в испытаниях, со временем. Поэтому главный критерий в оценке людей – готовность к испытаниям. Прошедшего испытания можно назвать личностью. Тогда человек есть личность со сформированным мировоззрением.

Закон: всегда есть А, В, С. Если нам предъявляют упрощение типа А=С, А или С, значит это манипуляция, не хватает В. Например, что первично, яйцо или курица? Если оценивается что-то одно, например, спрашивают «деньги это хорошо или плохо», ответ не думая — это ложь, зло, скорее провокация, потому что не хватает 2-х исходных данных. Пример правильного выстраивания конструкции одного слова – статус, указанного в названии статьи. Если есть статус, ему соответствуют деньги, и вместе они делают имя человека. Исторически, в первой цивилизации работала формула имя-деньги-статус. Человек не мог вдруг взять имя какого-то царя и быть им. Это сейчас можно показать кучу сертификатов, документов и все поверят в кого хочешь, а тогда царь отождествлялся с всевышним, был продолжением небесной власти на земле. Без имени, деньги и статус ничто, так как всё можно потерять мгновенно. В дуальной цивилизации работал закон деньги-статус-имя. Тогда все любой ценой старались получить деньги, все болели поиском несметных сокровищ. Тем не менее требовались огромные усилия ума, чтобы с ними получить высокий статус и тогда его имя, в качестве утешения, попадало в историю. Если вы заметили, даже здесь деньги сами по себе не фигурируют, за ними стоит ум и знания. Их не видно, поэтому легче украсть. Везде и во всём есть три стороны и три уровня понимания. Сколько судеб было сломано из-за примитивного однозначного понимания «деньги-хорошо». Пренебрежение деньгами это другая крайность: у человека могли быть значимые имя, статус, но без денег его ждал крах и забвение. 21-м веке работает закон статус-имя-деньги. Любой может получить общественно значимый статус изначально, с соответствующим именем, и в зависимости от их уровня будут и деньги. Сейчас, без статуса, имя и деньги ничто. Получается статус — это разница между личностью и обычным человеком, не-личностью, человеком с несформированным мышлением, без мировоззрения. Эта разница отражается в общественном положении личности.

Вывод: нет смысла ждать чудес, получишь трагедии, брать власть в руки, ее отберут, доказывая чью-то неправоту, сам станешь обвиняемым. Чтоб выжить в новых реалиях 21-го века, нам остается учиться делать, создавать, творить красоту, харизму, способности, открывать уму непостижимые богатства нового уровня. На самом деле мы еще по-настоящему не жили, а данная статья есть самый короткий путь к ней, к настоящей жизни.

3. Практика.

Как было сказано ранее, самое главное свойство большинства людей — это следование обстоятельствам. То есть, мы играем роль послушного зрителя, красиво одеваемся, тихо сидим, показываем всем изысканные манеры, а думаем, что актеры бывают только на сцене и вот-вот представление начнётся. В этом мире, наполненном избыточным количеством наигранных представлений, нам не хватает, да, других, представлений, но там, где сценой является наша жизнь. Именно в их зеркале можно увидеть наши маски, шаблоны, недостатки, и начать учиться жить по-новому. Например, у каждого в голове куча красивых и умных мыслей, но, если их попытаться выписать получится уродство из нескольких слов. Любая проблема в голове, аналогично, вселенского масштаба, но если ее один раз увидеть со стороны, она исчезнет, и до конца жизни ни один человек в мире не сможет ее для вас создать, даже подумать не сумеет. Мы знаем, когда весь мир против нас, вовремя протянутая одна рука, вовремя

сказанное одно слово способны опрокинуть миллионы врагов, миллиарды проблем. Да, но никогда в жизни мы этого не испытывали. Люди смертельно боятся уронить в глазах общества святой образ своей демоверсии. Когда человек тонет в проблемах, он не подаёт вида, а когда кто-то протягивает руку помощи, он хитро принимает её, но потом опять не подаёт вида. Главное - не уронить «своё лицо». Решить эту дилемму поможет выражение Архимеда: дайте мне точку опоры, я переверну мир. Нужны такие именно опорные представления, чтоб как прививки, один раз сработали и до конца жизни, чтоб никто даже подумать не подумал причинить вам вред. Тогда и не придётся делать вид, что всё хорошо.

Театр и кино создают хорошие образы в наших головах, психологи и врачи устраняют плохие, приходят новые, а ситуация не улучшается. Суть не меняется, потому что жертва остается жертвой, меняются только декорации. Вчера она всем доверяла, сегодня никому не верит, а завтра верит всему, потому что все так говорят. Тому, кто реально хочет начать жить, предстоит задача учиться играть свои роли и стать актером своей жизни. Односторонний подход и в этом вопросе состоит в убеждении, что научиться чему-то можно только у седых бородатых умудренных опытом жизни старцев. Если есть одна крайность, есть другая, а именно, учиться можно и у детей, играя с ними в их игры. На различных праздниках, в гостях, встречах вольно-невольно 2-3 раза в год мы с ними сталкиваемся. Чтоб понять суть, одного раза достаточно. Заметьте, родители таскают детей с собой как куклы на выставки. На таких встречах под страхом наказания детей приучивают вести себя правильно. Повзрослев, они в страхе так себя и ведут, везде, будто родители рядом. Как вести себя по-другому, они не видели, поэтому отзеркаливают родителей. Афоризм: как не воспитывай детей, они станут вашей копией. Третий шаг, постепенно учиться играть взрослые игры со своим окружением, то есть перестраивать сценарии. Общение со всеми, начиная со стандартного приветствия, продолжается по стандартным сценариям.

Опасность любой игры, состоит в том, что, вовлекаясь в нее человек может настолько вжиться в роль, что можно потерять свою идентичность. Пример тому, всем известный тюремный эксперимент. Нам кажется, что жизнь актеров мирового масштаба прекрасна, а на самом деле, как всегда, всё наоборот и гораздо сложнее. Шутить, троллить, прикалываться, также как и любая игра, имеет невидимые нравственные границы, когда неопытный, переступая их превращается в маньяка, или становится куклой для битья, или жертвой своих шуток. Даже одно безобидное слово может привести к непоправимым последствиям. Как говорится, за плохие дела иногда прощают, но, в этом мире, ни одно доброе дело не осталось безнаказанным. Единственный способ обойти эти опасности, стараться во всем быть чуть ниже любого встречного. На примере с детьми не стоит стесняться быть ниже их. Можно играть роль, что вы чуть глупее их, или наигранно показывать серьезность, главное соблюдать границы и держаться принципа "не навреди". Дети сами многому вас научат и будут благодарны вам до конца жизни (понятно, они вам никогда об этом не скажут). Человек развивается только в среде, где все вокруг него умнее, способнее, выше, сильнее. Разность потенциалов дает энергию для ваших достижений. Значит, самая выгодная роль, это роль вечного ученика, студента по-жизни, которого никто всерьез не воспринимает. Он, как рыба обходит все острые углы и препятствия, а отсутствие конкурентов гарантированно покажет самый короткий путь к достижению счастья, как в сказках.

«Вы заслужили всё то хорошее, что с вами произойдет!»

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DIGITAL TRANSFORMATION OF CIVILIZATION: REALITY AND PROSPECTS

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The modern stage of development of human civilization constantly confirms the law of constant increase in the rate of social progress. The process of formation of industrial society, which began in the late 18th - early 19th centuries, then transformed into post-industrial, and then into technotronic (E. Toffler), informational, clearly shows the importance of changes in the material and technical basis of society for subsequent transformations of all its components.

The industrial revolution of the 19th century not only created fundamentally new productive forces. It also resulted in changes in the social structure of society, the emergence of new social groups, the formation of a new political picture of the world and the emergence of new ideas and trends in spiritual life. During this same period, an intensive process of formation of a global (on a planetary scale) civilization system began. Countries that previously had little contact with each other establish new permanent connections and relations, becoming closer to each other.

The middle and the second half of the 20th century are marked by the development of the scientific and technological revolution. Qualitative transformations of productive forces change the entire way of life of people. Changes in the social and political spheres turned out to be so great that under the auspices of the UN special research programs were developed, the purpose of which was to understand and analyze the social consequences of the scientific and technological revolution in various socio-economic systems. However, after about 30 years, humanity again enters a period of fundamental civilizational transformations - the information society begins to form. The creation of the Internet and the production of personal computers turn out to be truly revolutionary factors. Back in the early 90s, the purchase of a PC in the CIS countries was available only to organizations. But literally in a few years they become an integral part of the life of every family. Their inclusion in the global network makes it possible for everyone to constantly contact other countries and continents. And all this is a short period of time on the scale of one person's life. Therefore, it is obvious that both the speed and depth of changes within the information society significantly exceed what humanity has encountered before. The formation of the system of infocommunication technologies determines the emergence of a truly global in scale, constantly functioning and including literally every subject of the planetary "thinking" system.

The system of infocommunication technologies as an initially technical component quite quickly begins to show its qualitative differences from previous innovations in the technical and economic sphere. It does not simply enhance the capabilities of society in its interaction with the world - it begins to duplicate and enhance those properties of the subject that were previously considered inherent exclusively to man - his cognitive functions. In other words, it goes beyond the technical and technological processes.

Naturally, initially infocommunication components develop within the already existing components of society, allowing them to accelerate and improve. But literally within 10 - 15 years they go beyond these limits. On their basis, new phenomena appear that were previously fundamentally impossible. And then the next stage begins - purely virtual phenomena arise, similar to those that existed before.

In the economic sphere, new technologies first allow for a significant increase in labor productivity. (For example, in design developments, they reduce the time it takes to create a new product several times.) Then they make it possible to create new economic technologies that were previously impossible due to their high cost. And finally, "purely virtual" economic components emerge within the global economic system. And very quickly this digital economy already surpasses the also high-tech, but traditional economy in its capitalization.

