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WIDENING OUR HORIZONS

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Abstracts

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Розширюючи обрії: зб. тез вісімнадцятого міжнар. форуму студ. і
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Подано матеріали міжнародного форуму студентів і молодих учених,
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«Дніпровська політехніка», м. Дніпро (Україна).
Розглянуто нагальні проблеми економіки, інженерії, інформаційних технологій,
охорони навколишнього середовища, наук про землю, гуманітарних наук.
Також приділено увагу сучасному законодавству, спрямованому на вирішення
цих проблем. Матеріали згруповано у розділи, що відповідають секціям форуму
і відображають сучасні тенденції та інноваційні розробки молодих учених,
представників різних країн світу в різних галузях економіки.

Foreword

April 5, 2023

Dear Students and Young Scientists,

My name is Ruslana Westerlund and I am a Ukrainian American. I was born in Soviet Ukraine in the 70's and was raised 30 km away from Shevchenko's birthplace, in the village of Buzhanka, most of you have never heard of before. I emigrated in 1995 when Ukraine was on the brink of economic collapse and moved to Minnesota. Now I live and work in Wisconsin. Wisconsin is known for one of the largest Universities, the University of Wisconsin-Madison. I was a researcher at the Wisconsin Center for Education Research at the University of Wisconsin-Madison until recently. Currently, I use my research to disseminate and train teachers on the most current and innovative methods of teaching students who speak other languages in American schools. Many of my students are newly arrived Ukrainians who have been displaced by war. They arrive in the United States full of hope and aspirations. Many of them are children. My role has shifted from supporting any immigrant children from all over the world to supporting my fellow Ukrainians. In my role as an educational linguist, my job is to bring innovation to schools through linguistics. I distribute my research through publications and training to a global community of educators. My reason for doing my work is to show the world that Ukrainians' contributions make this world a better place. So, I send this address to you to remind you that YOUR contributions in science make this world a better place.

This reminder is important especially in the time of this unprovoked war. It is important because russia deliberately targets universities and schools to destroy the future of Ukraine. YOU ARE THE FUTURE OF UKRAINE and you are the future of the Scientific Ukraine. But more importantly, your work will contribute to a better future of the whole world, especially when it's published in English and other world languages. Do you know how Zelensky reached so many global audiences? He addressed a joint meeting of Congress in the United States in English. He received standing ovations! I remember watching him on TV while cooking dinner and thought to myself, This is My President! My country is receiving standing ovations by the joint

session of the United States Congress. That was a historic moment! Ukraine has the world's attention in historically unprecedented ways.

We need to take advantage of the global attention focused on Ukraine right now and show the world that Ukrainian scientists are making meaningful contributions during the war time in such fields as macroeconomics and sustainability of economic development through projects like pay equity, efficiency in management process, and adaptability of tax systems, as well as environmental problems and their solutions such as territorial geodesign, natural emergencies and bioaugmentation. The world needs to know about your innovations in engineering, energy efficiency, and alternative sources of energy and earth sciences through projects like peaceful atom as a source of electrical energy, in polymer concrete (known as Epoxy Granite in the U.S.), in artificial intelligence, in exercise equipment for physical rehabilitation, wind energy, renewable energy and physical therapy and many other areas.

Sharing your research in English and other world languages shows the world that Ukrainians are innovators, engineers, scientists, mechanics and inventors. For three hundred years russia tried to erase our language, steal our inventions and take credit for our innovations. All the work that Ukrainians did was invisible to the rest of the world. It was all credited to russia. So this is *our time.* While many fight with tanks and ammunition, we fight with knowledge, new ideas, and new inventions. YOUR TIME IS NOW. The world needs to see Ukraine anew, as a country full of creative and smart scientists.

I have no doubt that your study and the research you carry on in different specialized areas as well as innovations you propose will be demanded for the restoration and reconstruction of Ukraine in the near future. The future of Ukraine depends on you.

I wish you inspiration and aspiration for new achievements and discoveries, fruitful sharing and exchanging experiences that will widen your horizons on the way to your GOAL - independent and peaceful Ukraine!

The world stands with you! You are not alone!
Слава Україні та українським науковцям!

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Introduction

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The Role of English language and Research in the Global Academic World

The English language has become the primary mode of communication in the global academic world. According to research conducted by the British Council, over two billion people worldwide speak English, including 94% of the academic papers published internationally (The British Council, 2018). Therefore, proficiency of the English language has become a critical factor in the success of students, academics, researchers, and scholars alike. This essay will explore the role of the English language in the global academic world, including its significance in research, teaching, and learning.

The English language plays a significant role in the realm of research. Scholars use it as a medium of communication to report their findings which are subsequently disseminated for worldwide consumption. Academic research is often conducted in an international context, and the need for a globally understood language has never been more pertinent. English is the lingua franca of international science, as much of the subject-specific vocabulary in science is derived from English (Hajar, 2017). An article from the National Bureau of Economic Research emphasizes the primacy of the English language in research-based publications. It states, "Papers written in English are published in international journals that are almost universally read by scholars and decision-makers worldwide" (Chu & Giovannoni, 2011). Moreover, English has become a vehicle for cross-cultural communication so that scientific research can be easily shared between countries with varying languages and cultures.

The role of the English language goes beyond research publications; it also plays a critical role in teaching and learning. English is utilized as an instruction medium in many renowned academic institutions worldwide. A survey conducted by QS Quacquarelli Symonds Ltd, a British company specializing in education and studies, revealed that 81% of prestigious universities worldwide teach their courses in English (QS World University Rankings, 2021). English is also used in MOOCs (Massive Open Online Courses), where students from different countries learn and discuss various topics. MOOCs offer educational opportunities for students who may not have access to traditional in-person education. The language used for instructions must be universally recognized, and English fills this requirement perfectly.

Furthermore, the dominance of the English language in academics empowers students and academics worldwide to access a vast amount of resources, including academic

journals, research papers, and textbooks. These resources then enable them to disseminate their ideas and findings on a global scale. Without a universally understood language, such resources would be inaccessible to many people worldwide. The English language, therefore, fosters academic exchange, facilitates global diversity, and equips individuals with the skills needed to participate in the global academic world.

In conclusion, the role of the English language in the global academic world is vital, underpinned by its importance in research, teaching, learning, and accessing available resources. Through its use in academics, English has become the primary international language for communication, enabling individuals worldwide to engage in cross-cultural communications and exchanges. As such, proficiency in the English language is paramount in ensuring students, academics, researchers, and scholars are able to participate effectively and contribute to the international academic community.

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Mortiers recyclés : comportement face au gel-dégel

Introduction générale sur problème

Pour limiter l'introduction continue des ressources naturelles, il est nécessaire d'augmenter l'importance des matériaux acquis par le recyclage, en particulier dans le secteur de la construction.

L'augmentation de la demande massive de ressources naturelles et la création massive de déchets de construction et de démolition suscitent des inquiétudes quant aux impacts financiers et environnementaux qu'ils ont toutes les chances de causer. Des tentatives sont faites pour promouvoir des méthodes écologiquement optimales dans la construction. Dans ce contexte, l'une des variétés les plus opportunes est la réintroduction des déchets de construction et la démolition dans la nouvelle construction : en particulier, l'introduction d'agrégats de béton secondaire. [1]

La hiérarchie principale de la durabilité passe par 3 "R": la première est la réduction, suivie de la réutilisation et finalement du recyclage.

Réduction - action de réduire quelque chose, d'en diminuer la valeur, le nombre, la quantité, l'importance

Réutilisation - toute opération par laquelle des substances, matières ou produits qui sont devenus des déchets sont utilisés de nouveau

Recyclage - Action de récupérer des déchets et de les réintroduire, après traitement, dans le cycle de production.

Lorsque les matériaux ont été utilisés dans la construction et qu'il n'est pas possible de les réutiliser, le recyclage est considéré comme la meilleure méthode probable pour réduire les sources d'origine. [2]

L'importance cruciale de l'application répétée de matériaux de construction recyclés tels que le béton, le sable découle du fait que ces matériaux sont considérés comme le matériau le plus appliqué.

La durabilité du béton est calculée en fonction de sa capacité à résister à des dommages tels que l'impact de milieux corrosifs, les cycles de congélation et de décongélation, le feu et l'abrasion. Le béton durable a la possibilité d'être préservé dans sa propre qualité et sa facilité d'utilisation grâce à l'environnement environnant.

Par temps froid, les structures en béton perdent leur qualité et leurs propriétés en raison des cycles de gel-dégel au cours de leur cycle de vie [3]. La plupart des critères de durabilité civile mettent davantage l'accent sur l'eau qui se trouve à l'intérieur des milieux poreux tels que les roches et les matériaux en ciment. En cas de gel et de dégel, le comportement de changement de phase glace / eau dans les pores

joue un rôle majeur en combinant la teneur en eau non gelée, la pression des pores, l'eau liquide dans le réseau poreux et le comportement thermomécanique de chaque composant du matériau poreux (Coussy et Fen-Chong, 2005; Coussy, 2005; Fen-Chong et Azouni, 2005). [4]

Les études dans le domaine de la technologie de traitement des déchets à grains fins avec le temps de démolition et de la formulation de bétons à base de ciments recyclés sont assez limitées et ne permettent pas pour le moment d'obtenir un « vrai » produit pour sa « mise sur le marché ».

La résistance au cycle gel/dégel est une caractéristique importante pour le béton extérieur dans les environnements nordiques. Cela est dû à un certain nombre d'autres propriétés du béton, notamment sa porosité, sa perméabilité et sa structure poreuse [Kosmatka, Steven H. et al., 2004]. Cette propriété est étudiée en mesurant la perte de masse du béton après plusieurs cycles de gel/dégel conformément aux spécifications ASTM C666. Il existe plusieurs études évaluant la résistance au gel/dégel des bétons granulaires recyclés.

Selon Li, la teneur en granulés recyclés a peu d'effet sur la résistance au gel/dégel du béton [Li, 2008], alors que selon Richardson, les bétons contenant des granulés recyclés sont plus résistants aux cycles de gel/dégel que les bétons témoins [Richardson et al., 2011]. Le béton contenant des granulés recyclés est beaucoup plus durable que le béton témoin (la différence de perte de poids observée est de 68 %). Selon l'auteur, une partie de cette différence s'explique par la différence de qualité du granulat recyclé et le fait qu'une méthode de cure différente a été utilisée pour le béton contenant des granulés recyclés [Richardson et al., 2011].

Selon Gokche et al., les bétons contenant des granulés de béton recyclés à l'air comprimé sont résistants aux cycles de gel/dégel, voire légèrement supérieurs à l'état de l'art 24 que le béton témoin [Gokche et al., 2011]. En revanche, les bétons utilisant des granulés airless recyclés ont de mauvaises performances même si la teneur en air du béton neuf est acceptable. La teneur en eau des pellets recyclés est particulièrement importante pour la résistance aux cycles de gel/dégel. Les granulés secs et saturés sont moins performants que les granulés semi-saturés (90 %) [de Oliveira et Vasquez, 1996]. Selon de Oliveira, les meilleures performances du béton utilisant des granulés semi-saturés s'expliquent par le fait que l'interface granulat/pâte est plus résistante et plus dense dans ces conditions.

Les objectifs du travail présenté sont de démontrer que les formulations des mortiers recyclés ont la possibilité d'être utilisées comme un nouveau matériau de construction. De plus, pour déterminer les performances thermiques (Hot Disc), physiques (porosité à l’eau) et mécaniques des éprouvettes et effectuer une analyse des propriétés résiduelles.

1.2. Effets de gel-dégel sur les bétons (ou mortiers)

Il existe un certain nombre de protocoles d'essai pour vérifier la durabilité du béton lors du gel - dégel. Ces procédures varient d'un pays à l'autre en fonction de la gravité du climat, la détermination précise du cycle de gel - dégel devant refléter la gravité de l'impact thermique naturel. La structure en béton subit des dommages dans

l'atmosphère hivernale lorsque ses éléments sont proches de la saturation en eau. Par conséquent, la microstructure du matériau subit des dommages qui entraînent une diminution de ses propriétés mécaniques.

Il existe plusieurs théories, ainsi que des modèles, qui peuvent décrire l'effet des cycles de congélation-décongélation sur les dommages causés à la matrice de ciment.

Une théorie est la théorie de Powers: c'est la théorie de la pression hydraulique (1949). Cette théorie explique que pendant la congélation de l'eau et en raison d'une augmentation séquentielle de son volume de 9%, la glace résultante expulse l'eau des pores des capillaires, créant ainsi une pression hydraulique directement liée à la longueur du trajet que l'eau peut parcourir sans dépasser la pression supérieure à la résistance à la traction de la matrice [5]

Le béton soumis à des cycles de gel/dégel peut subir deux types de rupture: la fissuration interne et l'écaillage. Ces deux modes de dégradation ne correspondent pas aux mêmes mécanismes. Ils n'apparaissent pas nécessairement en même temps ou sur les mêmes bétons. Dans les deux cas, les dommages au béton dépendent de l'environnement dans lequel il se trouve. Certains paramètres ont une influence notable, par exemple les cycles de congélation/décongélation (quantité, amplitude, vitesse de refroidissement, etc.), les conditions de saturation en eau et la présence de sels de congélation.

La congélation interne entraîne un gonflement et des microfissures dans la masse de béton. Ensuite, les fragments de la masse de ciment est détaché de la masse, ce qui entraîne une perte d'adhérence du matériau. Ensuite, il y a une érosion rapide de la matrice de ciment, qui s'accompagne éventu par la fissuration éventuelle des granules. Cette détérioration entraîne rapidement une diminution des caractéristiques mécaniques et raccourcit la durée de vie de la structure, ce qui réduit la qualité du renfort en béton de revêtement et la résistance à la pénétration d'agents corrosifs.

L'écaillage est une méthode de destruction de surface qui se produit en présence de sels gelés. Les fragments de la masse de ciment sont séparés de la surface du béton exposé. Ce phénomène est localisé. Après le remplissage, il s'étend à la fois en surface et en profondeur.

L'épaisseur de la détérioration peut atteindre plusieurs centimètres, ce qui conduit à l'écaillage des granules. Cette dégradation a avant tout un impact esthétique. Cependant, cela conduit finalement à une diminution de l'épaisseur de l’enrobage de l'armature. La sécurité des utilisateurs peut également être affectée en cas de chute de matériaux sur la chaussée. [6]

Les cycles de gel et de dégel ont deux types d'effets dévastateurs sur le béton.

Le premier est l'effet volumétrique du gel lorsque les agents de dégivrage ne sont pas utilisés.