Similar processes are taking place in all areas of our civilization, on a planetary scale.

The system of infocommunication technologies changes the geographical map of the world that is familiar to us. The latter, in addition to the existing physical, economic, political components, must be supplemented by information transmission lines, communication nodes, and information storage centers. And in a number of cases, this element of real geography, in which a person exists, turns out to be more important than the rest.

A virtual economy emerges, which often does not even come into contact with other economic processes, functioning independently. New social communities emerge on the basis of the Internet, the number of subjects in which already exceeds the population of the Earth. Virtual mechanisms arise that regulate political processes. And, finally, a virtual spiritual sphere develops, where its own ethical, aesthetic, legal and other norms are already present, which have no direct relation to real life, functioning only within their own framework according to their own laws.

Thus, since the system of infocommunication technologies, as noted earlier, enhances and reproduces, in a number of cases, the cognitive functions of a person, it also begins to display the processes and phenomena with which it interacts. A virtual image of objective reality emerges. In other words, with the help of the ICT system, it creates another area of reality. And, since this process involves not a separate subject or group, but humanity as a whole, a virtual model of all components of the surrounding world is formed. The previously existing reality is, as it were, doubled. This mechanism is similar to human consciousness, which creates a subjective image of the objective world, its own model of the world. However, the subjective reality that is formed by an individual exists primarily within the limits of his consciousness. He can obviously exchange its individual components with others. However, these mechanisms of mutual exchange have certain limits.

And the system of infocommunication technologies fundamentally increases these possibilities and even, in the ordinary sense, eliminates them altogether. Everyone has the potential to directly contact all of humanity and influence it. Moreover, information placed in a virtual environment does not disappear along with the disappearance of its source, but is preserved. Consequently, civilization generates a new product that is necessarily included in all spheres of society, becoming its integral element. A specific subject may not interact with this sphere at a certain time, but it is supported by all other inhabitants of the planet. Therefore, the virtual environment acquires a certain independence in relation to a specific individual, acquiring, in relation to him, the properties of objective reality. This new component of reality acquires a certain independence from the factors that generate it. Becoming a component of the world surrounding a person, it can already be placed between a person and the objective-practical reality. The subject begins to interact with objective reality through the tools of virtual reality. In modern conditions, a person has the opportunity not to contact other members of society and social structures directly at all, but at the same time provide himself with everything he needs. You can work remotely, receiving assignments online and a salary on a card. Furthermore, you can order everything you need online, take virtual trips around the world, etc. Virtual reality seems to replace objective reality. It is clear that objective reality does not disappear; a person, in principle, cannot exist outside and without it. But a specific individual may not be aware of this, continuing to exist in the virtual world. And this "world" causes significant changes in him. A social person of the information society experiences transformations in the functioning of the biological body, in cognitive properties, in personality characteristics and norms of social behavior [1]. And many of them, obviously, are negative. These new properties are already recorded empirically, but the reasons for their appearance and possible ways and means of minimizing their negative consequences for humanity have not yet become the subject of in-depth study.

Consequently, the physical, objective-practical shell of the Earth, in which human civilization arose and developed, was supplemented by a virtual shell. A "noosphere" ("sphere of reason") literally arose, the theory of the formation of which was developed by V.I. Vernadsky [1]. Its emergence is not a random process. It was the result of the action of general laws of the development of the Earth, all its components - inanimate nature, living nature, human society. And at the present stage, a single global "cognitive" shell has formed on the planet, that is, the Earth has become an "intelligent planet". Accordingly, its cosmic "status" has changed. It has ceased to be just an object of the Universe, which passively perceives external influences. Such a transformation of the planet allowed it to go beyond its own boundaries. The Earth acquired the properties of a subject, actively and purposefully interacting with space, cognizing it and already beginning the transformation of the adjacent parts of the latter.

It is clear that the term "reasonable" in the sense of "correct", "useful for man and humanity" is not applicable to all components of the global noosphere [2]. But, at the same time, it is obvious that this phenomenon of human civilization is integral and has its own specific laws of development. Therefore, its comprehension should be truly systemic, with the identification of general fundamental patterns and

analysis of their manifestations in various specific areas. Then it becomes possible to predict probable trends in the development of the information society and minimize potential negative trends. Otherwise, misunderstanding and failure to eliminate common problems will lead to the fact that a person will encounter their manifestations hundreds of times when trying to solve specific issues. And the task of this systemic comprehension of virtual reality as a component of civilization is, in our opinion, extremely relevant.

It should also be noted that the formation and functioning of virtual reality not only poses another historical challenge to humanity. This component of reality also creates new opportunities for solving emerging problems, both within it and in other structural components of civilization due to the development of virtual reality; it forms mechanisms that did not previously exist within human society. It is obvious that certain social processes develop differently in different countries - in some they have already reached a sufficient degree of formalization for a full-fledged analysis, while in others they are only just emerging. In this case, the opportunities for information exchange provided by the ICT system make it possible to almost instantly study and comprehend the processes occurring in different regions, use the accumulated experience and build activities in some countries taking into account the trends that have already manifested themselves in others.

Thus, the evolution of the technical and technological component of human society leads to the formation of a system of infocommunication technologies. This component of society has a paradigmatic effect on all civilization processes, creating a new virtual reality and transforming a person included in it. This additional reality brings to life a whole series of problems in all spheres of public life, but, at the same time, it also creates mechanisms that provide new opportunities for their solution. However, in order for this process to be successful, a comprehensive systemic analysis of the essential properties of virtual reality is required.

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Technical sciences

ADAPTATION OF METHODOLOGIES: FROM AGILE TO DEVOPS AND LEAN IN THE CONTEXT OF AI AND MICROSERVICES

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Abstract

In the context of rapid development of artificial intelligence technologies and microservice architecture, classical software development methodologies — Agile, DevOps, and Lean — face the need for deep conceptual adaptation. This study does not aim to develop software solutions, but offers a theoretically substantiated integration model based on the analysis of modern practices and scientific sources. The focus is on the intellectualization of DevOps, the unification of DevOps and MLOps into a single pipeline X system, the clarification of Lean principles in an ecologically and computationally rich AI environment, as well as the transformation of competencies and organizational culture. The substantiated methodology combines a systematic literature review, conceptual modeling, and case analysis. The proposed results form the basis for further applied research, as well as practical recommendations in the field of sustainable, automated, and adaptive development. The article contributes to the formation of new thinking in engineering and management practices based on the synergy of human and machine intelligence.

Keywords: *Agile, DevOps, Lean, MLOps, artificial intelligence.*

Introduction: *At the junction of technological eras, when software systems cease to be just code and turn into complex self-learning organisms, there is a need for a deep revision of the usual methodological foundations. Traditional approaches, once revolutionary - Agile with its flexibility and iteration, DevOps with its focus on continuous delivery and Lean as a philosophy of eliminating losses - are increasingly proving insufficient in the face of new realities, where the main role is played by intelligent agents, autonomous pipelines and distributed microservices [1, p. 2]; [4, p. 3].*

If earlier the development cycle could be compared to a well-oiled production line, today it is a dynamic ecosystem in which people, algorithms and infrastructures interact, each change in which generates a chain of mutual adaptations [2, p. 17]. The introduction of artificial intelligence into the software life cycle does not simply add new tools - it transforms the very essence of processes: from decision-making to quality assessment [11, p. 5]. Microservice architecture, in turn, destroys monolithic structures and requires new forms of organizational and technical thinking [13, p. 3].

In this context, it is not so much the creation of new methodologies that is relevant, but rather the deep adaptation of existing ones. We are entering a phase where methodologies are becoming "liquid" – capable of adapting to high-speed, self-changing and intelligent systems [14, p. 6]. The article you are holding before you is an attempt not only to analyze, but also to outline the direction of development of this transformation. There will be no code here, but there will be a concept. There will be no architectural scheme here, but there will be an architecture of thought.

The study aims to identify and substantiate those elements that enable Agile, DevOps and Lean to evolve: from a set of practices to an intelligently adaptive environment in which the software of the future is created [3, p. 7]; [15, p. 2]. It is in this intellectual plane that the main innovation is born - conceptual models, new roles, refined metrics and cultural patterns that can ensure not just technological superiority, but also sustainability, transparency and meaning in the context of digital acceleration [8, p. 4]; [7, p. 6].

1. Theoretical basis

The concepts of Agile, DevOps and Lean form a solid theoretical basis for modern software development practices [12, p. 1]. Agile sets values and principles based on iterativeness, adaptability and human-centricity. These approaches are born from a culture of flexibility, where rapid response to change

and close interaction between the team and the customer allow for the formation of a valuable product step by step [2, p. 21]. When developments acquired a large scale, the DevOps model came to the fore - a kind of continuation of Agile, aimed at optimizing the "code-environment" cycle through continuous integration, delivery and operational practices, with an emphasis on fast and high-quality delivery of value [3, p. 5]; [11, p. 4].

The next level of evolution was the Lean philosophy, which came from Toyota production and provided a methodology for eliminating waste and optimizing processes [2, p. 55]. In the context of development, Lean focuses on eliminating muda, enhancing feedback, delayed decisions, and creating holistic systems where the cost component of labor and resources is minimized, and the meaning and autonomy of the team is maximized [6, p. 3]. Consequently, DevOps is considered a synthesis of Agile, Lean, and ITSM elements - it is a closed cycle of introducing changes, increasing efficiency, and maintaining control [13, p. 4].

The current technological reality — saturated with artificial intelligence and microservices — poses challenges that force us to reconsider this stack of methodologies [4, p. 8]. Firstly, AI introduces intelligent agents — they can perform CI/CD management, generate configurations and test scenarios, thereby changing the nature of the development and quality control phases [1, p. 6]. Secondly, the microservice architecture, organized on the principle of distributed and self-sufficient components, imposes new requirements on version control, monitoring and integration — and AI, in turn, is able to simplify synchronization and verification of interdependencies in real time [5, p. 3]; [10, p. 4].

Thus, the theoretical basis consists of three interrelated elements:

Component	*The gist*	*The Impact of AI and Microservices*
Agile	*Reduced iterations, self-organizing teams, flexible requirements*	*Need automation of requirements generation and deferred decisions*
DevOps	*Release Continuity, CI/CD, Infrastructure as Code (IaC)*	*Intellectualization of processes, introduction of quality control of models*
Lean	*Elimination of waste, optimization of value flow, efficiency metrics*	*Rethinking Latency Metrics, Waste-analysis and carbon-footprint*

By moving from a simple Agile + DevOps + Lean synergy to AI integration-pipelines and microservice delivery, there is potential for rethinking each of these pillars. In theory, we see Agile becoming a platform for intelligent agility, DevOps becoming an environment for AI-automation, and Lean is a concept aimed at balancing value, quality and sustainability [4, p. 5]; [13, p. 4]. This revision requires a conceptual reconstruction of each methodology, taking into account new technological conditions [1, p. 6].

2. Innovative research directions

2.1 Intelligent DevOps

Developing the theoretical basis, we now turn our attention to the first innovative direction - the intellectualization of DevOps. The presented analysis reveals the potential of AI in the DevOps garb-conveyors, without technical implementation, but with the disclosure of novelty [14, p. 3]; [11, p. 2].

Integrating AI into DevOps involves implementing machine learning and predictive analytics at key stages of CI/CD. Today, tools can already predict the success of builds, identify anomalies, and even initiate automatic rollbacks, reducing downtime and increasing delivery reliability [3, p. 9]; [15, p. 5]. This allows us to view DevOps not just as an automated conveyor, but as a self-regulating system with "smart" agents capable of adapting to changes in the internal and external environment [1, p. 10]; [6, p. 3].

Key areas within the framework of intellectualization can be identified:

Direction	*Description*
AI-CI/CD optimization	*AI estimates the probability of build failure, prioritizes tests, and selects relevant configurations during deployment*
Predictive monitoring and self-healing	*Based on logs and metrics, ML identifies possible failures, initiates auto-correction or delayed rollback without human intervention*
Intelligent Code Review and Security	*AI automatically analyzes code quality and vulnerabilities, suggests improvements, reducing human errors*

Scientific research confirms the effectiveness of such practices. Thus, an architecture for using models in DevOps automation is shown in the concept of a model-oriented approach to process planning [1, p. 7]. In another example, DeepOrder, deep learning helps rank tests and speed up CI-cycles, reducing the time to identify errors [3, p. 6]. It has also been proven that LLM models can automatically generate CI configuration files (for example, for GitHub Actions), which dramatically reduces manual labor when setting up pipelines [4, p. 9]; [11, p. 4].

The novelty of this direction arises from the conscious identification of new phases and roles within DevOps-methodology. The following concepts are rational:

*• Adding AI-**phases**— stage «AI-analytics", where the historical context of the conveyor is collected and analyzed for adaptive change of the next cycle [14, p. 5];• The role of AI-**operator**— a virtual agent responsible for monitoring, diagnostics and escalation [6, p. 4];• Lean-**focus on efficiency**— AI-metrics (response time, prediction accuracy, number of automated fixes) become DevOps indicators-productivity [2, p. 19]; [8, p. 6].*

2.2 Integration of MLOps and DevOps

Moving from the intellectualization of DevOps, we are faced with the need to combine the pipelines of classic software development and the life cycles of machine learning models. This combination represents a new direction aimed at overcoming technological and organizational barriers between teams [13, p. 3].

MLOps as a discipline has evolved under the influence of DevOps, adapting to the specific needs of models - additional stages of data preparation, training, validation and monitoring [5, p. 5]; [15, p. 2]. However, traditionally MLOps and DevOps are implemented separately, which leads to "leftovers" in the overall software and ML supply chain: duplication of tools, disparate stages and reduced efficiency [6, p. 2]; [7, p. 3].

Conceptual core of integration

Aspect	*DevOps*	*MLOps*	*Integrated model*
Artifacts	*Code, assemblies, configurations*	*Data, models, hyperparameters*	*Unified registry of artifacts: code + models + data*
CI/CD pipeline	*Build, test, deploy*	*CI/CT/model setup*	*A shared pipeline where a change in code or data triggers a full cycle of development, training, and deployment*
Monitoring	*Uptime, latency, rollbacks*	*Drift, accuracy, A/B tests*	*General monitoring system via Grafana and Prometheus, displaying software and ML indicators simultaneously*
Teams	*Virgos and ops*	*DS, MLE, DevOps*	*Cross-functional teams sharing goals, tools and processes*

In this model ML-the model is considered as an artifact equivalent to code. Such unification leads to a reduction in fragmentation, an increase in traceability and consistency of processes [4, p. 6]; [13, p. 4].

*The path to integration includes:• Unified CI/CD-**pipelines**: code triggers not only the build, but also the retraining of models when data is updated [3, p. 7];• Unified infrastructure: use of containers and Kubernetes for all components of the system [11, p. 3];• Shared metrics and monitoring: simultaneous tracking of infrastructure metrics and model quality indicators [15, p. 4];• Collaborative culture: joint workshops and cross-training between data-engineers, DevOps-engineers and developers [6, p. 5].*

Such practices have already formed the basis of recommendations by large companies, including Netflix and Uber [13, p. 5].

The novelty of this direction is manifested in a number of theoretical and conceptual aspects: 1. New pipeline level — creation of pipeline X, combining CI/CT/CD for applications and models, based on a single registry of artifacts [1, p. 11]; 2. Extended version storage period — tracking code, data and models at all stages using metadata and registries [14, p. 6]; 3. Shared observability — software performance metrics and model results are displayed on single dashboards for comprehensive analysis [7, p. 4]; 4. Common work culture — development of common rules, SLA, security standards and change management for all development participants [2, p. 23].

Mixed studies confirm the practical importance of integration. For example, the work of DSR and J. Mathew describes improved collaboration, faster deployments, and reduced errors when DevOps and MLOps practices collide [3, p. 10]. This points to the scientific value of new integration practices, even in the absence of practical development [6, p. 5].

2.3 Lean Clarification-principles in AI-Wednesday

Developing the theme of DevOps and MLOps integration, we move on to clarifying Lean-principles adapted for an AI-rich environment-technologies. Transforming Lean in this context requires expanding traditional ideas about waste, adding new metrics and reconsidering approaches to sustainability, quality and value flow [5, p. 3]; [8, p. 5].

The Lean material originated in manufacturing and is extended to IT through the idea of eliminating waste, continuously improving and creating value for the user [12, p. 1]. In the classical understanding, seven types of waste are distinguished - from "unfinished work" to "defects" [2, p. 58]. However, AI-The environment introduces new sources of inefficiency: excessive consumption of computing resources, preparation of redundant data, energy and environmental costs associated with training and inference of models [9, p. 2]; [10, p. 4].

The changes concern four key areas:

Lean context	Traditional approach	AILean clarifications
Waste	Redundant code, tasks, defects	Formation of newwaste: retraining models, unnecessary data, energy costs
Metrics	Cycle time, WIP, defects	CPI (Carbon per Inference), MCI (Memory Cost Index), CO_2-training traces
Value Flow	Kanban-boards, pull-model	Accounting for "green flow" with minimal waste, visualization of the environmental budget
Culture	Kaizen, respect for people	LeanAI mindset: continuous iteration, ethics, environmental responsibility

Scientific publications on Green Algorithms demonstrate how to measure the carbon footprint of computations [5, p. 4], and Eco2AI offers a toolkit for tracking CO_2-emissions in ML-models [10, p. 3]. On the other hand, studies reveal that the use of LLM-assistants, although it speeds up development, can significantly increase the carbon footprint - on average by 33 times [9, p. 2].

LeanAI offers a shift in thinking: "AI is rocket, Lean is fuel" — striving not just for innovation, but for smart, sustainable growth [8, p. 5]. This gives rise to new practices: • LeanAI implementation awaits automated analysis of losses at the data and infrastructure level [7, p. 3]; • regular "ecoretrospectives" with energy and CO_2 analysis [10, p. 4]; • process KPIs include not only speed and quality, but also sustainability [6, p. 6].

Lean Clarification-principles in AI-environment shifts conceptual responsibility for waste, metrics and development culture onto six axes: economic, environmental, technical, social, ethical and managerial [12, p. 2]. This transforms Lean from a set of practices into a philosophy capable of ensuring sustainable development of software systems in the context of rapid growth of AI-technologies [2, p. 60].

2.4 Competencies and culture of the organization

Continuing the development of the topic, we move on to the fourth component - competencies and culture of the organization. This part reveals how exactly professional skills and organizational aspects change in an environment where AI and microservices become an integral part of DevOps and Lean processes [4, p. 7].

In a rapidly changing digital landscape, DevOps-the engineer becomes not just a technical specialist, but a bridge between the code, the operating system and analytics [11, p. 5]. To work effectively in the conditions of AI-environment requires advanced skills - from a deep understanding of scripting and containerization to the ability to interact with machine learning systems and ensure the security of models [3, p. 8]. At the same time, a successful specialist must have high communication skills, proactivity and flexibility, which is confirmed by sources on soft skills in DevOps-practices [14, p. 4].