Le deuxième type, qui est plus grave, est l'exposition superficielle au gel lors de l'utilisation de décongestionnants. [7]

Zhe Li et d'autres ont effectué des tests où ils ont découvert que la déformation était une augmentation parabolique ou linéaire avec une augmentation des cycles de congélation-décongélation. Par conséquent, la déformation plastique combinée et le

module d'élasticité montrent une relation linéaire avec les cycles de congélation-décongélation. Réduire la teneur en laitier de brique et augmenter la teneur en laitier de béton peut augmenter le module d'élasticité. En outre, la porosité maximale se produit après 10 cycles de congélation-décongélation. La porosité minimale à l'intérieur et entre les couches se manifeste dans 0 et 20 cycles de congélation-décongélation, respectivement. La dimension fractale du mélange de déchets de construction augmente progressivement et l'ordre entre les particules diminue avec l'augmentation des cycles de congélation-décongélation. Le rapport 2: 5: 3 des mélanges de déchets de construction recyclés a de meilleures propriétés mécaniques dans les cycles de congélation-décongélation et peut être utilisé comme charge. En outre, l'utilisation efficace des déchets de construction peut réduire la pollution de l'environnement et favoriser le développement d'infrastructures durables [8].

Huaishuai Shang et d'autres ont mené une étude sur des échantillons de béton soumis à différents cycles de congélation-décongélation. Le module d'élasticité dynamique, la perte de poids, la résistance à la compression cubique, la résistance à la traction et la résistance à la traction du béton ont été mesurés après 0, 100, 200, 300, 400 cycles de congélation-décongélation. Les résultats des expériences ont montré que le module dynamique d'élasticité et de résistance diminuait à mesure que le gel-dégel se reproduisait. Sur la base des résultats de l'expérience, l'effet des cycles de congélation-décongélation sur les propriétés mécaniques, le module d'élasticité dynamique et la perte de poids ont été analysé. Ce qui peut servir de base pour l'entretien, la conception et la prévision de la durée de vie des barrages, des installations hydrauliques, des structures côtières, des routes et des ponts en béton dans les régions froides du Nord. [9]

Les dommages causés par la décongélation se produisent dans le béton lorsque les molécules d'eau gèlent et se dilatent au-delà du volume du béton. Cela conduit à la rupture du béton, en particulier lorsque la pression créée dépasse la résistance à la traction du béton, ce qui conduit finalement à l'expansion et à la rupture des cavités. L'usure typique du béton due au gel-dégel comprend la fissuration accidentelle, la formation de tartre à la surface et la rupture des joints due à la fissuration en D, ce qui a un effet extrêmement négatif sur les propriétés mécaniques et la résistance à la perméabilité du béton. [10]

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BEGRÜNDUNG VON MASSNAHMEN ZUR VERRINGERUNG DER UMWELTGEFAHREN BEIM BETRIEB VON SCHLAMMLAGERN IN BERGBAU- UND AUFBEREITUNGSANLAGEN

Durch den Betrieb von Bergbau- und Aufbereitungsanlagen nimmt die Menge an Industrieabfällen zu, weshalb das Problem der ordnungsgemäßen Entsorgung und Lagerung immer wichtiger wird, denn die Abfallwirtschaft ist ein wichtiger Tätigkeitsbereich für jedes Unternehmen.

Viele Tausende Tailingbecken in vielen Ländern der Erde sind Hinterlassenschaften aus Bergbauaktivitäten. Ständig werden zudem weitere Becken gebaut, erweitert und befüllt, sie nehmen erhebliche Flächen in Anspruch und stellen häufig ein hohes Risiko für die Bewohner, die Natur und die Infrastruktur in ihrer Umgebung dar. Für die Bevölkerung der Erde wird für die nächsten Jahrzehnte weiter erhebliches Wachstum prognostiziert. Alle Menschen haben ein Anrecht auf menschenwürdige Lebensbedingungen und ihre Versorgung mit den erforderlichen Rohstoffen ist und bleibt eine gewaltige globale Herausforderung. Die Rohstoffe sollen möglichst wirtschaftlich unter gleichzeitiger Gewährleistung von Sicherheit und Arbeitsplätzen sowie Klima- und Umweltschutz bereitgestellt werden [3].

Um an Wertminerale zu gelangen, bewegen Bergbaufirmen große Mengen an Gestein. Es muss zunächst gemahlen und anschließend meist unter Zugabe chemischer Lösungen und großer Mengen an Wasser behandelt werden. Je niedriger die Konzentration der Wertstoffe ist, desto größer ist der Anteil des anfallenden Abraumschlamms. Diese sogenannten Tailings, die teils noch mit Chemikalien belastet sind, werden in große Schlammbecken gepumpt [1].

Schlammlager ermöglichen die Lagerung von Altgestein und prozesschemischen Bestandteilen mit minimalen Umweltauswirkungen, aber ihr unsachgemäßer Betrieb kann schwerwiegende Folgen haben.

Nach einer Analyse der wichtigsten Umweltprobleme von Schlammteichen lassen sich folgende feststellen: große Flächen werden für die Lagerung von Gesteinsabfällen bereitgestellt; es besteht die Gefahr einer vom Menschen verursachten Katastrophe; Schlammwasser tritt aus; die Umwelt wird durch Winderosion verschmutzt.

Die Bevölkerung, die in der Nähe von Schlammlagern wohnt, leidet häufig an Atemwegserkrankungen. Darüber hinaus besteht die Gefahr von Unfällen, die zu einer unkontrollierten Ableitung von Schadstoffen, zum Verlust der biologischen Vielfalt und zur Verschmutzung des Ökosystems führen. Um solche Situationen zu

vermeiden, ist eine ständige Bestandsaufnahme der Abfalldeponien erforderlich, um diejenigen zu ermitteln, die rechtzeitig saniert werden müssen.

Schlammspeicher nehmen große Flächen ein. Sie belasten die Umwelt durch den Staub, der entsteht, wenn sich Feststoffe absetzen und Wasser verdunstet. Die folgenden Maßnahmen können ergriffen werden, um die Luftverschmutzung in den Gebieten zu verringern, in denen sich Schlammlager befinden: biologische Rekultivierung; Waldparks als Windschutz; physikalische und chemische Stabilisierung; technologische Verfahren; Befestigung mit Bitumenemulsion; Begrünung; Aufrechterhaltung und ständige Anpassung des erforderlichen Wasserstands auf der Oberfläche der Lagertanks.

Schlammlagern, die ohne Einhaltung der vorgeschriebenen Normen und ohne ein Siebet gebaut werden, sind gefährlich für das Grundwasser, da die in solchen Anlagen angesammelte Prozessflüssigkeit in den Grundwasserspiegel sickert und sich mit Süßwasser vermischt, das wiederum Flüsse oder Trinkwasserreservoirs in der Umgebung speist.

Um eine Filtration zu verhindern, ist es notwendig, folgendes sicherzustellen: eine vollständige Abdichtung; chemische Beständigkeit; Widerstand gegen niedrige Lufttemperaturen; Verringerung der Anzahl von Transportvorgängen.

Um die negativen Auswirkungen von Schlammteichen auf die Umwelt zu verringern, hat sich die Methode der undurchlässigen Oberfläche unter Verwendung von Geomembranen durchgesetzt. Geomembranen auf der Basis von Polyethylen zeichnen sich durch hohe Korrosionsschutz- und Abdichtungseigenschaften, Flexibilität, Schrumpfungsbeständigkeit, Rissbeständigkeit und hohe mechanische Eigenschaften in Verbindung mit Säure- und Laugenbeständigkeit aus. Die Eigenschaften des Materials werden durch Temperaturschwankungen und ultraviolette Strahlung nicht beeinträchtigt, da die Dichtungsbahnen keine Zusatz- oder Füllstoffe enthalten, die zum Alterungsprozess beitragen und die physikalischen und mechanischen Eigenschaften verringern könnten.

Um der Gefahr der Winderosion der Oberfläche vorzubeugen, wird empfohlen, in Gebieten, in denen die Verdunstung die Niederschläge übersteigt, die Vegetation zu erhöhen. Zu den Bodenmerkmalen, die sich erheblich auf das Pflanzenwachstum auswirken, gehören Textur, Fruchtbarkeit und Toxizität. Die Textur beeinflusst das Wasserrückhaltevermögen. Schlammgrubensand hat eine geringe Wasserspeicherkapazität. Klärschlamm ist weniger durchlüftet und verdichtet sich beim Trocknen. Die Fruchtbarkeit des Bodens wird durch das Vorhandensein von Nährstoffen sowie von Bakterien und Pilzen beeinflusst. Eine hohe Toxizität und ein hoher Salzgehalt töten sich entwickelnde Pflanzen ab, obwohl einige Schwermetalle ein gesundes Pflanzenwachstum fördern.

Methoden zur Isolierung und Kontrolle von radiologischen Auswirkungen, Oxidationseffekten, Auslaugungseffekten und zur Erhöhung des Schutzes vor Erosion durch Wasser und Wind: Nasser Abdeckung; Trocken Abdeckung; Vegetation als eine besondere Form der trockenen Abdeckung.

Zur Erhöhung der Stabilität und zur Vermeidung von Verformungen von Klärschlammbecken werden verschiedene technische Methoden eingesetzt. In den

verschiedenen Phasen des Lebenszyklus, wie Betrieb, Stilllegung und Rückgewinnung, ist je nach den Merkmalen der jeweiligen Periode ein breites Spektrum verschiedener konventioneller und nicht konventioneller Methoden erforderlich.

Im Laufe des Betriebs des Schlammlagers muss die ursprünglich eingerichtete sanitäre Schutzzone vergrößert werden, es besteht die Möglichkeit einer Verschlechterung der sanitären und hygienischen Situation im Bereich der Anlage, und es besteht die Gefahr einer umweltgefährdenden Situation aufgrund der Migration von Ökopolitanen durch biologische Ketten, die dadurch eine Hemmung von Flora und Fauna verursacht.

Voraussetzungen für eine erfolgreiche Bewirtschaftung von Aufbereitungsrückständen und taubem Gestein sind eine ordnungsgemäße Materialbeschreibung, einschließlich genauer Voraussagen zu ihrem Langzeitverhalten, und eine gute Standortwahl. Abwässer und Stäube, die kontrolliert oder unkontrolliert aus Einrichtungen zur Bewirtschaftung von Aufbereitungsrückständen und taubem Gestein freigesetzt werden, können für Menschen, Tiere und Pflanzen unterschiedlich giftig sein. Die Abwässer können sauer, basisch, mit gelösten Metallen und/oder löslichen und aus der Aufbereitung mitgeführten unlöslichen komplexen organischen Bestandteilen sowie gegebenenfalls auch natürlich vorkommenden organischen Stoffen sein. Die in den Emissionen enthaltenen Stoffe sowie deren pH Wert, Gehalt an gelöstem Sauerstoff, Temperatur und Härte können wichtige Faktoren sein, die ihre Umwelttoxizität beeinflussen [2].

Die Einhaltung der geltenden Vorschriften und Bestimmungen bei der Planung, dem Bau und dem Betrieb des Schlammspeichers in der Bergbau- und Aufbereitungsanlage wird mögliche nachteilige Auswirkungen auf die Umwelt und die in der Nähe der Anlage gelegenen Städte und Dörfer minimieren. Ein stillgelegtes Schlammlager muss ständig überwacht werden, und falls erforderlich, sollten Arbeiten zur Verstärkung der Grube oder zur vollständigen Entfernung des Schlamms durchgeführt werden. Die Rekultivierung ist die letzte und die obligatorische Phase.

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Alaria alata (Goeze, 1782) as a Cause of Death

Helminthiasis is a kind of parasitosis – a disease, caused by a parasite. In humans, the most known examples are ascariasis, caused by members of *Ascaris* nematodes; echinococcosis, caused by cestodes of *Echinococcus* species; anisakiasis, caused by *Anisakis* nematode species, and alariasis, caused by trematode named *Alaria alata*. All helminthiases cause various health damage, ranging from the absence or mild symptoms to severe neural disorders and tumors [1].

Hence, the purpose of the work is the problem of alariasis spreading in Ukraine.

The aim of the work is to raise the problem of alariasis and discuss mighty risk factors concerning it.

Alaria alata is a flatworm, or fluke, which belongs to the Diplostomatidae family of the Trematoda class. Its adult and larval stages were discovered by Goeze and Gestaldi in 1782 and 1854, respectively. The adult stage is 3-6 mm in length and is divided into two morphologically distinct parts, with the ventral organ on the frontal part and the rest of the organs on the distal one [2]. Its cercaria is approximately 0,11 mm long and has specific morphology (fig. 1). There are quite big penetration glands lateral to the ventral sucker and above its distal edge. The ventral organ has eight rows of spikes; the acetabulum (the anterior sucker) is slightly bigger than the ventral one; the gastrointestinal tract is short, the bifurcation occurs slightly above the ventral sucker, and the tract ends without reaching the distal edge [3].

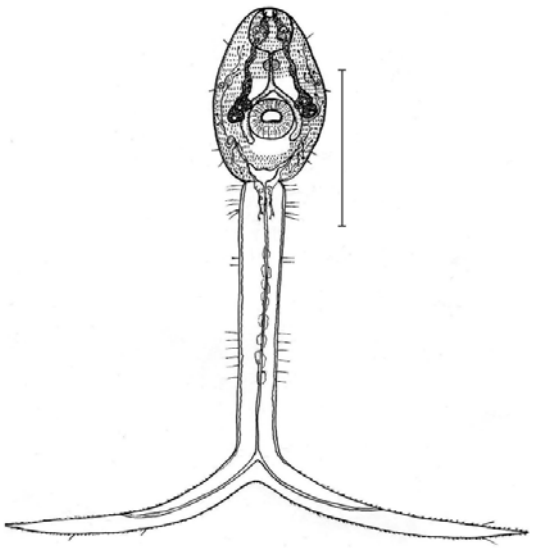

Fig. 1. Cercaria of *A. alata* from the snail *Planorbis planorbis*.
Scale bar: 0,1 mm [3].

However, we are more interested in the life cycle of this fluke. It is quite complicated, and, as in most trematodes, includes intermediate and paratenic, or unnecessary hosts (Fig. 2). The first host, usually freshwater snails such as *Planorbis* and *Helistoma* sp., is infected by the miracidia that hatch from the eggs [2]. Next, miracidia grow into cercariae, infecting the second intermediate hosts – frogs – when the latter eat the infected mollusk. There, cercariae turn into the mesocercaria stage and can infect the definitive hosts – carnivore mammals such as foxes, wolves, dogs, cats, and others – if they eat the infected frog or the tadpole. The infection prevalence in definitive host populations is often found to be very high – up to 99,4% [2]. The fluke is commonly found in the anterior part of the intestine of the definitive hosts.

However, the life cycle of *A. alata* also often includes paratenic hosts, which can be presented by wild boars, pigs, mice, snakes, and humans [2]. Similarly, they can be infected by eating infected intermediate or other paratenic hosts. Hence, they play a role of a reservoir for the fluke, whose larvae survive there in cysts, commonly found in the adipose connective tissue on the surface of the organs, muscles, and under the skin.