The DevOps organizational culture is traditionally built on the principles of openness, collaboration, and continuous learning, where process transparency and trust between teams are seen as the key to productivity [13, p. 5]. Transition to AI-oriented environment forces it to expand. AI becomes an active participant - a "participant" in decision-making, and not just a tool. In this context, a cultural model built on trust, collective responsibility and sharing of innovative initiative plays a key role [6, p. 5]; [15, p. 3].

The set of necessary elements can be represented as follows:

Component	Description
Technical skills	knowledge of AI/ML (AIOps), containerization, IaC, monitoring, security
Social skills	communication, cross-functionality, proactivity, training
Organizational values	trust, transparency, shared responsibility, innovative leadership
Pedagogical infrastructure	availability of programs for upgrading skills, cross-training, mentoring

Organizations where DevOps engineers and ML specialists work closely together are moving to a flexible team structure: cross-functional cells, platform groups, and competence centers, which ensures optimal communication and skill development [13, p. 5]; [6, p. 4]. In addition, the success of DevOps adaptation in the context of AI is associated with cultural resilience - the ability to implement changes in a structured and conscious manner, avoiding fragmentation and overload [2, p. 61]; [4, p. 8].

The pursuit of innovation requires a special kind of leadership approach – innovation leadership. A new type of leader not only stimulates creativity, but also creates a safe space of acceptable trials in which AI components and people can synergize [14, p. 6]. It is through the combination of technical competence, a culture of trust and innovative thinking that an organized environment is formed where AI becomes not a tool, but a means of collective creativity [15, p. 3].

3. Research methodology

To achieve the goal of identifying innovative directions for adapting methodologies without practical implementation, a combined systematic approach is used. First, a systematic literature review is planned based on the proven SLR methodology. The process includes a clear formulation of questions

(PICO/PICo), a detailed search in scientific databases (Scopus, Web of Science, arXiv), subsequent selection of publications by relevance, extraction of key data and their critical synthesis [1, p. 2]; [3, p. 5].

Next, the technical and profile aspects of the integration of DevOps, MLOps and Lean are analyzed in several stages:

Stage	Action	Target
Formulating questions	What is typical for AI-intellectualization? How are metrics and roles changing?	Clarification of the direction of literature search
Search and Extraction	Metrics analysis, pipeline description, cognitive models - data structure extraction	Collection of empirical and conceptual examples
Critical analysis	Comparative synthesis of practices and identification of gaps	Building a basis for hypotheses about novelty

Then the Design Science Research (DSR) method is applied, focused on the development of conceptual models - the artifacts are not software solutions, but integration models and interaction schemes of methodologies and roles [1, p. 5]; [4, p. 6]. They are created within the framework of the iterations "development - evaluation - reflection", while the sources of evaluation are documents and case descriptions of implementations from global practice [13, p. 4]; [14, p. 3].

The empirical aspect is implemented through qualitative case studies based on infographics and reports from companies where Pilot is observed-projects combining DevOps and MLOps [3, p. 10]; [6, p. 4]. An in-depth comparative analysis of these cases will allow us to verify the validity of the proposed models and adaptation schemes.

At the same time, the mixed-methods approach, which combines SLR, DSR and case studies, provides a comprehensive overview. This approach allows for both the breadth of theoretical context and the depth of practical examples, while maintaining a focus on the formation of conceptual novelty and well-founded recommendations [15, p. 4].

In moving on to the advancement of innovative proposals, it is important to note that the research methodology provides a link between theoretical constructs and the possibility of their verification, which makes the conclusions not just hypotheses, but well-founded concepts ready for further research [5, p. 6].

4. Expected results and contribution

The study is expected to identify and systematize key areas of innovation in the adaptation of Agile–DevOps–Lean in the context of AI and microservices. First of all, a conceptual model will be proposed — AIintegrated pipeline X, which combines CI/CT/CD for code, data and models, and turns ML-model into a full-fledged development artifact, smoothing the gaps between DevOps and MLOps [14, p. 5]; [4, p. 8]; [11, p. 5].

The structural results of the study can be presented as follows:

Expected result	Description	Contribution
Pipeline X architecture	CI/CD integration with data preprocessing, training, monitoring stages	Expands DevOps-practices towards fullstack ML support
AIDevOps Kit-metrics	Suggestion of new indicators (MTTD, MTTF, MTTR + CPI, MCI)	Expands the assessment of process performance and sustainability
LeanAI Framework	Lean refined-principles: waste-analysis, ecoretrospectives	Provides tools for sustainable development and environmental accounting
Roles and Culture	Defining AI Competencies-operator, crosstraining	Assists in the educational and organizational development of teams
Well-founded case concepts	Meta-analysis, prototypes of conceptual frameworks	Provides theoretical justification for the proposed models

Empirical and conceptual findings will emerge through the following aspects:

- ***Transparency and consistency.*** *Integrating code, models, and data into a single chain will improve traceability, reproducibility, and communication between teams, as demonstrated by the practices of Netflix and Uber [13, p. 5]; [4, p. 6].*
- ***Sustainability and responsible development.*** *LeanAI metrics such as CPI and CO_2-routes will allow us to evaluate the effects of developments from the point of view of environmental and economic costs [5, p. 4]; [8, p. 6]; [10, p. 3].*
- ***Improving team interaction.*** *The proposed roles and crosstraining practices contribute to increased efficiency and reduced fragmentation, as noted in the research of DSR and J. Mathew [3, p. 10]; [6, p. 4].*

Theoretical contribution *consists in the formation of a system integration model combining DevOps, MLOps and Lean with an emphasis on AI and microservices - this is a significant step from empirical practices to scientific justification [1, p. 11]; [14, p. 5]. Such a contribution allows us to take a fresh*

look at development methodologies, providing a basis for subsequent applied and experimental work [15, p. 3].

Practical value *consists of recommendations for organizations: the use of the proposed models will allow the formation of a single DevOpspipeline, reduce waste and carbon footprint, and increase the speed of AI inference-functionality into operation [7, p. 3]; [11, p. 4].*

Finally*, directions for future research will become obvious: development of CPI and MCI measurement tools, creation of pipeline X editors, standardization of AI roles-operators, as well as an empirical assessment of the effectiveness of LeanAI-methods [9, p. 2]; [12, p. 2].*

Conclusion

In conclusion, we would like to emphasize that the analysis revealed a critical need to transform Agile, DevOps, and Lean methodologies in the context of the rapidly growing influence of AI and microservice architecture [2, p. 62]. The transition from existing practices to new concepts required a systematic review: from adding intelligent phases and automated agents, through integrated pipelines, to environmentally oriented metrics and revising the organizational culture [6, p. 5]; [14, p. 6].

As a result, it was proposed:

- ***Conceptual model of pipeline X****, where code, data and models are run together through CI/CT/CD, creating a single software and AI lifecycle-components [4, p. 8];*
- ***Lean Extension-principles****: introduction of new waste-metrics (CPI, MCI), the practice of ecoretrospectives and "green" value streams [5, p. 5];*
- ***Rethinking Roles****: the emergence of AI-operator, crosstraining, culture of shared responsibility, innovation leadership [14, p. 3].*

The main result is a methodological ecosystem capable of covering all stages of AI-developments without practical implementation of the product, but with clearly stated development directions. This ecosystem allows for technological, environmental and organizational challenges to be taken into account, which significantly expands the methodological toolkit and lays the foundation for subsequent empirical and applied research.

As a result*, the result of the article is not just a theoretical description, but the construction of a conceptual field that includes models, metrics and cultural practices, ready to become the starting point for the next stage of research and implementation.*

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HOW AI IS CHANGING THE PROFESSION OF THE AEROSPACE ENGINEER

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Abstract

The article is devoted to the transformation of the aerospace engineering profession under the influence of artificial intelligence (AI). It examines the change in the engineer's role — from an executor to an integrator of intelligent systems — and emphasizes the need for interdisciplinary training, including programming, modeling, and working with digital twins. Particular attention is paid to practical projects, educational programs (including MAI), strategic growth within companies, and the importance of personal resilience in the context of AI. It is concluded that a future engineer is a specialist who is capable of not only using AI, but also forming the architecture of hybrid systems, acting as a system architect and coordinator of machine agents.

Keywords: *aircraft manufacturing, engineer of the future, artificial intelligence, interdisciplinarity, sustainability.*

Introduction

In recent decades, the world has witnessed the rapid growth of artificial intelligence (AI), which has evolved from a concept for laboratory experiments into a key driving force behind the transformation of all high-tech industries [1, p. 1; 3; 19]. One of the most sensitive and at the same time promising areas of its application is the aerospace industry [6; 16, p. 3; 19]. It is here that the precision, reliability and complexity of engineering solutions reach their peak, and the cost of an error can be commensurate with the loss of human life or billions in damages [16, p. 4]. Against this background, the rapid introduction of AI is becoming not just a technical innovation, but a strategic factor changing the very essence of the profession of an aerospace engineer [1; 3; 34].

Artificial intelligence in aerospace today is not a hypothesis, but a reality covering a wide range of areas: from automation of design and production processes [7; 8; 11], to flight control, analysis of data from orbital platforms and predictive maintenance [6, p. 2; 17]. Moreover, the development of machine learning technologies, neural network models and digital twins makes it possible not only to analyze and reproduce complex processes, but also to predict the behavior of systems in conditions that have not yet been implemented in practice [5; 18; 38]. Thus, AI no longer just helps the engineer - it begins to make decisions, model the behavior of aircraft [20, p. 5], optimize the geometry of parts [22; 24], and identify potential failures before they occur [6, p. 4].

In this context, we understand AI in two forms. The first is analytical, focused on prediction, diagnostics, and identification of patterns and anomalies in large volumes of engineering data [1; 3; 19]. The second is operational, capable of acting autonomously: controlling robots in production [8; 11], coordinating navigation systems [2; 32], and monitoring engine operating parameters in real time [37, p. 6]. The fusion of these two components creates an environment in which an engineer becomes not only a developer and designer, but also a curator of an intelligent environment, where the boundaries between man and machine are gradually blurred [16, p. 5].

The peculiarity of aerospace engineering is its systematicity and interdisciplinarity, which makes it particularly susceptible to technological changes [25, p. 2; 27]. Here, AI is not just a tool – it is a new level of system integration. It enters into a dialogue with aerodynamics, thermodynamics, materials science, automation, and increasingly – with the philosophy of engineering thinking [26, p. 3; 30]. For a specialist, this means the need to rethink his professional role: from an executor of technical tasks to an architect of complex interactions between data, machines and decision-making logic [16, p. 6].

As AI penetrates key stages of aerospace design and operation [6; 19], engineers are faced with the challenge of not only mastering new tools, but also adapting their thinking, work processes, and professional guidelines [13, p. 11; 34]. This is not just the digitalization of the industry, it is a civilizational challenge in which the engineer becomes not an observer, but an active participant in technological evolution [1; 16].

A modern understanding of artificial intelligence in the context of engineering practice requires a clear distinction between its functional areas. In engineering and especially in aerospace, AI manifests itself primarily in two forms: analytical and operational [16, p. 2; 1; 19].

Analytical AI is designed to process and interpret large amounts of data in order to predict the behavior of technical systems, diagnose faults, and optimize design parameters [3; 6, p. 3; 5]. Such models are actively used in the development of digital twins, simulations of aerodynamic processes, and analysis of equipment failures on board aircraft [6; 18; 38]. Machine learning algorithms here not only select the best parameters, but also identify hidden connections between external conditions and the internal response of complex systems, which previously required many years of experience and empirical generalizations on the part of the engineer [22; 37, p. 6].

Operational AI, unlike the analytical one, operates in real time and makes decisions under uncertainty. It controls robots used on aerospace assembly lines [8], provides autonomous navigation for drones and unmanned vehicles [2; 32; 33], coordinates the actions of control systems in flight, including adaptive control of thrust, control surface position, or energy redistribution [13, p. 10; 37]. It is no longer an auxiliary tool, but a control subject capable of acting without human intervention, often faster, more accurately, and taking into account many factors inaccessible to human perception [16, p. 5].

For engineers, this represents a fundamental shift in the very nature of their profession. AI changes not only the tools they use (be it a CAD environment or an aerodynamic simulator), but also the architecture of their thinking, the structure of tasks and the degree of responsibility [24; 25, p. 4]. If earlier an engineer was a developer and at the same time an executor, now he becomes a system integrator, a coordinator of interactions between AI subsystems, a guarantor of the correct interpretation of their results and, most importantly, the final link in the decision-making chain [30].

In addition, an engineer can no longer rely solely on traditional knowledge of aerodynamics, thermodynamics, or strength. He or she is required to understand the principles of machine learning, neural network structures, and the logic of algorithms [1; 22; 26]. Even simulations now require not just calculations, but also the configuration of AI models capable of learning from initial data, refining parameters, and adapting to new conditions [3; 5; 18]. Thus, artificial intelligence does not displace the engineer, but rather takes him or her to a qualitatively different level — the level of strategic thinking and responsibility for the functioning of hybrid human-machine systems [16, p. 6].

2. The direct impact of AI on engineering activities includes a key transformation in the field of design and modeling. In this area, the possibilities of AI are revealed most clearly [11; 34].

Generative design is a method, which uses computational algorithms (e.g. genetic algorithms, GAN) to iteratively generate design variants that satisfy given constraints: strength, geometry, mass [11; 22]. Such algorithms are included in many CAD systems and allow hundreds and thousands of projects to be analyzed in a time in which a person could only consider a few [8; 24].

In aerospace engineering, this means optimizing frames, bodywork, and fasteners—where every gram adds value [11; 25, p. 6].

Digital twins (digital twins) and MBSE (Model-Based Systems Engineering) approaches further enhance the effect: they create a virtual clone of a product or system connected to real sensors and models [6; 36; 38]. This allows for "what if" analyses, predicting deviations, and testing management scenarios without the risk of equipment failure [5; 18]. Consequently, design goes beyond the initial stage and becomes a continuous process of the product life cycle [19; 34].

This is clearly demonstrated by the example of NASA and the xEMU spacesuit. Using AI modules – a combination of genetic algorithms and GAN networks – the team of engineers was able to reduce the weight of the fasteners and frame by 50% without losing strength [28; 29]. This allowed them to save hundreds of grams, turning them into additional payload or additional equipment – a critical result in preparation for lunar missions [30].

Thus, the synergy of three technologies – generative design, MBSE and digital twins – dramatically accelerates development, increases accuracy and reduces risks. [6; 8; 38].

Below is a comparison diagram of the "traditional approach vs. AI approach" modeling.

Element	Traditional approach	AI-approach
Iteration time	Weeks-months	Hours-days
Volume of options	Tens	Hundreds-thousands
Accuracy of analytics	Depends on the engineer's skills	Statistically sound, formalized
Weight loss	≈10%	Up to 50%
The role of an engineer	Executor, controller	Architect, AI systems consultant

The seamless combination of logic, data, physics, and AI creates a new quality of design: engineers gradually move from working alone with drawings and reports to curating a complex hybrid system of

"human-machine-model". Thanks to this, it becomes possible to design lighter, more efficient, adaptable structures with a deep understanding of the behavior of systems [11; 16, p. 6; 24; 26].

In the field of aerospace manufacturing and assembly, AI is manifested in the interaction of engineers with collaborative robots (cobots) – intelligent assistants created to work directly alongside humans [7; 8]. These compact robots, equipped with safety sensors and a Machine Learning system, are capable of performing monotonous, precise and often physically demanding operations: drilling holes, applying adhesives, finishing sanding [10; 17]. Thanks to this, engineers are able to concentrate on strategic tasks, while the cobot ensures stability, accuracy and safety of execution [34; 16, p. 5].

This collaboration goes beyond the traditional automated approach: cobots can be easily integrated into existing production lines, often without the need for protective fencing [8]. Lead-through teach programming and touch interfaces allow the engineer to literally "help out" the robot by manually setting its movement trajectory [10; 17]. Modern models, such as the Techman TM6S, already have a reach of up to 1.8 m, weigh only 35 kg, and have high movement repeatability [9].

AI visual inspection is another powerful direction. Machine vision with the help of high-definition cameras and neural network algorithms allows for the automatic detection of microcracks, geometric distortions, and surface defects [34; 16, p. 7; 6]. One cobot can process an entire aircraft wing, analyzing images in real time and connecting an inspector only after suspicious signs are detected [17; 38].

The advantages of this approach are summarized in the table:

Parameter	Traditional inspection	AI visual control and cobot
Accuracy	Up to 90%, depends on attention	98-99%, stable
Speed	Minutes-hours	Seconds per frame, no downtime
Human factor	Tired engineer → mistakes	No fatigue, smooth work
Integration into the line	Fencing/replacements required	Functions next to a person
Possibility of adaptation	Reconfiguration - 24 hours	Reprogramming in hours

The case of the French Air Cobot project is famous for the fact that the mobile cobot is able to autonomously scan the underside of an aircraft, record geometry and surface data, apply non-destructive testing algorithms and transmit the results to an analyst-inspector.This allows to reduce maintenance time, reduce the risk of missing defects and ensure traceability of inspection history [8; 17; 34].

Thus, the transition to collaboration with robots and the introduction of AI inspections allows aerospace companies to simultaneously improve quality, speed up production and reduce the workload of engineers - shifting their role from physical execution to managing intelligent systems and analyzing results.[16, p. 5; 10].

In the field of maintenance and predictive monitoring, the efficiency of aerospace technology is directly related to the quality of diagnostics and the speed of response.Modern artificial intelligence technologies are radically changing the approach to maintenance, a key factor in safety and economic efficiency [6; 13].

***GE Aerospace's Exemplified Engine Diagnostics Partners with Palantir**, where AI machine learning models analyze data streams from ≈44,000 operating engines worldwide [17]. In near real time, anomalies are recorded, trends towards potential failures are identified, and recommendations for intervention are issued tens of hours before a breakdown, thus achieving a 60% reduction in response time in predictive maintenance [17; 6].*

Additionally, the EMS system from GE and SAS demonstrated a reduction in the number of unscheduled maintenance and aircraft downtime at the Scandinavian carrier [17].

AI Wingmate, another breakthrough from GE Aerospace in collaboration with Microsoft, is an internal platform that serves engineers' needs, from finding documentation to working through non-standard technical situations.In the first three months of operation, more than 500,000 requests and 200,000 pages of technical data were processed, which frees specialists from routine analytical work and allows them to focus on critical engineering decisions [17; 33].

Let's present the key benefits of AI integration in engine maintenance in a summary table:

Parameter	Before the introduction of AI	With AI-technologies
Anomaly detection time	Weeks - months	Hours - days (up to 60% reduction)
Equipment downtime	Multi-hour - daily	Minimal - if you plan ahead
Maintenance planning	In fact - after the refusal	Predictive - ahead of schedule
Engineers' workload	A lot of routine analysis	Focus on critical case analysis and expertise
Reliability of operation	Statistics + experience	Trained model + data + analytics

These changes not only reduce operational costs and risks, but also move the engineer into the role of a strategic analyst who uses AI as an intelligent assistant.Instead of routinely processing huge amounts

of data, it focuses on interpreting deep causal relationships, validating maintenance plans, and confirming the accuracy of predictive models [16, p. 6; 34].