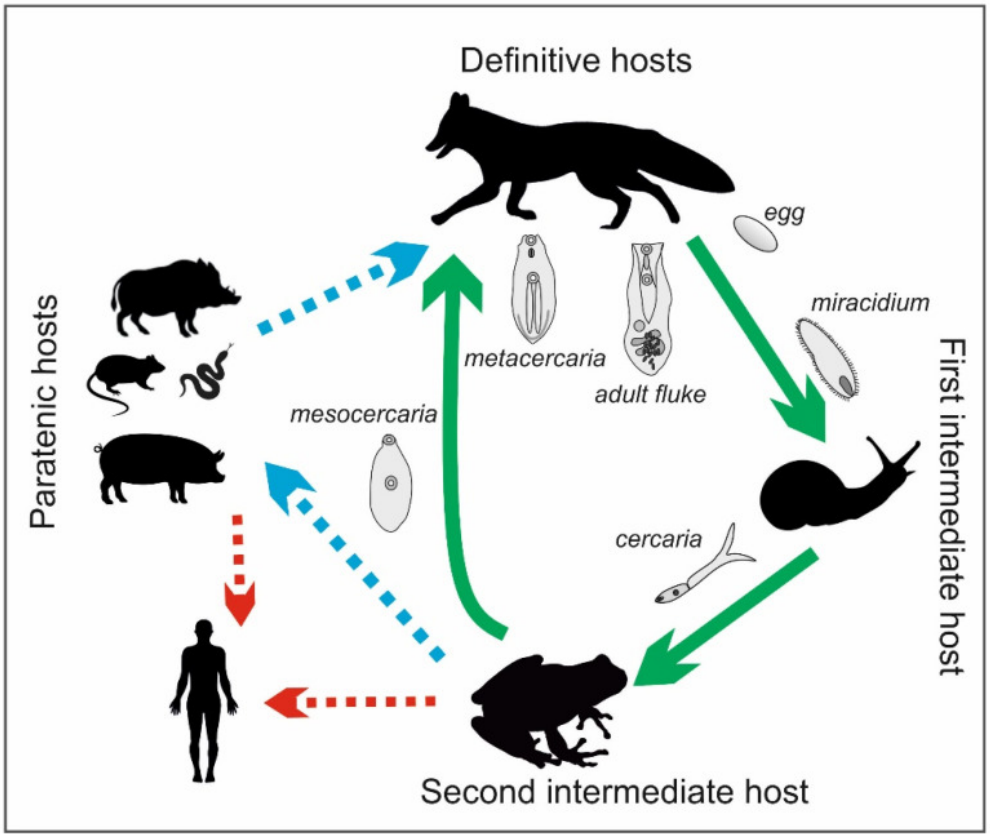

Fig. 2. The life cycle of *A. alata* [2].

As mentioned above, humans are also exposed to *A. alata* infection. There are various clinical signs which range from low-grade respiratory and cutaneous symptoms to diffuse unilateral subacute neuroretinitis. In 2009, a team of German scientists published a review on *A. alata* pathogenicity and mentioned a case of alariasis in a 24-year-old Canadian man. Within 2 days he had typical flu symptoms, and the next day was admitted to a hospital with severe dyspnea and hemoptysis; the coma started on the fourth day, along with skin petechiae; the patient died on the ninth day from extensive internal hemorrhages, as the autopsy demonstrated. Several

thousands of *A. alata* mesocercariae were found within the viscera and almost all organs [4].

In 2014, the intermediate hosts, *P. planorbis*, were found to be infected by *A. alata* cercariae in Volyn oblast [3]. The research demonstrated the presence of the fluke in the mollusks and is positioned as the first report of *A. alata* in Ukraine. Obviously, the presence of the helminth in an intermediate host indicates its presence in the entire ecosystem.

According to the Law of Ukraine №1478-III "On Hunting Economy and Shooting" as of February 22, 2000, foxes, raccoon dogs, and wolves, which are the definitive hosts of *A. alata*, are game animals and are allowed to hunt in winter (https://zakon.rada.gov.ua/laws/show/1478-14#Text). The foxes are common in the territory of Volynska oblast [5], so there is a necessity to carefully examine and cook the game before consuming it.

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The Growing Impact of Plastic Pollution on the Environment in Ukraine

It is now generally accepted that plastic is a versatile, durable material that has been widely used since the 20th century due to its physical and chemical properties, that ensure strength, lightness and long service life. An infinite amount of plastic waste ends up in water bodies, some goes to landfills, and a small portion is recycled. In recent years, people have produced more plastic than during the entire last century. This paper considers the possibility of reducing the amount of plastic waste entering the environment and, accordingly, reducing the level of environmental hazard from such pollution.

A significant portion of household waste gets into the Black Sea from Ukraine's landmasses. Scientists have found that every hour, rivers carry 6 to 50 items of garbage into the sea, 83% of which is plastic [1]. Pieces of plastic are prevalent in seawater (Fig.1.1).

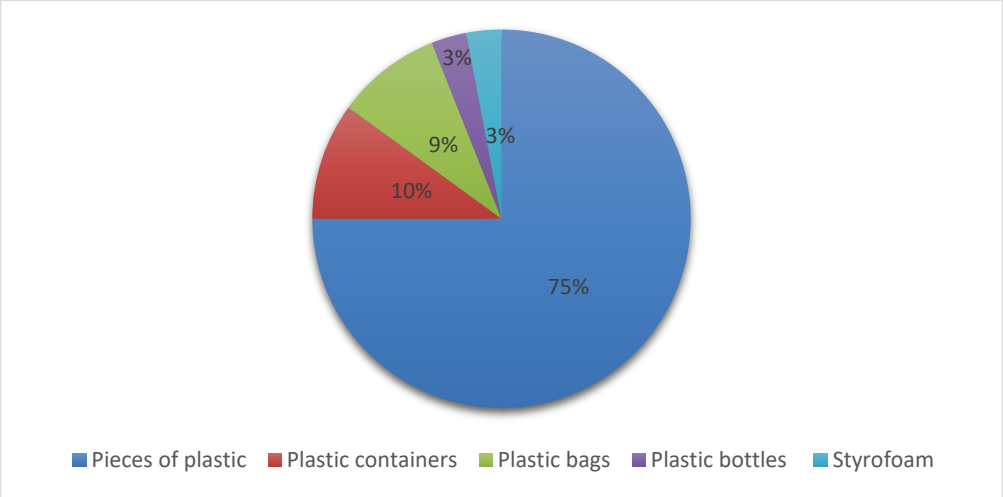

Figure 1.1 - Composition of plastic debris prevalent in seawater

Plastic debris blown around by bad weather, illegal dumping of waste into the ocean, and flushing products containing plastic down the toilet are examples of how household plastic ends up in large and small water bodies.

Burning plastic does nothing but harm. The combustion temperature is insufficient for the plastic to burn completely, so the plastic residues along with the smoke pollute the air, thereby harming the environment and human health.

Soil is affected when plastic waste ends up in landfills and in places not intended for any kind of garbage. Flora and fauna also suffer from plastic, as it releases harmful substances into the soil under sunlight, which subsequently affects the growth and development of plants, or even inhibits their functioning; animals eat such plants and get sick and die. Sea creatures often confuse pieces of plastic in the

sea with food, and die as a result. Plastic items from abandoned fishing nets kill dolphins, sea turtles, and other animals. Plastic in the sea poisons the lives of its inhabitants, as shown in Figure 1.2 [2].

Figure 1.2 - A small crab cannot get out of a plastic cup in the Philippines [2]

Despite a considerable amount of research on plastic recycling, only a few attempts have been made to investigate the recycling of PET plastic by mechanical processes.

PET plastic is widespread in Ukraine, and its quantity is infinite. Due to the decay time in nature, plastic bottles have become number one polluter, and it is they that need to be addressed for research.

This study analyzes the efficiency of PET bottle recycling. Every year in Ukraine, 8.3 million tons of plastic bottles end up in landfills, dumps, and recycling stations, and every Ukrainian uses 500 PET bottles every year, with 81.2% of all waste not being recycled. There are only 22 sorting stations in the country for recycling plastic bottles, paper, metal, glass etc.

Some Ukrainians are already sorting waste and recycling plastic. The country's separate collection infrastructure is not yet well established, developed, and 100% efficient. Only 180,000 tons of waste are recycled, despite the possibility of recycling 320-350,000 tons of plastic. On average, 90% of the cost of bottled water is the cost of a plastic bottle.

Environmentalists have recorded that household plastic makes up 83% of the garbage in the Black Sea. Ukrainians are divided into two groups, one of which actively supports plastic bags, while the other one is not yet ready to give up bags and continues to accumulate bags. Some use disposable plastic gloves in supermarkets because they are free, as shown in Figure 1.3.

Figure 1.3 - A plastic glove as a way to avoid paying for a bag in a supermarket [4]

Unfortunately, people throw garbage outside the yard, not realizing that this will not protect them from negative consequences. Landfills are not proving ground, so when garbage evaporates, it pollutes the air and seeps into the soil and ends up in groundwater.

In general, bottles are the most recycled plastic in the world. The Flex method is widely used in Ukraine, and the end result is synthetic fiber. Injection molding takes the second place. The third place is extrusion, which uses temperature to blow out new blanks for various things, ranging from a new bottle to a multilayer film. It is estimated that 6, 312, 500 tons of plastic can be recycled by extrusion per year.

Further research is needed to test the readiness of the population for innovations, as not everyone wants to change the situation with plastic waste.

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Green Roofs as an Innovative Trend of Urban Architecture

Green architecture gives hope that mankind has finally started to think about the destructive impact on nature. People are progressively trying to learn to co-exist with nature in harmony. Green roofs maintain the ecological state of the city, adjust the temperature and increase the green zone. They help to reduce the amount of greenhouse gas emissions by 62%. Moreover, flora on roofs helps to absorb rain and intake moisture in buildings. It may give an 8 per cent increase in staff efficiency. Green roofs are good heat isolators, with a soil layer absorbing low noise and plants absorbing high noise. In this paper, we show the advantages of green roofs and their introduction in Ukraine.

In many cities all round the world, green roofs have already become a norm. In Germany, more than a quarter of the roofs in the cities are green. In Japan, there are incentive programs to encourage green roof implementation.

Among the most famous projects of Italian architect Stefano Boeri are Vertical Forest in Milan, Villa Mediterrone in Marseilles, and House of the Sea of La Maddalena. Vertical Forest is an example of the first "vertical forest" building. It represents two towers, 80 and 112 meters tall, with about 800 trees, 11 000 perennial plants, and 500 bushes. This project shows the environmental, social and economic benefits of green roofs. Vertical Forest building has received the International Highrise Award [1].

The Belgian environmental architect Vincent Callebaut is developing projects of futuristic ecosystems that take into account several aspects of sustainable development (renewable energy, biodiversity and urban agriculture). One of his most striking works is TAO ZHU YIN YUAN (2010-2021), the first prizewinner as Carbon-absorbing Vertical Forest in Taipei. This project is inspired by the structure of DNA with double spiral. Each of the twisted spirals around the central cylinder has 42 apartments and open balconies with cascade of trees, bushes and flowers [2].

There are vertical gardens of French botanist Patrick Blanc in many countries of the world. He creates incredible works of living art for cities, public buildings, museums, hotels, restaurants, shopping centers, and private homes. One of his brightest works is Caixa Forum in Madrid, Spain. Fifteen thousand plants and more than 250 different species grow on the wall. The garden is equipped with a special system of irrigation. Caixa Forum is a kind of urban oasis contrasting to the older buildings [3].

ZinCo is a well known Ukrainian company. It specializes in landscaping roofs. The famous projects are Astarta organic business center in Kyiv, Cascade Plaza and

Villa Olympic in Dnipro, library and terrace of the Ukrainian Catholic University in L'viv etc. [4].

We suggest the implementation of green roofing for the commercial center Babylon in Dnipro. Intensive green roofs are recommended for shopping centers, hotels etc. Better air quality near the roads with heavy traffic will be one of the impacts of the project. Green roofs of Babylon will also help to reduce the consequences of climate change and promote sustainable development of the city. Typical for mountain flora shrubs and trees can be planted on the roofs. Among them are Betula pendula Roth, Sorbus aucuparia, Acer platanoides, Pinus sylvestris and others. These plants can grow in the harshest conditions, are capable of surviving with little water, and have high phytomeliorative functions (Fig. 1).

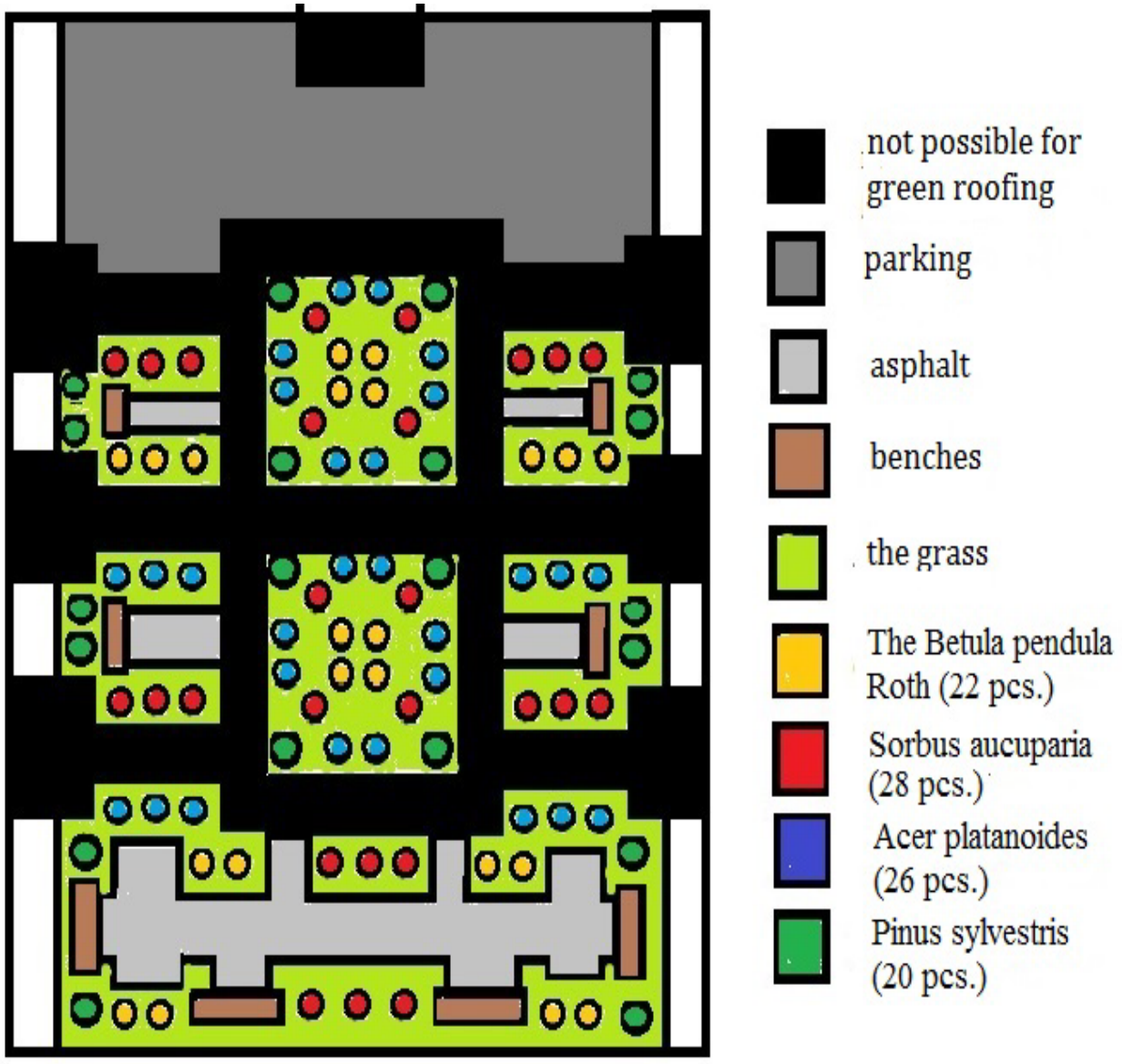

Fig. 1 – The proposed positioning of trees on the roof of the commercial center Babylon, Dnipro.