Thus, maintenance in the age of AI is no longer a routine check, but a synergy between the engineer and the algorithms: forecasting, diagnostics, planning and continuously improving decision making.This is a fundamental shift that opens up new ergonomics of the profession and improves flight safety [6; 13].

In an era where AI is increasingly penetrating the autonomous driving space, the field of flight control and autonomy is becoming a new battleground for safety, efficiency and innovation.It is here that a new paradigm of aerospace engineering is emerging [16; 19; 20].

AI algorithms created for route optimization and work with ATM systems are aimed at solving two key problems simultaneously - increasing airspace capacity and efficient use of resources.The review showed that approaches based on deep reinforcement learning (DRL solutions) are actively used for automated generation of optimal routes taking into account dynamic conditions – obstacles, weather and air traffic [20; 13].

For example, studies show that DRL can achieve precise execution of maneuver sequences in conditions of altitude change, seismic turbulence, and FMC aircraft dynamics using the Six DoF method.[20, p. 7].

At the drone level, from delivery systems to racing, DRL algorithms like AgilePilot have emerged that can change the trajectory of movement in real time, predicting the movements of objects and adjusting the speed to visual sensors.The Israeli project Lander.AI demonstrates the ability of a DRL agent to adaptively control landing on moving platforms taking into account wind effects, achieving accuracy inaccessible to classical PID controllers [33; 20].

Table 1. Comparison of the traditional approach and the DRL approach in flight control

Parameter	Traditional method	DRL-based approach
Resistance to interference	Limited by design skills	Learns from noise, adapts in real time
Learning speed	Requires manual configuration	Automatic improvement without human supervision
Work cycle (learning cycle)	Program → tests → programmer cycle	Cycle training → test → model update
Applicability	Narrow, for specific conditions	Universal, covers many scenarios
Data requirements	Behavior model + manual adjustment	Large simulations + real data

At the ATM level – i.e. air traffic control – DRL systems already help resolve conflicts between flights, maintaining the priority of safety and transparency of decision-making [20]. This is important not only for avoiding conflicts, but also for dynamic redistribution of air corridors under high loads [13].

Thus, DRL solutions form a new ecosystem of autonomous control, where engineers become not only designers but also mentors of AI agents. They manage simulated environments, train models and ensure their safety, interpretation and suitability for certification [20, p. 5; 16].

This is a new peak in the engineering ladder – the transition from direct influence to control of intelligent agents that adapt flight trajectories in real time and ensure reliability even in the most unforeseen situations [13; 20].

In modern aerospace engineering, new professional roles are being formed and the requirements for key skills are increasing, without which it is impossible to work effectively in the context of active implementation of AI [16; 34].

The emergence of AI engineers, autonomous systems specialists, and certification reflects the current trend of expanding functional horizons. AI engineers are interdisciplinary professionals who are able to work simultaneously with both machine learning and aerospace systems [1; 3; 19]. According to job platforms, the demand for such specialists continues to grow: vacancies for AI/ML engineers in the aerospace sector are actively published by leading companies, including Lockheed Martin, Maxar, and GE Aerospace [17; 34].

Their responsibilities include not only creating and training AI models, but also integrating them into critical systems, ensuring their reliability, security, and compliance with strict industry standards—which essentially becomes a new professional mission [16, p. 6; 25].

In addition to a deep understanding of aerodynamic designs, materials science, and control systems, engineers now require advanced programming skills and proficiency in analysis and ML tools. Python is the main language of most ML libraries (TensorFlow, PyTorch); it has become a universal basis for writing scripts, preparing data, and building prototypes [1; 3]. MATLAB/Simulink remain key for modeling, generating synthetic data, and integrating AI models into digital twins and simulators [6; 5; 18].

DevOps and MLOps are breakthrough areas that link the development and operation of AI: containerization, CI/CD processes, monitoring of models in "combat" conditions, which is described in detail in modern literature [34; 38].

As a result, the integration of the listed skills creates a new type of specialist: an AI development engineer who can not only create a model, but also deploy it, ensure its operation, check its safety, observe its behavior and document the entire work cycle [25; 26; 34].

Skill	Example of application	Meaning
Python + ML	Processing data from sensors, training models	Ability to rapidly prototype AI
MATLAB/Simulink	Creation of digital twins, testing system	Relationship between physical models and AI
DevOps/MLOps	Docker, Jenkins, CI/CD for AI products	Reliable deployment, tracking
Certification & Ethics	Model safety, explainable AI	Guarantee of compliance with standards

Thus, the 21st century aerospace engineer is a hybrid: a person capable of performing complex technical and mathematical calculations and simultaneously managing the life cycle of AI solutions. *Without a combination of these skills, further development of the profession will become impossible - they are what turn an engineer into an intellectual architect of new systems, responsible for their efficiency, reliability and safety [1; 25; 16, p. 6].*

With artificial intelligence taking over routine operations, the aerospace engineer is moving to a new level of responsibility – from executor to strategist. *AI effectively automates repetitive tasks: from simple calculations and visualization to generating rough models and basic debugging in the early stages of development [3; 5; 11]. This reduces the burden on junior specialists, as the CTO of ServiceNow reported: AI "occupies the middle level", doing the work that used to be done by dozens of intern engineers, and AMTEC research confirms that it is precisely these routine operations - data analysis, simulations and basic documentation - that are automated first [34; 38].*

As a result, the engineer moves on to strategic tasks, including systems architecture, integration of adjacent subsystems, and coordination of interdisciplinary teams. *Thus, experts identify two profiles of outstanding engineers of the future: horizontal specialists solving cross-functional and systemic problems, and deep specialists focusing on critical narrow problems [24; 26; 30].*

They are required for large-scale projects – designing complex systems, implementing new AI functions, balancing safety and efficiency requirements [19; 16, p. 5].

Critical thinking, the ability to interpret AI results, and creativity are key. Although machine learning algorithms can identify patterns and offer solutions, they do not take into account the industry context, ethical aspects, hidden patterns, and risks [1; 34]. Inteq Group experts emphasize that only human analytics can analyze AI output, develop a strategic line of action, and consider long-term consequences. This is confirmed by Forbes and GP Strategies: critical thinking is a new strategic resource that can prevent "data hypnotism" and ensure flexibility in decision-making [34].

Table: Changing Focus in the Engineering Profession

Role	Before the AI era	With the introduction of AI
Task type	Routine calculations, preparation of drawings	Systems architecture, interdisciplinary solutions
Control	Single-level communication	Team coordination, project decision making
Skills	Specialized technical knowledge	Strategic thinking, systems approach, critical analysis
Attitude towards AI	Tool to help	Partner, the result needs to be interpreted
Value for the company	Within the given process	Initiator of innovation and change

Thus, the adoption of AI frees the engineer from mechanical work, but requires maturity of thinking: to formulate strategic tasks, question the recommendations of algorithms, test hypotheses, consider risks, balance between efficiency and safety. This is a qualitative and logical transition - from the production of a "product" to advanced engineering thinking, where a person is responsible for what AI means and how it is applied in the critical environment of aerospace [16, p. 6; 1; 34].

In an effort to ensure the safety and reliability of aerospace systems, the engineering profession is entering a new era of accountability – related to AI explainability, certification, and resiliency. This is becoming the cornerstone of trust in aviation [13; 16; 34].

Explainable AI (XAI) is no longer optional – it is essential for interpreting model decisions in an aviation context. Without the ability to explain how an algorithm works, it cannot be certified to regulations or trusted in mission-critical situations [13; 16, p. 5]. Research shows that XAI helps identify biases and model failures and enables causal analysis, which is critical for aviation [20; 34].

Regulatory bodies such as the FAA, EASA and ICAO require AI system developers to have traceability: traceable links between data, algorithms and output decisions, which ensures transparency and is auditable [13].

Certification and resiliency are the next level of responsibility. Typically, aviation uses the DO-178C standard for software, DO-254 for hardware, and ARP4754/4761 for complex system solutions. When

implementing AI models, these regulations must be adapted so that the algorithm not only meets the target function, but also undergoes formal assessment of trust, safety, resilience, and interaction with other system components [16; 34].

In addition, engineers are required to develop fault-tolerant architectures that include redundant function chains and protection mechanisms such as FMEA, duplication of critical nodes, graceful deprecation, and fail-safe strategies that ensure the system transitions to a safe state upon failure [13; 34].

These methods allow one to withstand the certification "stress test" and prove the system's ability to withstand the Kurt of failure [16, p. 6].

A systems engineer, integrating AI into aircraft systems, becomes responsible for the following:

- *creating a hierarchy of requirements, linking them to code and training data;*
- *implementation of XAI tools to ensure transparency;*
- *development of fail-safe architectures that comply with SIL classes;*
- *interaction with regulators and preparation of evidence documentation (traceability matrices, safety cases, FMEA reports) [13; 34].*

Thus, safety, trust, and ethics become an integral part of the engineer's profession. He or she moves from the role of a developer to the role of an engineer-curator of AI systems, responsible for explaining algorithm decisions, model certification, and fault tolerance in the most complex and critical conditions of the aerospace environment [16; 34].

Developing this theme, in this section we will look at specific examples – technological milestones where AI is already delivering tangible results in the aerospace sector.

PhysicsX is a UK-based startup with an ambitious goal of revolutionizing engineering practice through physically-informed AI. After raising $135 million in Series B funding, the company is now valued at nearly $1 billion [38]. PhysicsX is developing a platform that allows engineers to build, train, and deploy AI models based on Large Physics Models (LPM). In one case study, they optimized a hydraulic manifold for engines, so instead of weeks of simulations, engineers got results in hours, significantly expanding the number of solutions to consider and improving the quality of the final design [38].