The Betula pendula Roth is frost resistant, photophilous and unpretentious plant that is well suited for growing in contaminated areas. Used for landscaping alleys, parks and provides good conditions for plant growth, it properly disinfects the soil.

The Sorbus aucuparia is cold-resistant, shade tolerant and resistant to most diseases. Moreover, it is suitable for single and group plantings.

The Acer platanoides is hardy and shade tolerant. However, it grows better in full sun. Ecologists recommend it for greening along roads, because it can withstand polluted air.

The Pinus sylvestris is frost resistant and undemanding to soil. It has a huge superficial root system, so it can grow on nutrient-poor soils, vacant lots and roadsides.

Table 1 – Properties of trees for dust absorption (adapted from 5)

Latin name	Dust absorption by one tree, kg/veg. period	Absorption of SO2 by one tree, g/veg. period
Betula pendula Roth	20	90
Sorbus aucuparia	5	50
Acer platanoides	20	20
Pinus sylvestris	30	-

The results of the research show that green roofing as an innovative trend of urban architecture is vitally important for urban ecosystem. Ninety-six trees that absorb 1 700 kg of dust and 3,78 kg of SO2 during the vegetation period will improve air quality in Dnipro and life of its dwellers.

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Section 02 Innovations in Engineering, Energy Efficiency and Alternative Sources of Energy, Earth Sciences

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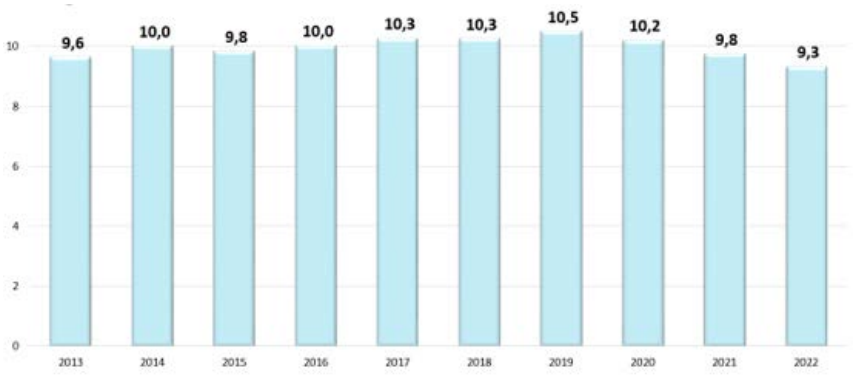
The growing role of gas production in Ukraine's energy independence

Ukraine's energy independence means an increase in gas production, which will provide 100% of the needs of the population, 100% of the needs of utility companies, and the commercial sector. Energy independence is a new image of modern Ukraine. Currently, there are many different sources of energy in Ukraine, such as: oil energy, gas industry, solar, renewable, thermal, wind energy. In my work, I want to consider exactly the gas industry of Ukraine, its relevance in our time.

The gas industry is a branch of the fuel industry, the enterprises of which are engaged in the extraction of natural and associated (oil) gas from the depths of the earth, the production of liquefied gas, artificial combustible gases from solid and liquid fuels, storage, and transportation of gas through gas pipelines for supply to the population and industry. On the territory of Ukraine, it is being developed on the basis of deposits of the Dnipro-Donetsk oil and gas-bearing region, the Transcarpathian oil-and-gas-bearing region, and the Black Sea-Crimea oil-and-gas-bearing province. The largest gas deposits are located in the Kharkiv, Poltava and Lviv regions. The gas industry of Ukraine is developing on the basis of deposits of the Transcarpathian, Dnipro-Donetsk oil and gas regions and the Black Sea-Crimea oil and gas-bearing province. Gas consumption in Ukraine is 30-32 billion m3 per year. Gas production in Ukraine has stabilized at the level of 18-20 billion m3 per year. Thus, Ukraine's self-sufficiency in gas today is approx. 70%. By 2020, it is planned to reach 28 billion m3 of natural gas production, of which almost 50% should be produced thanks to new investments and modern technologies. In general, by 2020, the country had to abandon the import of raw materials at the expense of its own resources. In 11 months of 2020, "Ukrtransgaz" transported 15.6 billion m³ of gas from Europe to Ukraine by order of its customers. This is 11% (1.6 billion m³) more than the same indicator last year and 34% higher than the average mark (11.7 billion m³) of the corresponding periods in 2016-2019. Natural gas consumption in Ukraine increased by 3.7% in 2020 compared to 2019 (from 29.9 billion cubic meters to 31.0 billion cubic meters). In 2020, the population consumed 8.2 billion cubic meters. m of gas, which is 1.3 billion cubic meters. m (13.7%) less than in 2019, due to the decrease in demand for natural gas, which depends on temperature indicators.

Natural gas production in Ukraine in January-June 2013-2022, million cubic meters



JSC "Ukrgazvydobuvannya" in 2022, despite the destruction and occupation of part of the production facilities in the east of the country, maintained stable production of natural gas. Last year, the company produced 12.5 billion cubic meters of natural gas (commercial), which is only 3% less than in 2021. Such a result became possible in the conditions when hundreds of production facilities and equipment units were shelled, many deposits and hundreds of wells of Ukrgazvydobuvannya were or still are under occupation or near the front line.

It is noted that in 2022, Ukrgazvydobuvannya drilled 47 new wells, which is almost equal to the figure of the previous year. At the same time, the company's drillers set two drilling records for at least the last 15 years: monthly and daily penetration. In addition, 74 hydraulic fracturing operations were performed, achieving another record - the largest number of operations by its own fleet per month. Likewise, the company managed to keep the number of other operations at a high level: 191 overhaul of wells, 486 operations with coiled tubing installations, 2,333 geophysical operations. Also, 141 wells were equipped with mechanized production systems - this is almost twice as many as in 2021. As reported, in October 2022, the drilling unit of Ukrgazvydobuvannya - Ukrburgaz - set a record for monthly drilling, which is 30,505 m.

Ukraine’s energy resources should be a pillar of postwar economic recovery, but the future role of natural gas in Ukraine depends on a few critical uncertainties. Key factors include the status of Russian gas transit, the ability to invest in domestic production and attract foreign investment, and the scale of international financial support to rebuild and redesign Ukraine’s future energy system.

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La place de la géodésie dans l'étude de l'Univers

La géodésie est considérée comme l'une des sciences anciennes. Il est connu que le développement et la formation de la géodésie en tant que science prennent leur début aux temps anciens. A l'époque, c'étaient des philosophes-ingénieurs qui s'y sont engagés.

A l'heure actuelle, cette science se trouve dans une situation paradoxale : il y a beaucoup de géodésies, différentes dans l'approche, les méthodes et les caractéristiques, mais il n'y a pas de géodésie de système unique. Aujourd'hui, la géodésie dite « officielle » n'a pas de base théorique générale, de base méthodologique, elle ne définit pas le sujet, il n'y a pas de méthode généralisée, comme un ensemble de méthodes utilisées dans la résolution des tâches nationales, économiques, scientifiques et techniques [1].

Une place importante, sinon la principale, dans les études de toute science occupe l'unité méthodologique – un sujet, une méthode, un objet. Les sciences se diffèrent dans leurs méthodes. Les objets d'étude peuvent correspondre, mais les sciences doivent différer dans leur matière, c'est-à-dire déterminer où est leur essence et leur but. Ce n'est qu'après la définition du sujet et de sa méthode qu'une compréhension claire de la science devient acceptable. Aujourd'hui, le niveau de développement de la civilisation détermine de nouvelles tâches et le rôle de la géodésie. Cela est principalement dû au fait qu'il y a eu des changements significatifs dans l'environnement technologique, du logiciel et de l'informatique, ainsi que les besoins d'information spatiale de la société moderne. Par conséquent, il y a un développement actif d'une nouvelle vision de la géodésie en tant que science géospatiale qui crée une base spatiale mobile pour la mise en œuvre d'un certain nombre de projets. Afin de répondre aux nouvelles exigences en matière de fourniture d'informations à la société et à l'économie, on distingue les tâches d'information géodésique :

- analyse générale de l'information spatiale par toutes les industries pour un territoire donné par l'intégration de diverses informations thématiques sur une base spatiale commune;
- établissement des changements dans la localisation spatiale des objets de la zone étudiée, causés par des facteurs naturels et anthropiques, par l'accumulation et la maintenance d'une base de données d'informations spatiales sur les conditions passées du territoire et ses changements;
- analyse et prévision de l'état futur des territoires dans l'espace sous influence humaine par simulation du territoire, traitement de grands volumes

d'informations spatiales obtenues à différents moments et sur divers sujets, à l'aide de puissants numériques [2].

Tout cela, sans exception, a créé des conditions favorables au développement et à l'application de systèmes d'information géographique novateurs, de technologies spatiales et de systèmes GNSS.

Les principales tendances dans la formation et le développement de l'industrie géodésique et cartographique sont sa modernisation dans le cadre des approches appliquées aux activités géodésiques et cartographiques, et l'introduction de mécanismes modernes de gestion et de régulation publique dans ce domaine.

Cette modernisation doit comprendre :

- changements dans les formes existantes d'administration publique;
- mise en œuvre des changements institutionnels sur le terrain [3].

En résumé, il est à noter que la géodésie s'est développée et se développera comme un moyen technique, un logiciel et un matériel informatique. Ainsi, la solution conjointe des problèmes scientifiques de la géodésie avec d'autres sciences nous permet de connaître et d'étudier l'Univers et la Terre sur laquelle nous vivons et de contribuer au développement de l'humanité en tant que partie de l'univers.

La définition et la compréhension de la géodésie dans le cadre de la théorie du développement de cette dernière a une base théorique et méthodologique systématique, et sa base de preuves est toute l'histoire de la géodésie.

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Analysis of Directions for Increasing Energy Efficiency in the Electromechanical System of Drum Ball Mills

Given the energy price rise in the world, improving energy efficiency in industrial production has always been and will continue to be a highly relevant topic. This problem is equally relevant to large mills in the mining industry. Such mechanisms are very energy-intensive, and their share of the total energy consumption of the entire enterprise is very significant. Such equipment consumes a very large amount of electricity, e.g. the main drive can have the power of up to 10,000 kW and more.

The electromechanical system of the mill consists of the drum itself, the auxiliary equipment and its driving part. The main drive consists of an electric motor (of various types), a gearbox (usually used for the motor power of up to 2,000 kW), couplings and electronic control systems [7]. Additional equipment is a conveyor (feeder) that feeds the material into the mill. For dry grinding, a fan is also used to transport the finished (crushed) material out of the mill. Comparing with the electric motor of the main drive, the electric motors for the auxiliary equipment have significantly lower power.

Let's start with improving the energy efficiency of electric motors. For the moment for low-voltage motors (voltage up to 1000 V), the minimum energy efficiency class in Europe and many other countries of the world should be at least IE3 [8]. Globally, the requirements to upgrade to at least IE2 came into force in June 2011 (although in some countries they began to be implemented since 2004). At that time, there were exceptions for certain categories of electric motors (such as those using a frequency converter to control the motor, roller conveyor motors, explosion-proof motors, motors with built-in brakes, etc.) In January 2015, requirements for the energy efficiency class for electric motors of 7.5 kW to 375 kW were introduced. The energy efficiency class for such motors had to be at least IE3. Later, in January 2017, these requirements were extended to smaller electric motors (0.75 kW to 375 kW). And since July 2021, these requirements have become even stricter. Low-power electric motors from 0.12 kW to 0.75 kW (2, 4, 6, 8 poles) – not lower than class IE2; motors with a power of 0.75 kW to 1000 kW – not lower than class IE3. At the same time, the combination of an IE2 motor with a frequency converter is no longer allowed. The same requirements apply to electric motors with built-in brakes. The important thing is that these energy efficiency requirements do not apply to medium- and high-voltage motors (voltage above 1000 V).

Therefore, one of the ways to improve the energy efficiency of the electromechanical system is to use electric motors with a higher energy efficiency class in new equipment or to replace existing electric motors. It is also important to remember that new, even stricter, requirements for the IE4 and IE5 classes will be

gradually introduced around the world. IE4 will be launched in July 2023 for motors with a power of 75-200 kW and the number of poles 2, 4, 6. Therefore, many manufacturers of electric motors and gearmotors already have their own designs for electric motors with IE4 and even IE5 class. Previously, these classes could be obtained in permanent magnet motors (PMSM) [2]. For example, the German company Bauer Gear Motor GmbH began developing electric motors with energy efficiency classes IE3 - IE4 back in 2008 and launched them into mass production in 2011. The development was carried out in cooperation with Dnipro Polytechnic. This was done for electric motors of relatively low power. The development of higher-power motors is a prospect for this year.

An increase in the energy efficiency class is achieved by using new materials in the construction of the electric motor (usually copper instead of aluminium), reducing the air gap between the rotor and stator, sometimes increasing the size of the electric motor (although all manufacturers try not to increase the size of the motor), using a frequency converter to control the motor and modern bearings of various designs, as well as improving the ventilation of the motor.

As for the mechanical part of our system, it is composed of the gearbox and couplings. Modern gearboxes already have a fairly high efficiency [5]. Power losses in the gearbox occur in its gears, bearings, and seals [1]. The main areas where the energy efficiency of the gearbox can be improved are the surface treatment of the teeth (grinding), using quality control and oil cooling systems, additional systems for monitoring gearbox parameters (vibration and temperature sensors in bearings), using modern high-quality lubricants of the required viscosity, and using bearings of a different design. One of the leading manufacturers of industrial gearboxes is the company GSM, Italy. This company includes a separate enterprise engaged in high-quality final machining of gears (grinding) with an accuracy of up to grade 6.

For connecting couplings, elastic couplings of various designs are commonly used to transmit relatively small torques. To transmit higher torques, gear couplings are used. For example, couplings from company JAURE, Spain. They are available with a nominal torque of up to 10,750,000 Nm and a weight of up to 31,000 kg. They have several options for improving the efficiency of couplings. The standard material for them is C45/C55 steel. When alloy steel is used, the overall dimensions of the coupling do not change, but the nominal torque increases by 65%. The rated torque increases by 80% when standard material and additional induction hardening are used. The rated torque increases by 114.5% when alloy steel and additional induction hardening are used. The largest increase in parameters is observed when alloy steel and nitriding are used – the nominal torque increases by 122.5%. It is important to note that to maintain or increase the parameters of the couplings, it is necessary to use high-quality modern lubricants and regular maintenance of the couplings.

Another very important part of the electromechanical system is the automation and control (power) system. The automation system must ensure optimal mill utilization by controlling the raw material feeding drive and the finished material extraction drive. This ensures a balanced operation of the mill without reloads, the grinding

process itself, and the prevention of excessive power consumption by all electric motors in the system.

Induction motors are typically controlled by frequency converters (FCs) or soft starters (SSs). These electronic devices are used for many types of industrial equipment, such as conveyors, lifting equipment, pumps, compressors, fans, and smoke exhausters. Frequency converters provide the necessary power consumption depending on the required performance of a particular mechanism due to the soft start and speed control functions. Large energy savings (30-50%) can be achieved by regulating the speed of electric motors of auxiliary equipment such as pumps, fans (as well as compressors and smoke exhausters). These mechanisms have a cubic electricity consumption dependence on the speed of the drive motor (operating mechanism).

Synchronous and slip-ring motors have a starting and control system different from that of induction motors. This is especially true for synchronous motors. These types of motors have many advantages in terms of technical parameters. But they also have such disadvantages as a much higher price and the complexity of starting up. One of the well-known manufacturers of high-power electric motors is German company LDW (Lloyd Dinamowerke GmbH). This company also produces very big low-speed DC motors up to 8,000 kW.

Conclusion: As mentioned above, the requirements for the level of energy efficiency of power equipment will only increase. Today, the problem of energy efficiency is very important. As we can see, increasing the energy efficiency of the mill's electromechanical system is ensured by increasing the efficiency of each particular part of the system, and not just by increasing the energy efficiency class of the electric motor. All of this makes it possible to achieve a more efficient production process and save primary resources. It also has a significant impact on the uninterrupted and reliable operation of the entire system of the mill.

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Analysis of landslide trends in Ukraine

Landslide is the displacement of masses of rocks along a slope under the influence of their own weight and additional load due to slope erosion, waterlogging, seismic shocks and other processes.

Landslides can occur in any terrain and cause significant damage, both in terms of human casualties and material damage.

The cause of landslides is an imbalance between the shear force of gravity and the retaining forces.

This disturbance is caused by the following reasons:

– increase in the steepness of the slope due to water erosion;

– weakening of rock strength due to weathering or waterlogging by precipitation and groundwater;

– the impact of seismic shocks;

– construction activities.

Landslides usually occur on slopes composed of water-retaining (clay) and aquiferous rocks. The displacement of rock blocks with a volume of tens of m^3 or more on steep slopes occurs as a result of groundwater wetting the detached surfaces.

Landslides occupy a dominant position among exogenous geological processes due to their widespread occurrence in almost all administrative regions of the country. They occur on a relatively small area, but their activation has significant negative consequences due to the rapidity of their development, significant deformation and destruction of engineering facilities.

Modern landslide activation on slopes of different genesis is often associated with the manifestation of related processes, such as erosion and abrasion, which are factors that intensify the main process. The intensification of landslides on the territory of settlements is associated with active economic activity without taking into account planning restrictions, lack of proper engineering and environmental measures for the development of territories. The greatest damage from landslide development and activation is caused to urban areas with dense development and a large population.

Thus, according to the National Report on the State of Technogenic and Natural Safety in Ukraine in 2020, the area of landslide areas within urban areas is more than 44,0 km^2.

Landslides are occurring in 405 settlements, including Kyiv, Dnipro, Kamianske, Odesa, Lysychansk, Kupiansk, Chernivtsi, and others. According to the latest data (as of 2020), 22968 landslides were recorded in Ukraine. A comparative

histogram of the number of landslides in 2019 and 2020 throughout Ukraine is shown in figure 1 [1].

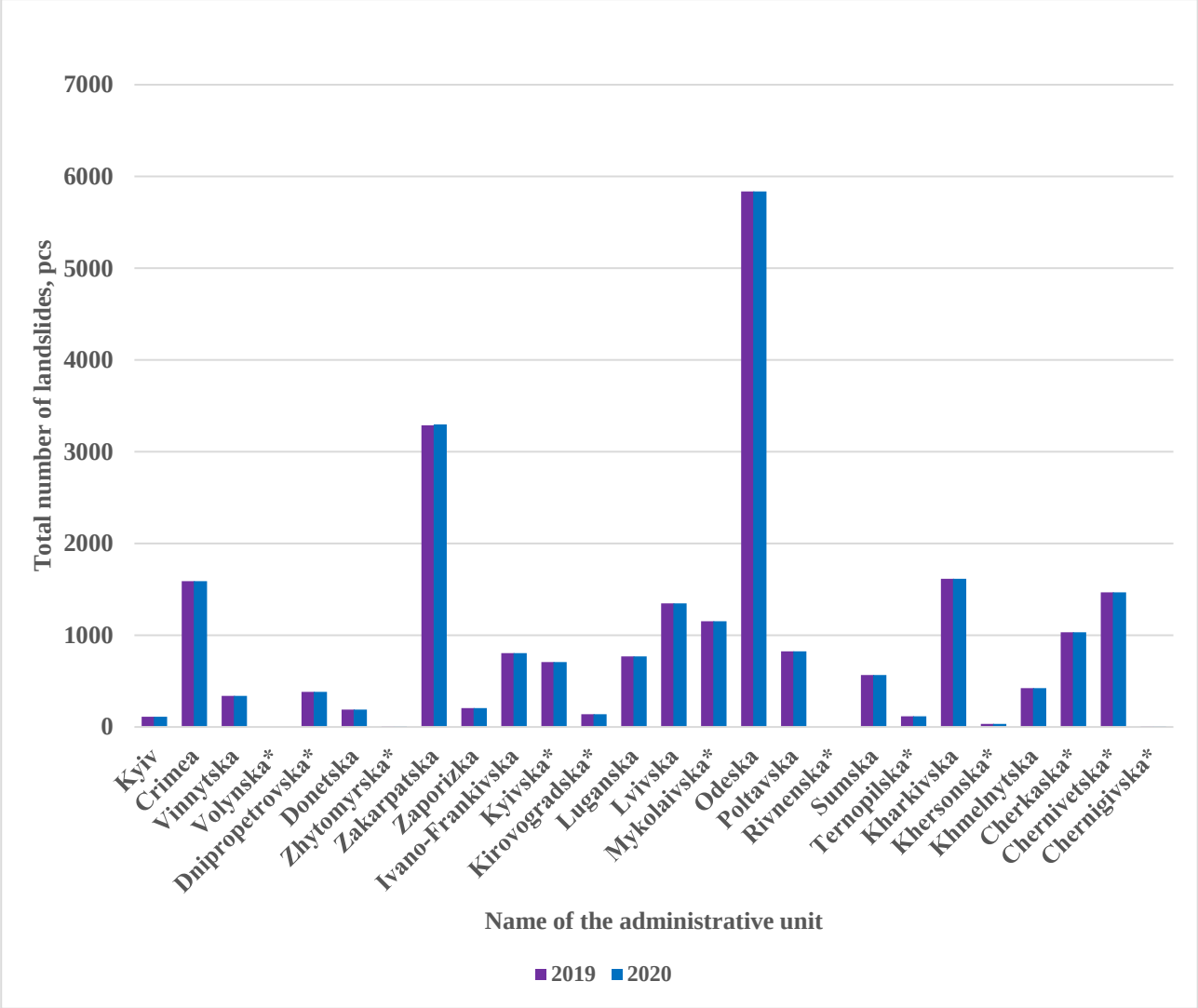

Fig.1 – Histogram comparing the number of landslides in 2019 and 2020 in all administrative units of Ukraine

Figure 1 demonstrates the relevance of the problem of landslides in Ukraine and the need for progressive study of the processes in order to prevent them, continuous monitoring of the stability of slopes, and regulation of human industrial activity [2].

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Energy saving and efficient use of alternative energy sources

Energy saving is an important issue that has gained significant attention in recent years due to the rising global concern over the depletion of non-renewable energy sources[1] and the adverse effects of climate change caused by greenhouse gas emissions. Energy saving refers to the reduction of energy consumption through the implementation of energy-efficient technologies, practices, and policies. The benefits of energy saving are numerous, including cost savings, improved energy security, reduced carbon emissions, and environmental sustainability[2].

One effective way to save energy is to improve the energy efficiency of buildings. Buildings account for a significant portion of energy consumption worldwide, and improving their energy efficiency can result in substantial energy savings.[3] This can be achieved through various means, such as using energy-efficient lighting systems, improving insulation, and upgrading HVAC systems.[4] In addition, the use of smart building technologies, such as building automation systems and energy management systems, can optimize energy usage and reduce waste.

Another way to save energy is to promote energy conservation behaviors among individuals and businesses.[5] This can be done through educational campaigns and incentives that encourage people to adopt energy-saving habits, such as turning off lights and electronics when not in use, using energy-efficient appliances, and reducing transportation-related energy consumption by using public transport or carpooling.

Governments can also play a vital role in promoting energy saving through policies and regulations that incentivize energy efficiency and discourage wasteful energy practices. This can include energy performance standards for buildings, tax credits for energy-efficient appliances and vehicles, and energy labeling programs that inform consumers about the energy efficiency of products.[6]

Overall, energy saving is a critical issue that requires collective efforts from individuals, businesses, and governments to achieve significant results. By adopting energy-efficient technologies and practices, promoting energy conservation behaviors, and implementing effective policies and regulations, we can reduce energy consumption, save costs, and protect the environment for future generations.

The efficient use of alternative energy sources has become increasingly important in recent years as the world seeks to reduce its reliance on non-renewable energy sources and transition towards a more sustainable energy future. Alternative energy sources[7] refer to sources of energy that are not based on fossil fuels, such as solar, wind, geothermal, and hydropower. These energy sources offer numerous benefits, including reduced carbon emissions, improved energy security, and economic growth opportunities.

One effective way to promote the efficient use of alternative energy sources is through the deployment of renewable energy technologies.[8] Solar photovoltaic (PV) systems, wind turbines, geothermal heat pumps, and hydropower turbines are examples of renewable energy technologies that can generate electricity and heat without relying on fossil fuels. These technologies have become increasingly cost-competitive in recent years, making them more accessible to individuals and businesses.

Another way to promote the efficient use of alternative energy sources is through the implementation of energy storage technologies. Energy storage technologies, such as batteries and pumped hydro storage, can store excess energy generated by renewable energy technologies and release it when needed. This can help overcome the intermittency and variability issues associated with renewable energy sources and ensure a reliable and stable energy supply.

Governments can also play a critical role in promoting the efficient use of alternative energy sources through policies and regulations that incentivize their adoption. This can include renewable energy targets, feed-in tariffs, tax incentives, and subsidies for renewable energy technologies and energy storage.

Overall, the efficient use of alternative energy sources is crucial for achieving a more sustainable energy future. By deploying renewable energy technologies, implementing energy storage solutions, and promoting effective policies and regulations, we can reduce our reliance on non-renewable energy sources, mitigate climate change, and create economic growth opportunities.

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Results of the correlation analysis of the relationship between germanium, beryllium and fluorine in the coal seam $c_8^в$ of the "Dniprovska" mine of Western Donbas

The general relevance of research of germanium content in coal seams is explained by the possibility of its industrial extraction and use as a valuable accompanying component. Currently, coal deposits are considered as the most important mineral raw material base for the industrial production of germanium [1]. Special relevance of the performed research provides a solution of the National Security and Defense Council of Ukraine dated July 16, 2021 "About stimulation of the search, extraction and enrichment of minerals that have strategic importance for the sustainable development and defense capability of the state" and Decree of the President of Ukraine No. 306/2021, which introduces this solution into effect. In these documents, germanium ores are included in the list of strategic importance for the sustainable development and defense capability of the state.

Previously, toxic and potentially toxic elements were mainly studied in coal seams of various geological and industrial areas of Donbas [2]. At the same time, research of the connection of germanium, beryllium and fluoride in the coal seam $c_8^в$ of the Dniprovska mine field had not been carried out before.

The purpose of the work is to investigate the features of the relationship between germanium, beryllium and fluoride concentrations in the coal seam $c_8^в$ of the Dniprovska mine.

The factual basis of the work was the results of 370 quantitative spectral analyzes of coal in the $c_8^в$ seam within the Dniprovska mine for germanium, beryllium and fluoride, performed after 1981 in the central certified laboratories of production geological exploration organizations of Ukraine from the material of reservoir samples obtained by production and research enterprises and organizations and the authors personally.

Ten percent of duplicate samples were sent to internal laboratory control. Twelve percent of duplicate samples were subjected to external laboratory control. The quality of the results of the analyzes (correctness and reproducibility) was evaluated as the significance of the average systematic error, which was tested using the Student's criterion, and the significance of the average random error, which in turn was tested using the Fisher test. Since all these errors at the significance level of 0.95 turned out to be insignificant, the quality of the analyzes was recognized as satisfactory.

First of all, analytical calculations of the correspondence of the empirical distributions of the studied elements to the normal distribution were performed. For this purpose, the Kolmogorov-Smirnov, Shapiro-Wilk, Lilliefors and Pearson xi-square agreement criterions were calculated. In all cases, the results of the

calculations confirmed the non-compliance of the studied samples with the normal or lognormal distribution law. Thus, for a more realistic assessment of the central tendency of the content of germanium, beryllium and fluoride, instead of the values of the arithmetic mean, it is necessary to use the median values.

Then the values of germanium, beryllium and fluoride content were normalized according to the formula:

$$X_{i\ norm.} = (X_i - X_{i\ min})/(X_{i\ max} - X_{i\ min}),$$

where $X_{i\ norm.}$ is the normalized unit value of the element content, X_i is the unit value of the element content, $X_{i\ min}$ is the minimum value of the element content, $X_{i\ max}$ is the maximum value of the element content.

In this way, the calculated normalized values of oil samples from each deposit were processed using the STATISTICA 11.6 program, in which the calculation of descriptive statistics, correlation and regression analyzes and graphical visualization of the results of the performed studies were performed.