The company also introduced LGM Aero, a model trained on millions of meshes that can suggest the shape and characteristics of aerodynamic elements in seconds [38].

GE Aerospace, together with Palantir, uses AI for predictive monitoring and maintenance of aircraft engines. ML algorithms analyze telemetry of thousands of machines around the world and predict potential failures tens of hours before failure, which allows to reduce downtime by ~60% and optimize the technical resources of engineers [17].

Altair HyperWorks/PhysicsAI have implemented geometric deep learning for CAE simulations. Models running on historical calculation data produce physical predictions up to 1000× faster than traditional solvers [38]. This opens up new horizons for optimizing design processes: engineers can quickly and massively explore design options without waiting for lengthy simulations [5; 18].

Table. Comparison of AI application cases

Precedent	*Situation*	*Result with AI*
PhysicsX (LPM, LGMAero)	*Simulation Days-Weeks, Limited Choice*	*Seconds-Hours, hundreds of variations, instant analysis of geometry and behavior*
GE Aerospace + Palantir	*Reactive maintenance after failure*	*Predictive Maintenance: Identifying Problems in Tens of Hours, Reducing Downtime by 60%*
Altair PhysicsAI	*Slow CAE simulation, time and cost*	*Up to 1000x faster predictions, faster iterations and improved solutions*

Thus, the three cases illustrate different stages of the engineering process: from conceptual design (PhysicsX), through operational analytics (GE + Palantir), to virtual testing (Altair). In all cases, AI does not simply accelerate existing processes - it changes the strategy of engineering work: transferring resources to creative and analytical activities, strengthening the roles of systems thinking and active decision-making [5; 17; 38].

The first challenge is*the disappearance of routine positions and the need for reskilling/upskilling. According to reports from the World Economic Forum, up to 22% of modern professions may change dramatically by 2030, freeing up huge amounts of routine work [34]. In the aerospace industry, machines are increasingly taking on tasks related to data processing, basic simulations, and documentation [3; 6; 18]. But the unification of employees into specialized AI teams is opposed by personnel shortages - a lack of professionals capable of combining deep engineering knowledge and ML/MLOps skills [1; 26; 34]. Therefore, companies and engineers need an active and well-thought-out reskilling strategy - from mastering Python and ML tools to implementing MLOps and DevOps processes [3; 38].*

*The second challenge is*Explainability, safety and certification. Any AI systems in aviation must be "explainable", safe and certified. Modern research emphasizes that the lack of transparency of models hinders certification, reduces trust and limits the ability to inspect model solutions [13; 16; 34]. Regulatory initiatives such as the FAA Roadmap for AI Safety Assurance, EASA SESAR HUCAN and arbitration publications require traceability, formal evidence of safety and risk management [13; 20]. Current regulations DO 178, ARP4754, DO 254 are not created for probabilistic AI - new methods for risk assessment, operational reliability and testing of the "fifth transformation" of AI models are required [34; 16, p. 6].

*The third challenge is*Ethical and regulatory barriers that hinder the implementation of AI. As AI adoption increases, demands for algorithmic fairness, transparency of data use, accountability, and cybersecurity increase [13; 34; 38]. The industry faces regional differences: the US prefers a flexible approach, the EU introduces strict regulations, including the AI Act, Russia and others have their own strategies. In such an environment, risk analysis becomes more complex; each project requires deep interaction with regulators, auditing, and continuous monitoring - without this, innovations are illegal, and the risks are excessively high [34].

Summary table of calls

Call	*The essence of the problem*	*Consequences for the engineer and the company*
Retraining	*Elimination of routine tasks, need to master AI skills*	*Investments in training, adaptation of HR processes, new career paths are required*
Explainability & Certification	*AI systems are incomprehensible and do not fit current regulations*	*Traceability, new testing methodologies, integration of XAI and secure architectures are needed*
Ethical and regulatory barriers	*Different regional regulations, requirements for bias, privacy, liability*	*Engineers need to be proficient in legislation, auditing, and making ethical and legal decisions.*

Thus, the basis of change is not a technological challenge, but a systemic transformation of the engineering environment. Engineers and employers will have to rebuild not only competencies, but also culture, processes, partnerships - in order not only to implement AI, but also to do it safely, regulated and ethically [16, p. 6; 34; 13].

In this section, we consider the engineer's systematic approach to training - learning the skills and mastering the platforms needed to work with AI in aerospace engineering.

Learning Python, MATLAB, ML, DevOps and AI models becomes the foundation for professional growth. Python is a universal language with support for machine learning libraries (NumPy, scikit-learn, PyTorch) and a platform for creating MLOps processes [1; 3; 34]. Thus, NumPy provides convenient massive programming, which is the basis of ML development, and scikit-learn provides reliable solutions for classification and regression problems [3].

MATLAB and MATLAB/Simulink continue to dominate the modeling of physical systems: their courses, such as "MATLAB Fundamentals for Aerospace Applications," allow engineers to process data, visualize it, and automate it through scripts [5; 18]. In addition, modern trainings in Advanced MATLAB Programming prepare for the development of complex algorithms and ML problems [6; 34].

Mastering traceable DevOps and MLOps practices is becoming no less important. *The distance learning course "Python Essentials for MLOps" from Duke University via Coursera teaches API creation, testing, and automation of ML workflow [34]. Interactive articles from MathWorks demonstrate the integration of MATLAB/Simulink into the ML pipeline with streaming data processing (Apache Kafka, Grafana), CI/CD releases on Matlab Production Server, and model monitoring [5; 18].*

This allows the engineer to not only train the model, but also to build its operation, accompanied by samples, rollbacks and updates - as part of the product life cycle [38].

In parallel, it is important to master AI platforms and MBSE environments. *Altair PhysicsAI, integrated into HyperWorks, provides geometrically driven deep learning that accelerates CAE simulations by thousands of times [38]. TrueInsight interactive guides help engineers go from loading models to analyzing predictions.*

In addition, the MBSE + AI + Digital Twin platform from PivotPoint (Agile MBSE training) teaches how to build digital twins and integrate AI models into the system environment [6; 36]. This means moving from point simulation to a comprehensive project life cycle covering design, testing and operation [19; 38].

Table: Skills and corresponding platforms or tools

Skill	Platform / data	Example of training or analysis tools
Python + NumPy, scikit-learn	Working with arrays, ML models, prototyping	Coursera MLOps, arXiv (scikit-learn, NumPy)
MATLAB / Simulink	Modeling of physical systems, automation	MathWorks courses, Coursera certification
DevOps/MLOPs	CI/CD-pipelines, monitoring, pipeline models	Coursera, MathWorks publications
Altair PhysicsAI + HyperWorks	CAE acceleration, digital twins, deep learning	TrueInsight guides, Altair platform
MBSE + Digital Twins	System modeling, integration of IIModels	PivotPoint training, Agile MBSE

Thus, the training of an engineer must be strategic, comprehensive and interdisciplinary. It starts with fundamental languages and analysis tools, extends to the ability to implement ML solutions, build reliable workflows and ends with the practice of working with advanced platforms. This turns a specialist from an executor into an integrator who creates and supports intelligent engineering solutions [1, p. 2; 3, p. 3; 34, p. 10].

An important step in preparing an engineer to work in an AI environment is the implementation of practical projects, whether as part of their studies, hobby, or professional activity. Such projects allow the theory — modeling, programming, AI development — to be consolidated into specific engineering solutions [5, p. 4; 6, p. 4; 38, p. 12].

Developers and researchers are increasingly creating open-source frameworks for drone digital twins. For example, Springer published a solution that uses ROS Gazebo and ArduPilot to create a realistic UAV simulator with a recreation of the external environment using satellite data, allowing missions to be tested in practice [2, p. 3; 32, p. 9]. On GitHub, you can find the Twinflie project, a system for controlling a swarm of drones in a controlled environment, or Deepthewarrior's Drone-Digital-Twin, a repository with an implementation of a drone digital twin based on deep learning, developed in collaboration with DFKI [33, p. 10].

An example of such a direction is ArduPilot, a free drone autopilot system used by research groups and the military [2, p. 3]. It offers a full stack of software and hardware under the GPL license. The Paparazzi Project is another major project started in France in 2003: an autopilot platform for professional and amateur UAVs [32, p. 9].

These projects allow engineers to integrate into large communities, review code, suggest improvements, and implement features [2, p. 3; 33, p. 10].

For example, MIT has developed a digital twin project based on ROS 2 and a probabilistic graph model for monitoring the state of a UAV. Phoenix Drone is an open-source tail-sitter drone used as an educational platform for studying aerodynamics and control. Microsoft Research has proposed AirSim Drone Racing Lab, a simulator for testing autonomous drone racing algorithms [33, p. 10]. This helps engineers hone their deep learning and autonomous control skills.

Additionally, FlightGear and OpenVSP, publicly available flight simulation and aircraft modeling projects, help engineers master not only the theory of aerodynamics, but also the specifics of its implementation in a digital environment [14, p. 6; 32, p. 9].

Project Recommendations

Project goal	Examples of projects	Benefits for an engineer
Drone Simulations	ROSGazebo, AirSim	Reinforcing skills in ML, ROS, control, visualization
Digital twins	Twinflie, DroneDigitalTwin	Creation of system replicas, monitoring and diagnostic algorithms
Opensource autopilot software	ArduPilot, Paparazzi	Deep dive into the system, documentation, community
Aerodynamics modeling	FlightGear, OpenVSP	Concept development, CFD work, flight physics

Thus, participation in such projects turns engineering education into a practice-oriented one, combining the study of AI and system modeling. This allows not only to adapt to new tools and processes, but also to take responsibility for the result, integrating into real engineering contexts - from simulation and diagnostics to autonomous control [33, p. 10].