Performing a correlation analysis between the contents of germanium and beryllium allowed to establish a direct weak relationship between the concentrations of these elements, which is 0.37. Based on the results of the regression analysis, a linear regression equation was calculated (the graph of the regression equation is shown in Fig. 1):

$$Ge = 0{,}1794 + 0{,}2967 \cdot Be.$$

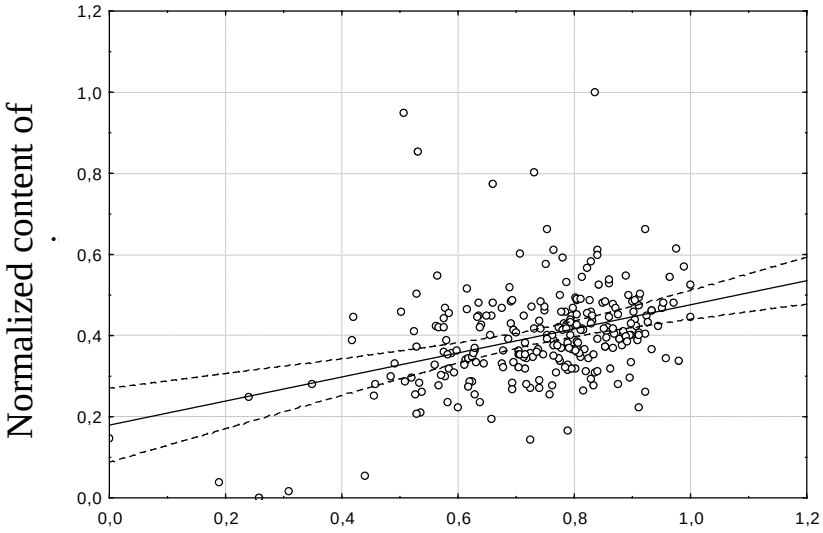

Fig. 1. Graph of regression equations between concentrations of germanium and beryllium

According to the results of the correlation analysis, a weak inverse relationship between germanium and fluoride concentrations was established, while the correlation coefficient is -0.36. According to the results of the regression analysis, a linear regression equation was calculated (the graph of the regression equation is shown in Fig. 2):

$$Ge = 0{,}4781 - 0{,}268 \cdot F.$$

In our opinion, the established weak but direct connection between germanium and beryllium indicates their joint accumulation in the contact zone of the coal seam, which occurs according to the "Zilbermints law".

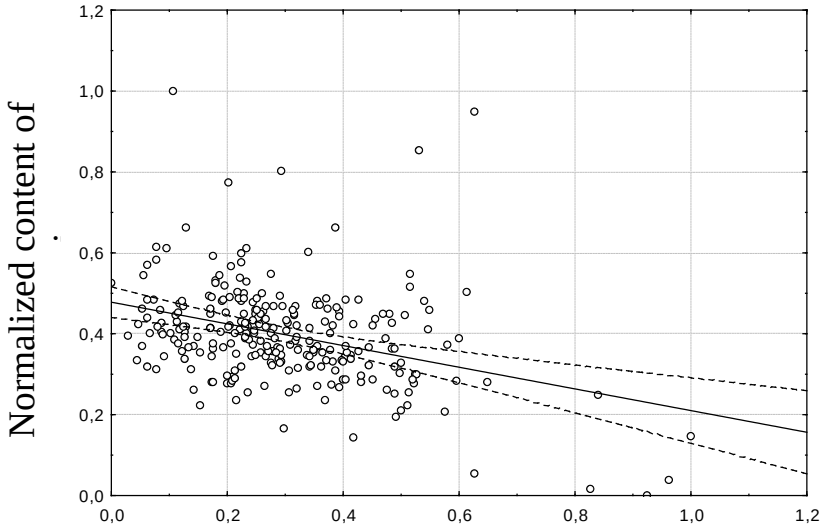

Fig. 2. Graph of regression equations between concentrations of germanium and fluoride

Conclusions. The analysis of the conducted studies shows: 1) the inconsistency of the empirical samples of the considered elements with the normal or lognormal distribution law, therefore, as a more realistic assessment of the central tendency of the contents of germanium, beryllium and fluoride, instead of the values of the arithmetic mean, it is necessary to use the median values; 2) the polymodality of the distribution of germanium, beryllium and fluoride is recorded, which, taking into account the geochemical features of these elements and their behavior in the general process of formation of the Donbas coal seam, allows us to assume the polygenicity of their accumulation in the coal seam; 3) an inverse weak relationship between the contents of germanium and fluoride, and a direct weak relationship between the concentrations of germanium and beryllium was established; 4) calculated regression equations make it possible to predict and interpret in geological terms the general trend of germanium concentration in the coal seam $c_8^в$ of the Dniprovska mine field by the content of fluoride and beryllium.

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Le problème de mise en œuvre des systèmes automatisée et robotiques dans la construction

La construction est l'une des principales industries qui assure la création de nouvaux fonds, ainsi que l'expansion et la reconstruction des fonds existants. Il est possible d'assurer une interaction claire de tous les éléments de la production de la construction uniquement à condition d'appliquer une organisation scientifique, une planification et une gestion de la construction. Dans la construction, comme dans toute branche de l'économie, l'efficacité de la production augmente grâce à la mise en œuvre de réalisations scientifiques et techniques, à l'amélioration de la gestion et à la planification de l'organisation de la production et de la main-d'œuvre. Actuellement, l'automatisation des processus répétitifs peut être observée dans de nombreuses industries. Malgré un grand choix de recherches les plus récentes et modernes, tous les avantages d'une telle modernisation des travaux de construction, la plupart de ces dernières, malheureusement, n'ont pas pu être largement appliquées.

En analysant les ouvrages scientifiques des auteurs nationaux et étrangers, on peut identifier les problèmes suivants qui ralentissent la mise en œuvre des mécanismes déjà existants :

1. *La limitation fonctionnelle [5]*. À nos jours, l'application de la robotique en construction est limité à un ou deux processus répétitifs (les imprimantes 3D de construction mettent uniquement du béton, des robots maçons posent des briques, certains modèles peuvent appliquer aussi du mortier), qui sont gérés à l'aide des progiciels spéciaux. De plus, une limitation fonctionnelle, dans certains systèmes, peut se révélée en raison de la complexité des formes architecturales.

2. *L'imperfection technologique des appareils [1]*. De nombreux dispositifs de construction automatisés présentent certains inconvénients, tant en fonctionnement que lors du traitement des données, car ils ne sont pas dotés d'un niveau d'intelligence artificielle suffisant pour gérer certaines tâches. En raison de leur imperfection, ils doivent être améliorés.

3. *L'entretien de l'équipement*. Ce problème est en partie lié à l'imperfection technologique, car des programmes supplémentaires ou des composants d'accompagnement peuvent être élaborés pour les robots de construction existants. De plus, il n'existe toujours pas de centres techniques spécialisés pour l'inspection réglementée et la vérification de l'efficacité du système. Il convient de noter que ces technologies nécessitent des réparations relativement fréquentes.

4. La *qualité des travaux [2]*. Aujourd'hui, le résultat du travail des systèmes de construction automatisés semble brut et même de qualité insuffisante et doit donc être mis au point par un spécialiste.

5. *La mise à disposition de ressources spécifiques*. Pour réaliser des travaux à l'aide d'équipements de construction innovants, on utilise souvent des matériaux spéciaux "non sériels", dont la production peut être longue et le coût déraisonnablement élevé. En outre, l'équipement peut nécessiter des matériaux connexes supplémentaires pour assurer un fonctionnement stable et atteindre une productivité maximum.

6. *Le temps d'installation et de démontage de l'équipement [3]*. Pour commencer les travaux, il est nécessaire de préparer la zone nécessaire où les travaux seront effectués et de monter toutes les parties du système, de vérifier la fonctionnalité de l'équipement, de préparer et de télécharger l'algorithme dans le système d'exploitation de l'appareil

7. Les *changements importants lors de la prise de décisions organisationnelles et technologiques*. Déjà au stade de la conception, les solutions organisationnelles et technologiques adoptées différeront sensiblement de celles existantes. Il est nécessaire de créer des normes, des standards et des méthodes pour la sélection rationnelle des systèmes automatisés des bâtiments et de leurs conditions de fonctionnement.

8. Le *monopole de grandes entreprises*. Compte tenu du coût élevé des technologies innovantes, les cercles d'investisseurs craignent de perdre investissements et bénéfices. Compte tenu du coût des nouveaux équipements, qui ont été testés dans des conditions de laboratoire et non sur le chantier, la plupart des grandes entreprises de construction n'osent pas moderniser le processus de construction.

9. *Le perfectionnement professionnel et la formation des spécialistes*. Aujourd'hui, il y a un problème de la pénurie des spécialistes dans le domaine en question.

10. *Le risque d'évincement des personnes des principaux processus [3]*. Actuellement, le risque de réduire au minimum les gens de nombreux processus répétitifs est assez élevé. Les équipements de construction robotisés pourront travailler plus rapidement que plusieurs travailleurs à la fois, ne nécessiteront pas de salaire et réduiront le risque d'accidents du travail.

Pour la mise en œuvre efficace des systèmes automatisés et robotisés dans la construction, les problèmes posés nécessitent des solutions rationnelles. Il faut faire attention au fait que les problèmes identifiés sont interconnectés et qu'il est impossible de tous les résoudre à la fois. Ainsi, il est nécessaire de mettre à jour les principaux problèmes et les résoudre en priorité, ce qui à l'avenir pourra aider et stimuler la résolution de problèmes secondaires.

Afin de définir la procédure de la résolution des problèmes en question et fixer les priorités, il est nécessaire de faire appel à des experts et de mener une eenquête dont les résultats doivent être publiés dans un article scientifique.

En guise de conclusion, on peut dire que la classification des principaux problèmes de l'introduction de processus automatisés et robotiques dans la construction a été effectuée. Donc, celle-ci pourra aider les scientifiques à choisir la direction de la recherche pour résoudre les problèmes identifiés.

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Untersuchung der Arbeitsbedingungen bei der Herstellung von Bauprodukten und Entwicklung von Maßnahmen zu deren Verbesserung

Bauprodukte sind nach § 2 der Hessischen Bauordnung (HBO) Produkte, Baustoffe, Bauteile und Anlagen sowie Bausätze, die nach EU-Bauproduktenrecht hergestellt und in Verkehr gebracht werden, um dauerhaft in bauliche Anlagen eingebaut zu werden, und dessen Leistung sich auf die Leistung des Bauwerks im Hinblick auf die Grundanforderungen an baulichen Anlagen auswirkt. Hierunter fallen auch vorgefertigte Anlagen (z.B. Betonfertigteile), die mit dem Erdboden verbunden werden [1].

Das deutsche Regelungssystem für Bauprodukte und Bauarten ist in den 16 Landesbauordnungen festgelegt. Die Landesbauordnungen basieren auf einem gemeinsamen Muster, der Musterbauordnung (MBO). Die Landesbauordnungen definieren die allgemeinen Anforderungen an bauliche Anlagen. Zudem ist hier das Zulassungs- und Genehmigungsverfahren für Bauprodukte und Bauarten festgelegt. Die allgemein definierten Anforderungen an bauliche Anlagen werden durch Technische Baubestimmungen konkretisiert. Auch für diese gibt es ein gemeinsames Muster: Muster-Verwaltungsvorschrift Technische Baubestimmungen (MVV TB).

Die Bauordnungen unterscheiden folgende Ver- und Anwendbarkeitsnachweise für ungeregelte Bauprodukte und Bauarten:

- Allgemeine bauaufsichtliche Zulassung (abZ);
- Allgemeine Bauartgenehmigung (aBG);
- Europäische Technische Bewertung (ETA);
- Zustimmung im Einzelfall (ZiE);
- vorhabenbezogene Bauartgenehmigung (vBG).

Während die allgemeine bauaufsichtliche Zulassung, die allgemeine Bauartgenehmigung und die Europäische Technische Bewertung durch das Deutsche Institut für Bautechnik ausgestellt werden, erfolgt eine Bearbeitung der Zustimmung im Einzelfall bzw. der vorhabenbezogenen Bauartgenehmigung durch die zuständigen obersten Bauaufsichtsbehörden [2].

Bei Bauproduktenbetrieben sind folgende Regeln zu beachten: Transport und Lagerung.

Die wichtigsten schädlichen Faktoren im Unternehmen für die Herstellung von Bauprodukten sind Lärm, Vibrationen, ungünstiges Mikroklima und Industriestaub. All diese schädlichen Produktionsfaktoren verursachen Krankheiten und wirken sich negativ auf die menschliche Leistungsfähigkeit aus.

Das Unternehmen Brookland wurde 2016 auf der Grundlage des Industrieriesen Budmeister gegründet, der seit mehr als 20 Jahren ein führender Hersteller von Stahlbeton und anderen Bauprodukten in der Ukraine ist.

Dienstleistungen von „Brookland“ LLC sind Messung und Berechnung von Materialien; Verlegung von Pflastersteinen; Lieferung von Pflastersteinen.

Die wichtigsten hergestellten Produkte sind Pflastersteine und Straßenelemente.

Bei der Herstellung von Pflastersteinen verwendet die Firma "Brookland" LLC die Methode des Vibrationspressens:

- Vorbereitung der Betonmischung
- Transport der Betonmischung zum Trichter der Formmaschine
- Bildung der Hauptschicht (untere Schicht)
- Bildung der Frontschicht
- Stapeln und Transport zur Produkthaltekammer
- Halten in der Kammer und technische Kontrolle
- Transport der Produkte im Lager zur Endfestigkeit.

Die folgenden schädlichen Produktionsfaktoren wurden im Unternehmen Brookland LLC entdeckt: erhöhter Lärmpegel am Arbeitsplatz (Presswerk); erhöhter Vibrationspegel am Arbeitsplatz (Presswerk); erhöhte Staubigkeit der Luft im Arbeitsbereich (Betonmischanlage).

Um die Arbeitsbedingungen bei der Herstellung von Betonmischungen zu verbessern, wurden folgende Maßnahmen vorgeschlagen: Auswahl eines geeigneten Gebläses und eines Zyklons, um den erforderlichen Luftaustausch in den Räumlichkeiten zu gewährleisten; Verwendung von persönlicher Schutzausrüstung; Anwendung von organisatorischen und technischen Maßnahmen.

Um Arbeitsunfälle im Unternehmen zu reduzieren, müssen bestimmte Maßnahmen zur Reduzierung von Unfällen umgesetzt werden.