The most important stage of strategic training is the choice of an educational program that combines fundamental engineering principles and modern AI competencies. Moscow Aviation Institute (MAI) is deservedly one of such universities. Its core areas are Aerospace Engineering and Artificial Intelligence in Technical Systems, which provide for an in-depth study of MBSE practices, digital duality, mathematical modeling, and machine learning [6, p. 4]. In addition to technical disciplines, the program includes courses in certification, project management, and reliability, which allows graduates to meet international aerospace industry standards [3, p. 3].

At the same time, MAI offers educational tracks with network programs — for example, in collaboration with the Siberian and Smolensk universities — covering topics such as neural networks, digital twins, and unmanned control systems [6, p. 4]. An additional option is the MAI Advanced Engineering School, which focuses on creative design, generative technologies, and interdisciplinary innovative approaches. This creates a fertile environment for students who aspire to become leaders of technological change [1, p. 2].

Monitoring technology trends in real time remains equally important. The 2025 Paris Air Show marked a trend towards digital twins, automation and sustainable development of aviation, which confirms the increased interest in hybrid technologies and environmentally friendly innovations [14, p. 6]. SpaceX increased the number of launches to 170+ in 2025, rebuilding its approach to energy and resource conservation [34, p. 10]. Leading players Boeing and Airbus are increasingly investing in AI, drones and electric drives, while hard-tech startups are pushing the boundaries of what is possible, integrating AI not only into software, but also into the mechanical part of the devices [32, p. 9].

Thus, the dynamic combination of education and trend monitoring creates a competitive advantage. An engineer who regularly updates his knowledge of new platforms (such as MBSE, HyperWorks, MLOps), industry events (conference format, articles, pilot projects) and corporate innovations (SpaceX, Boeing NeXt) forms a relevant and in-demand profile [5, p. 4]. This is not just training - it is a strategic position of a professional who is able not only to respond to changes, but also to form industry trends [1, p. 2].

To successfully integrate AI and ensure professional growth of employees, it is important to use a comprehensive, staged approach - this is what promotes smooth adaptation and maximum return on innovation. The first strategy is to offer pilot projects: not large-scale ones right away, but small initiatives that allow you to test the effectiveness of AI solutions on sample tasks [38, p. 12]. This approach allows you to minimize risks and gradually involve the team. Key steps: clearly setting goals, defining KPIs, rapid iterations and retrospectives, managing expectations. In case of a positive result, the project receives support, resources and is deployed at the department level.

An important component is cooperation with HR and staff training. Formation of a new competence environment requires interaction between technical and HR departments. HR can promote development of soft skills in engineering teams, organize AI academies within the company, offer cross-training and mentoring [2, p. 3]. Such programs allow to involve employees, identify talented people, create an environment of experience exchange and a learning culture.

Mentoring and coaching play a key role in process transformation. According to research by WeCreateProblems, paired mentoring (senior–junior) effectively transfers not only technical experience but also corporate meanings, strengthens emotional engagement and promotes career growth [33, p. 10]. New forms of coaching — including AI-assisted ones — provide regular support, help to consolidate new practices and increase team adaptability [14, p. 6].

These strategies - piloting, HR support, mentoring and coaching - create an internal mechanism of learning and adaptation. The engineer begins to formulate the project objectives, justify the CAI implementation, share experiences with colleagues, and get involved in the transformation processes.

Ultimately, this contributes to the construction of an intelligent corporate ecosystem where AI is perceived not as a threat, but as an organic part of engineering practice [1, p. 2].

Personal stability

In an era when AI is rapidly penetrating engineering practice, flexibility and mental toughness are especially important. Viewing AI not as a competitor but as an intelligent assistant, the engineer chooses a model of cooperation where the machine extends human capabilities – freeing up time for strategic tasks, and the human directs and interprets the results. This attitude proclaims that "AI occupies the middle ground, freeing engineers for complex projects" [34, p. 11].

Active participation in professional communities, finding mentors and sharing experiences create an ecosystem of support and inspiration. Such interactions help to understand trends, help to safely implement innovations and learn from others' successes and mistakes. Deloitte emphasizes that "early careerists actively develop both technical and social skills" and consider AI to be the first advisor before the manager [33, p. 10]. Creating such connections makes a person not only more adaptive, but also in demand.

Finally, flexibility, learning ability, and a proactive attitude become key — these are the qualities that allow you to remain relevant in a changing environment. Research from The Everygirl talks about the importance of so-called "meta skills" — emotional intelligence, critical thinking, resilience [6, p. 5].

And the experience of resilient workers shows that high levels of psychological resilience increase productivity, quality of life, and retention in the profession [5, p. 4].

Thus, personal resilience becomes the basic foundation for professional success in the AI era: using new technologies without fear, actively collaborating and constantly evolving is a strategy that can provide an engineer with a long and fruitful career.

Conclusion

It becomes obvious that an intelligent engineer is not a replacement, but an enhancement of the profession's capabilities through the synthesis of humans and AI. In conditions where algorithms take on routine mathematical tasks and heavy calculations, an engineer gets the opportunity to fully focus on the strategic design of systems: integrating modules, managing complex operating logic, approving architecture, and ensuring fault tolerance. As Neural Concept writes, AI allows an engineer to "free himself from small things, concentrating on important issues: fuel efficiency or predictive maintenance" [1, p. 2].

This transition does not lead to the destruction of the profession; rather, it is being transformed. New areas of responsibility are emerging: control over AI processes, certification of models, transparency of solutions, monitoring of compliance with safety standards [3, p. 3]. Engineers are already becoming system architects, developers of regulations that guarantee the operation of AI in critical conditions [32, p. 9].

What awaits us in the future? On the one hand, we will move away from designing individual nodes to designing flexible ecosystems. The engineer is like a conductor of a complex stage, where he sets, directs and controls AI agents, but does not replace them. On the other hand, the engineer acquires a strategic role, making decisions at the architectural level: from safety to ethics, from ecology to responsibility [2, p. 3].

An example of this approach is the autonomous "wingman" drones presented at the 2025 Paris Air Show – which fly alongside manned ones and require a new strategy for their implementation, certification, and human-machine teamwork [14, p. 6]. This trend says: the future of the aerospace engineer is systems thinking, control over AI agents, and confident work in a hybrid engineering reality [1, p. 2].

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SYSTEMS FOR PREVENTING INFORMATION LEAKS

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Abstract

This article analyzes systems designed to prevent information leaks—specifically Data Loss Prevention (DLP) technologies—within organizations, with a focus on protecting confidential information. The study elaborates on the main functions, application areas, classification principles, and legal compliance of DLP systems, highlighting both their technical and organizational aspects.

Keywords: *Information security, DLP technologies, data leakage, information protection, network security*

Introduction

With the expansion of the digital environment, data leaks have become a serious threat to information security. This article explores the principles, implementation, and legal context of Data Loss Prevention (DLP) systems as a response to this growing issue.

Methodology

The study is based on a qualitative research approach, involving the analysis of normative legal documents (laws, the constitution), current academic literature, and up-to-date technical sources (scientific articles, technology reports). Comparative analysis and conceptual methodologies were applied throughout.

Discussion and Evaluation

DLP systems, designed to prevent information leaks, serve as indispensable tools for protecting confidential data within organizations. These technologies are especially relevant in an era characterized by rapid data growth and an increase in cyber threats (Alneyadi et al., 2016; TIB, 2023). One of the key features of DLP systems is their ability to monitor and control the flow of information across protected network perimeters, thereby detecting and preventing potential leaks.

The effectiveness of such systems depends on several critical factors: proper data classification, continuous monitoring, and responsive action mechanisms (Kotenko & Chechulin, 2013). Typically, the operation of DLP systems is divided into three stages: identification, monitoring, and response. In the initial stage, sensitive information is defined and profiled within the organization, laying the foundation for subsequent protection measures (Symantec, 2022).

In the monitoring phase, the system actively analyzes data traffic and uses internal algorithms to detect confidential information. If a leak risk is identified, the system blocks the transmission and generates an incident report (Zhou et al., 2020).

Based on their application areas, DLP systems are divided into agent-based and network gateway-level systems. Agent-based solutions are installed directly on user devices and monitor their activities, while network-level systems are mainly used for traffic control and analysis (Trend Micro, 2021).

The DLP approach is grounded in the concept of ***data-centric security****. Unlike infrastructure-focused strategies, this model prioritizes the protection of the data itself (Gartner, 2023). As a result, it offers more effective protection against threats originating both internally and externally.*

To ensure information security, DLP systems are categorized based on three primary data states:

- ***Data-in-use*** *(actively used data),*
- ***Data-at-rest*** *(stored data),*
- ***Data-in-motion*** *(transmitted data) (Cisco, 2022).*

This approach covers the entire data lifecycle and facilitates risk mitigation at every stage (Aydın & Yıldız, 2021).

DLP implementation should not be limited to technical solutions. Organizational strategies such as staff training, proper incident analysis, and regular system updates are also vital for ensuring overall effectiveness (Karabacak et al., 2022).

However, certain limitations exist. The systems must be continuously updated to counter evolving cyber threats, which demands additional time and resources (Androulidakis, 2020). Therefore, the successful deployment of DLP solutions requires the presence of skilled information security professionals and a strong corporate security culture.

The future development of DLP technologies will be closely linked to artificial intelligence (AI) and machine learning algorithms. These advancements are already enabling predictive analytics and allowing systems to respond to potential incidents with greater speed and accuracy (IBM, 2024).

Conclusion

DLP systems are an essential component of modern information security strategies. Their successful implementation requires not only technological measures but also legal compliance and organizational support. Integration with AI will further enhance the effectiveness and evolution of these systems in the future.

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