№ S/N	**Maßnahmen**	**Handlungen, um das Risiko zu reduzieren**
1	Arbeitsschutzmanagementsystem	Ein Arbeitsschutzmanagementsystem entwickeln, im Unternehmen implementieren und dessen Funktionsweise laufend analysieren.
2	Bewertung beruflicher Risiken	Berufliche Risiken im Unternehmen einschätzen.
3	Maßnahmenplan zur Reduzierung von Arbeitsunfällen	Entwicklung und Umsetzung eines Maßnahmenplans zur Reduzierung von Arbeitsunfällen.
4	Auswahl und Ausbildung	Auswahl und Schulung der Mitarbeiter unter Berücksichtigung der Reduzierung von Unfallrisiken durchführen.
5	Medizinische Untersuchungen	Führen Sie in gesetzlich vorgesehenen Fällen rechtzeitig medizinische und psychiatrische Untersuchungen von Mitarbeitern durch.
6	Erklärende Arbeit	Mit jedem Mitarbeiter der Organisation in jeder Abteilung Aufklärungsarbeiten zum Arbeitsschutz durchzuführen.
7	Persönliche Schutzausrüstung	Um nur hochwertige und effektive PSA zu kaufen, müssen Sie: an thematischen

		Ausstellungen teilnehmen, mit Herstellern kommunizieren, die Produktion von PSA besuchen.
8	Kontrolle der Betriebsfähigkeit der Ausrüstung	Überprüfen Sie die Gebrauchstauglichkeit der technologischen Ausrüstung, kontrollieren Sie den technologischen Prozess.
9	Auswahl der Räumlichkeiten und Ausstattung	Berücksichtigen Sie bei der Auswahl einer neuen Produktionsstätte oder -ausrüstung Arbeitsschutzrisiken
10	Sonderangebot	Es ist notwendig, rechtzeitig eine besondere Bewertung der Arbeitsbedingungen durchzuführen
11	Garantien und Vorteile	Bieten Sie Ihren Mitarbeitern Garantien und Leistungen, die durch Gesetze und interne Vorschriften vorgesehen sind
12	Arbeits- und Ruhemodus	Halten Sie Arbeits- und Ruhezeiten ein, da Übermüdung der Arbeitnehmer eine häufige Unfallursache ist.

Die Arbeitsbedingungen sind von erheblicher Bedeutung und wirken sich erheblich auf den Körper des Arbeitnehmers, seine geistigen und körperlichen Funktionen aus und beeinträchtigen folglich die Produktivität und Arbeitsfähigkeit des Arbeitnehmers bei allen Arbeitsaktivitäten.

Alle aufgeführten Maßnahmen und Mittel werden es dem Unternehmen "Brookland" LLC ermöglichen, die Arbeitsbedingungen erheblich zu verbessern und die Zahl der Unfälle und Berufskrankheiten zu reduzieren.

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Use of unmanned aerial vehicles to detect forest fires

The analysis of amount of forest areas and wood stocks in Ukraine revealed the existing problem of the shortage of forest resources. The occupied area of forests in our country today is 15.9% of the territory. In order to achieve 20% of forest cover according to European standards and recommendations, it is necessary to preserve the existing amount of forests and plant more than 2 million hectares of new forests. It will take about 20 years.

The state and number of forested areas on the territory of our country in many cases depends on the solution of such problems as the preservation and improvement of the quality of the forest fund of Ukraine. Fire protection of forests and monitoring of forest fires is one of the main components of guaranteeing the safety of national natural resources, since the consequences of forest fires are catastrophic both for the biosphere and for the atmosphere, hydrosphere, and lithosphere.

According to source data [1], about 25,000 forest fires occur annually in Ukraine, covering an area of more than 30,000 hectares, and this problem is increasing every year. Forest fire monitoring is governed by regulatory documents, namely: the Forest Code of Ukraine, the Laws of Ukraine "On Environmental Protection" and "On Plant Life".

Quite often, forest fires turn into ecological disasters (Fig. 1) if they are detected late, that is why it is extremely important to use monitoring of forest fires, which allows you to quickly deal with outbreaks at the initial stage and suffer minimal losses.

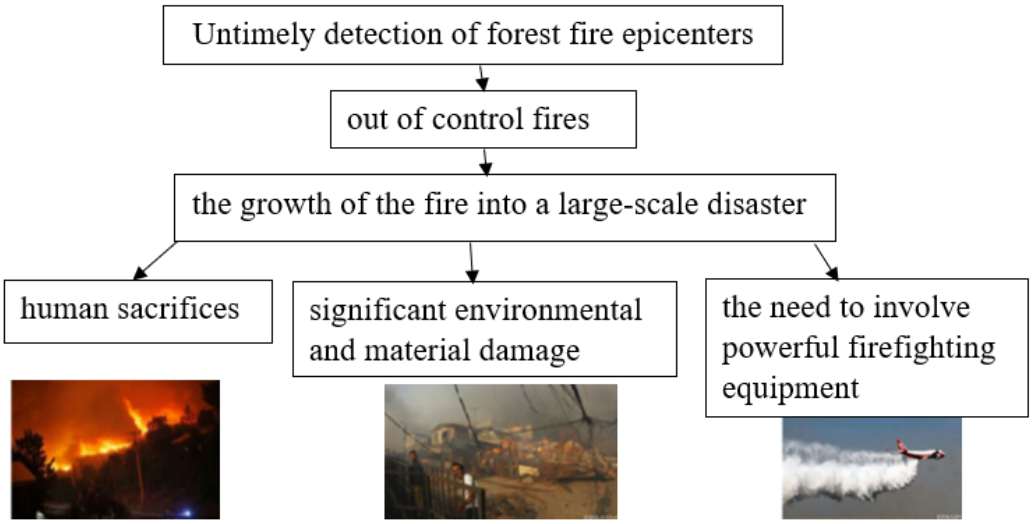

Fig. 1. Consequences of late forest fire detection [1]

Figure 2 shows the classes of fire safety in relation to the means of forest fire detection and its elimination. There are 3 levels according to the traffic light principle, which show the importance of timely monitoring in order to detect forest fires (green level), followed by the second (yellow) level, which requires a quick response to prevent a forest fire from turning into an ecological disaster (red level).

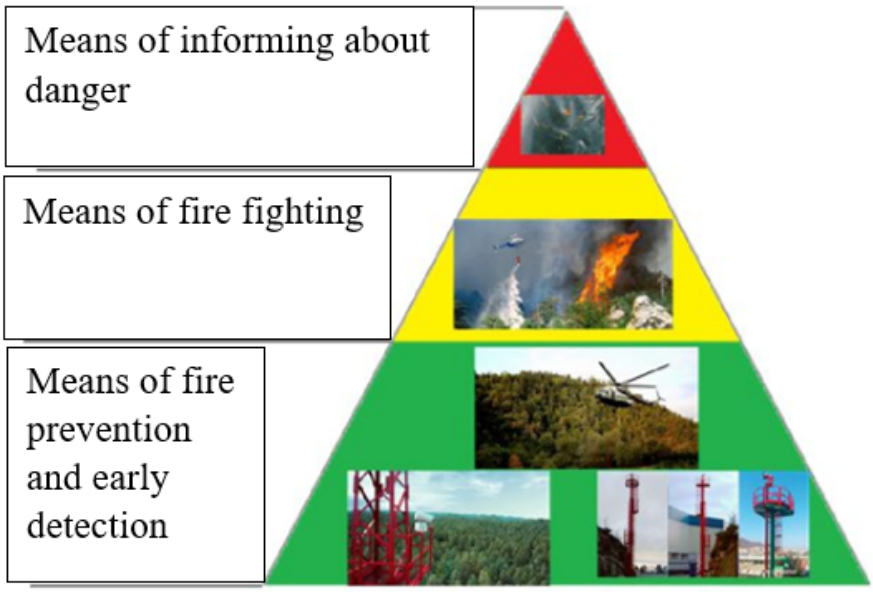

Fig. 2. Fire safety levels [2]

The effectiveness of forest fire monitoring can be increased through the use of unmanned aerial vehicles (UAVs) and GIS technologies. During planned flights, it is possible to detect forest fires and timely notify relevant services about the danger of forest fires. The use of UAVs makes it possible to improve the modern forest fire protection system without the high costs of using aviation and space satellites.

When using unmanned aerial vehicles, it is necessary to be guided by certain regulatory documents that have not been developed yet and, accordingly, not approved in Ukraine. So, from a legal point of view, their status is not defined, on the other hand, you can find a clear definition of the concept of "unmanned aircraft" in Article 1 of the "Air Code of Ukraine":

"unmanned aircraft - an aircraft designed to fly without a pilot on board, the flight control and control of which is carried out using a special control station located outside the aircraft" [3];

"aircraft - a device for flights in the atmosphere or outer space" [3].

Also, there are no requirements regarding the use of drones in the main regulatory documents. This problem is observed not only in Ukraine, but also in other countries of the world.

The use of UAVs for both aerial photography and forest fire monitoring is a very relevant direction in the development of geospatial data collection methods. Materials from space photography have maximum coverage, but their relevance is insignificant. In some areas, you have to wait months for space pictures. Aerial

photography and aerial laser scanning have higher relevance and accuracy, but provide coverage of smaller areas compared to space photography. Also, both of the above methods of obtaining images are expensive. And the use of UAVs is justified in cases where it is necessary to quickly obtain accurate information about the terrain in small areas. In addition, taking into account the cost of each of the solutions, UAVs occupy very favorable positions, and in some cases are optimal from the point of view of financial costs.

So, the advantages of using UAVs are:

1. Profitability.
2. The possibility of shooting from low heights, obtaining high-resolution images.
3. Promptness of taking pictures.
4. The possibility of application in emergency zones without risk to the life and health of pilots.

Conclusion.

The high level of danger caused by forest fires worldwide can be minimized if forest fire outbreaks are detected in a timely manner through monitoring. Experience shows that among the many modern geodetic and photogrammetric methods of detecting forest fires (ground, aerial photography, space, satellite photography, remote sensing, UAV), the most expedient and optimal is the use of UAV.

As a result of the active development of unmanned aerial vehicles in our time and their use for monitoring forest fires is due to the presence of significant advantages such as: filming without a pilot, the duration and range of the flight, good maneuverability, the possibility of monitoring around the clock, under any meteorological conditions, their low cost and the possibility of their mass production, compared to traditional and space-based monitoring methods.

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L'efficacité énergétique des structures préfabriquées en béton armé

Les structures préfabriquées en béton armé (SPBA) sont les plus courantes dans les pays développés. Ils sont utilisés pour la construction de bâtiments et de structures de différents types et destinations, des bâtiments résidentiels et industriels. Les éléments des SPBA sont fabriqués dans des usines dans des conditions de température et d'humidité contrôlées, permettant d'obtenir une haute qualité et une précision dimensionnelle. Les éléments préfabriqués sont ensuite livrés sur le chantier où ils sont assemblés sur place. L'utilisation des SPBA réduit la quantité de déchets sur le chantier, réduisant ainsi le coût de transport des matériaux et l'impact environnemental de la construction.

Basé sur les propriétés du béton armé, les SPBA sont utilisées principalement dans les structures de soutien. Leur utilisation dans les structures de confinement est limitée par des contraintes thermiques [1].

En Ukraine, jusqu'en 1991, il y avait une production de masse de bâtiments de SPBA. Aujourd'hui, l'efficacité énergétique de ces bâtiments n'est pas conforme aux normes existantes, ce qui rend nécessaire de les isoler. Une nouvelle construction utilisant des structures «anciennes» n'est plus pratique.

L'efficacité énergétique des structures de confinement peut être améliorée, à notre avis, par l'utilisation des panneaux à trois couches. La couche extérieure du panneau est en béton armé, qui sert d'isolant de l'environnement, par exemple, il protège le bâtiment contre les précipitations et la lumière du soleil. La couche intermédiaire est un noyau d'isolation, qui sert pour l'isolation thermique. Divers matériaux comme la laine minérale, la mousse ou la mousse de polystyrène extrudé peuvent être utilisés comme isolants. La couche intérieure doit être fabriquée en béton armé, assurant la capacité portante de la structure [3]. L'application de cette technologie tient compte de tous les paramètres de conception tout au long du cycle de vie des bâtiments.

Il faut souligner que l'utilisation de telles constructions permet d'augmenter l'efficacité énergétique de l'enveloppe thermique du bâtiment et, à condition de l'application des systèmes de l'économie d'énergie, permet de passer au concept de « bâtiment passif » et même au concept de « triple zéro » [2].

Le dessin 1 montre un exemple d'une maison construite des panneaux muraux à trois couches.

Dessin 1. L'installation des panneaux à trois couches

La figure 2 montre la conception de l'école maternelle.

Dessin 2. La conception de l'école maternelle construite des panneaux à trois couches.

En guise de conclusion, il faut dire que dans l'ensemble, l'utilisation de techniques de SPBA est une méthode clé pour améliorer l'efficacité énergétique des bâtiments qui réduit le coût du chauffage et de la climatisation, la quantité de déchets sur place, crée des bâtiments durables et sûrs et diminue l'impact environnemental des constructions. Donc, l'utilisation de ces constructions nécessite la modernisation des technologies de la fabrication des structures en question et l'acquisition de l'expérience nécessaire par les concepteurs.

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Donetsk basin from the perspective of its reserves of mineral resources

Ukraine is rich in mineral resources. One of the richest regions in mineral deposits is Donetsk Oblast often called Donbas. The aim of this paper is to examine this Oblast from the perspective of its mineral deposits and their value for Ukrainian economy.

The group of combustible minerals of Donbass includes hard and brown coal, natural gases. They are a valuable source of energy for blast furnaces and thermal power plants, high-quality raw materials for the chemical industry etc.

Hard coal is a solid combustible mineral of plant origin with a high carbon content (75-97 percent). The formation of coal in the Donetsk basin took place more than 300 million years ago. Coal is the main wealth of the Donetsk basin, represented by various grades from long-flame and coking to gas, fat, and anthracites. It gives life to many industrial enterprises and transport, thermal power plants.

Natural gas. It is difficult to name a branch of the economy in which natural gas would not be widely used as a convenient and fuel or excellent raw material. In the chemical industry, for example, it becomes not only an energy resource, but also a raw material used to produce mineral fertilizers.

Peat. Insignificant reserves of peat of local importance are located in the northern part of Donetsk region.

The ore minerals of Donbass and adjacent territories include iron, mercury, nepheline, polymetallic and copper ores.

Iron ores are natural mineral accumulations containing iron, one of the most common elements on the Earth. In terms of reserves and production of iron ore, Ukraine occupies one of the leading places in the world. Their development provides raw materials for the metallurgical and chemical industries. Iron ore manifestations associated with coal rocks in Donetsk Basin are represented by mineralized limestones, interlayers in coal, as well as brown-iron accumulations in shale rocks, which, as a rule, have no industrial value.

Donetsk basin has the richest reserves of non-metallic minerals: rock salt and gypsum, chalk, and marl, fluxing and building limestones, unique refractory, and brick clays, building and glass sands, kaolin and dolomites, sandstones and fluorite.

Rock salt. The total reserves of table salt in Donetsk basin are 25.4 billion tons. Salt is mined both by underground mining method (Artemovsky district), and by the method of underground leaching of layers (wells near Slavyansk).

Gypsum. Gypsum is a constant companion of rock salt deposits of the salt-bearing suite of Permian deposits, where its main developed deposits are located in Artemovskoye, Mikhailovskoye, Pshenichanskoye and Popasnye Leski.

Chalk. Chalk has a significant distribution along the northern and southern as well as the northwestern margins of the Donetsk Basin.

Marl is a sedimentary carbonate-argillaceous rock containing up to 80 percent carbonates. Marl deposits are confined to the southern margin of Donetsk Basin.

Limestone - a sedimentary rock composed mainly of calcite. Donetsk basin has huge reserves of limestone, the largest deposits of which are Yelenovskoye, Karakubskoye, Novotroitskoye and Severo-Shevchenkovskoye.

Sandstones. These sedimentary rocks common in Donbass are cemented sand of different types: argillaceous, carbonate and/or ferruginous.

Natural crystalline rocks of igneous origin are represented by granites, syenites, diabase and many other Precambrian rocks. Their deposits are found within the Azov crystalline massif.

Sands. Within Donetsk Basin, loose sedimentary rocks - sands - are distinguished by their significant distribution and diversity. Large reserves of building, molding, glass, concrete, and ballast sands have been explored here.

Kaolin. In Donbass and adjacent territories, large deposits of minerals have been explored such as primary kaolin formed at the site of weathering of crystalline rocks of the Azov massif.

Graphite is the softest among all known minerals. It is a type of pure carbon. In Donetsk region, it is confined to the area of distribution of Precambrian crystalline rocks of the Sea of Azov.

Phosphorites are found in many beams of the northern and the northwestern Donbass in the form of layers in Cretaceous and Paleogene rocks; the weight of individual clusters sometimes exceeds a kilogram.

Vermiculite. The Kamennomogilnoye deposit of vermiculite, a mineral formed from mica as a result of weathering, has been discovered in the Sea of Azov. It is a valuable heat and sound insulating material.

Ocher. On the territory of Donbass there are ocher clays. Their most famous deposit is Yasnopolyanskoe (in the Slavyansk region of the Donetsk region). Ocher clays are suitable for the preparation of "dry ocher", other brands of natural paints.

To conclude, Ukraine harbors some of the world’s largest reserves of titanium and iron ore, fields of untapped lithium and massive deposits of coal. The most part of those coal deposits, which for decades have powered Ukraine’s critical steel industry, are concentrated in the East, where Russia has made the most inroads. If Russia succeed in annexing the Ukrainian territory it has seized, Ukraine will permanently lose access to almost two-thirds of its deposits. Ukraine would also lose myriad other reserves, including stores of natural gas, oil, and rare earth minerals.

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Can we install solar panels in the flats?

Nowadays, the consumption of energy is enormous. As a result, humanity burns a lot of fossil fuels being harmful for environment to provide electricity for most of us. Nevertheless, this amount can be reduced by using renewable sources of energy, such as solar, wind, and hydro ones.

However, the current share of energy, for example, in Ukraine generated by RES is very small. It reached 12,4 percent by the end of 2020[1]. Besides, most of produced energy is taken from large power stations. To improve the situation some of us could install our own sources of renewable energy, mostly solar panels. This offers many benefits, for example, we can use energy more productively, burn fewer fossil fuels, and get some kind of financial autonomy.

So, this modern trend is becoming more popular. However, due to a big size of the solar panels, they are often placed in the big power plants or private households. Moreover, a lot of people still doubt if these solar panels can be installed in the multi-apartment building. The answer to this question is positive. So, let us consider some examples of solar panels for householding use.

To begin with, the first idea that should be mentioned is connected with a solar panel system placed on the roof of the apartment block. It can be seen on the new buildings. Their owners benefit from their use because the renewable sources of energy increase the cost of apartments. Furthermore, renters can save money on electricity bills and help reduce environmental pollution. In addition, if the building doesn't have solar panels, tenants can ask a landlord to install them.

There are some cases when an approval from bodies such as neighbor councils or building management is needed. Moreover, the installation should be complied with all rules related to altering the style or structure of building in the living area.[2]. The other problem is a tilt angle. The knowledge of it is very important for maximizing energy yield. It depends on many factors, such as latitude of the location, the weather condition, and surrounding obstacles. For example, for Ukraine it is perpendicular, in summer, 30-35, in spring and autumn – 45, and in winter an angle of 70 is desirable[3]. Moreover, orientation of solar panels on the side of light has a considerable contribution in productivity.

Secondly, there are many solar panels that can be installed on the balcony on your own. You need only to have custom-made structural support in the balcony to lock the panel in place as a protective measure [4]. The size of the panel is determined by the balcony's dimensions. The lower the price per wat, the larger the panel. The 160-wat panel is ideal, because it is small and light [4]. Moreover, you can connect ones in series using inventor. Nevertheless, their payback period is rather big due to their cost and amount of energy they generate. Furthermore, it depends on

weather conditions, for example electricity production can be reduced by 20-30% as a result of clouds [4]. Besides, the tilt angle must be constantly changed because of the movement of the sun.

Therefore, the 160-watt panel can produce from 10 to 190 watts of power or roughly 1 kWh a day [4]. You will be able to run a 400-watt device for a few hours. Besides, balcony panels are related to wall-mounted ones. They are installed parallel to the wall or have a high slope. As a result, they need to be fastened properly to stay upright and avoid displacement and damage. However, they have setback in energy production. The energy absorption is the most successful when the sun is lowest in the sky [5]. Therefore, these panels produce more electricity in winter than in summer. Moreover, they are more effective far from the equator. Nevertheless, these types of panels generate less power than roof or ground ones. As for the maintaining, they are cleaned easier as rains can wash away dirty things and the leaves from the panel surface. Furthermore, it is easier to see in what condition they are. However, such drawback as difficulty to replace should be taken into consideration [5].

Finally, a lot of portable solar panels can be found on the market. For instance, one of the most popular for homes is a portable solar panel kit. This one is quite small. It includes one or more panels, a battery bank, and a charge controller [6]. Moreover, the slope of it can be changed. It is suitable for the apartments that do not have the access to roof to install the panel or have a small balcony. The peak power varies from 80 to 160-200 watts. Besides, the cost is much less than roof ones, but its durability is reduced in comparison with roof solar panels.

In conclusion, it should be noted that the market offers a plenty of solar panels for the apartments. So, people can make decision in terms of their possibility and requirements. Such factors as installment, access to roof or wall, and balcony size can play an important role to make choice.

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About relationship between "total content of metals" indicator and the concentration of paraffins, resins and asphaltenes in oils from the deposits of the Eastern oil and gas-bearing region of Ukraine

Scientific interest in the question of the accumulation and migration of metals in oil is connected with the possibility of their industrial extraction in the process of oil refining and the purpose of further realization as a concomitant raw material, actual scientific and technical questions of the genesis of hydrocarbons, as well as the possibility of determining the environmental risks of using this oil as raw materials for the production of oil products and, first of all, gasoline and diesel fuel.

A high total metal content is also a serious problem during the processing of petroleum raw materials, because it leads to irreversible deactivation of catalysts as a result of the deposition of metals on the active surface, blocking of the pore space and destruction of the catalyst structure. Previously, in a series of scientific works [1-5], some features of geochemistry and distribution of metals in caustobiolites have already been considered.

The purpose of this work is to establish and investigate the relationship of the "total metal content" indicator (calculated as the sum of the contents Hg, Zn, Fe, Mn, Ni, Al, Cr, V, Co,) with the concentrations of paraffin, resins and asphaltenes in base oils 36 active deposits of the Eastern oil and gas region of Ukraine.

The Eastern oil and gas-bearing region is currently the largest and most promising in Ukraine. Geologically, it is located within the Dnipro-Donetsk depression. The factual basis of the work was the results of analyzes of the content of metals in oils from 36 fields: Bakhmachskyi, Prylutskyi, Krasnozayarskyi, Kachalivskyi, Kremenivskyi, Karaikozovskyi, Korobochkinskyi, Kulychikhinskyi, Lipovodolinskyi, Monastirishchenskyi, Matlakhovskyi, Malosorochynskyi, Novo-Mykolaivskyi, Perekopivskyi, Prokopenkivskyi, Radchenkivskyi, Rozpashnivskyi, Sofiyivskyi, Sukhodolivskyi, Solontsivskyi, Solokhivskyi, Talalaivskyi, Trostyanetskyi, Turutynskyi, Kharkivskyi, Shchurynskyi, Yuryivskyi, Yaroshivskyi, Khukhryanskyi, Sagaidatskyi No. 1, Sagaidatskyi No. 13, Kybytsivskyi No. 5, Kybytsivskyi No. 51, Kybytsivskyi No. 52, Kybytsivskyi No. 56, Kybytsivskyi No. 1. These deposits were chosen based on the principles of maximum completeness of geochemical information, their location in different oil and gas-bearing areas, different composition of the oil system, different geological types of traps, different structure of deposits and different ages of oil reservoir rocks. Thus, in our opinion, these deposits are sufficiently representative for the Eastern oil and gas-bearing region of Ukraine.

No less than 30 oil samples from each deposit were tested for metal content using X-ray fluorescence analysis on an energy-dispersive spectrometer "Sprut" SEF 01. Spectrum accumulation time is 600 sec.

Thus, from each of the 36 deposits, at least 30 oil samples taken from the wells within the five years of their operation were analyzed. Then the values of the total content of metals and all other geological and technological indicators were normalized. Normalized values of indicators of oil samples from each deposit were processed using the STATISTICA 11.6 program, which performed the calculation of descriptive statistics, correlation, regression analyzes and graphical visualization of the results of the performed studies.

According to the results of the correlation and regression analysis and taking into account the Chedok scale in the oil samples from the considered deposits, it was established the presence of a very weak inverse correlation of "total metal content" and resin (correlation coefficient -0.05, regression equation $Me_{total} = 0.2175 - 0.0517 \cdot Re_{oil}$), a very weak direct relationship between "total metal content" and asphaltenes (correlation coefficient 0.06, regression equation $Me_{total} = 0.1968 + 0.518 \cdot A$), a very weak direct relationship between the indicator "total metal content" and paraffins (correlation coefficient 0.02, regression equation $Me_{total} = 0.2012 + 0.0205 \cdot C$), graphs of regression equations are shown in fig. 1-3).

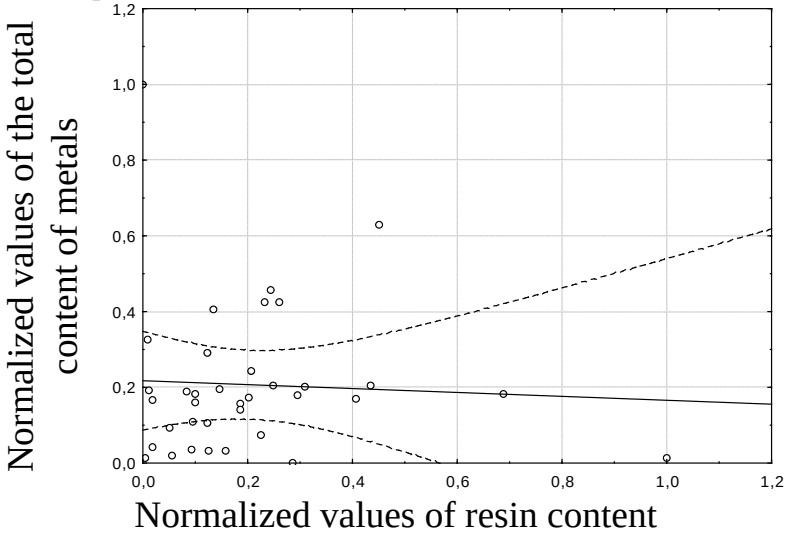

Fig. 1. Graph of regression equations between "total metal content" and resin in oil deposits of the Eastern oil and gas region of Ukraine

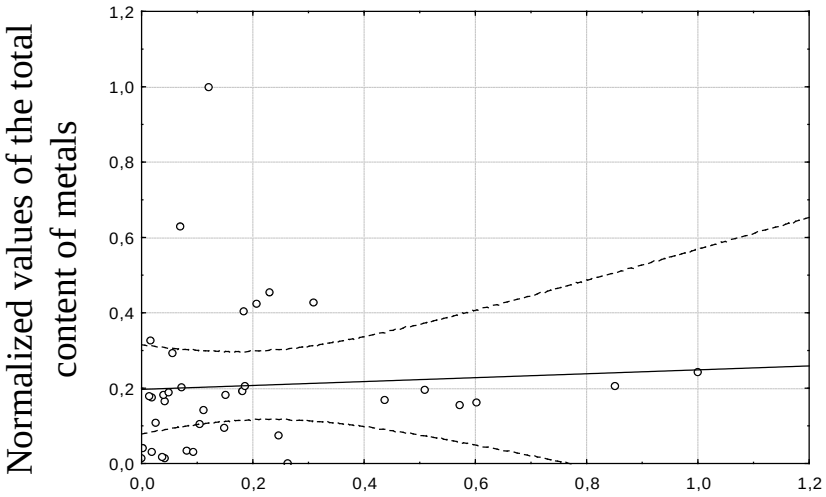

Fig. 2. Graph of regression equations between "total metal content" and asphaltenes in oil deposits of the Eastern oil and gas region of Ukraine

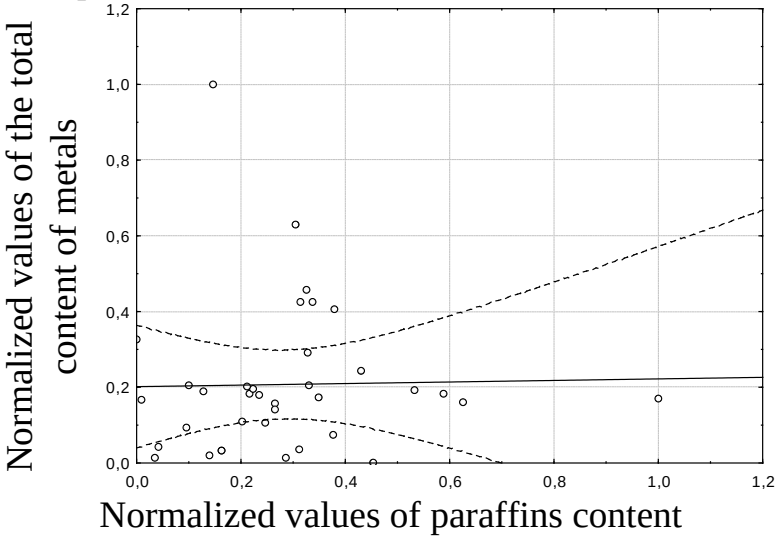

Fig. 3. Graph of regression equations between "total metal content" and paraffins in oil deposits of the Eastern oil and gas region of Ukraine

Main conclusions:

- The indicator "total metal content" has a very weak correlation with the contents of paraffins, resins and asphaltenes. In this regard, established relationships can only be used as indicators of a general trend.

- Considering the integral nature of this indicator, in further studies it makes sense to consider the relationship between each of the elements included in its structure and the contents of paraffins, resins and asphaltenes separately, as well as to evaluate the contribution of each of the metals to the overall indicator.

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Certain peculiarities of land management in wartime conditions

Wartime conditions have had a negative impact on land management activities: access to the State Land Cadastre (SLC) has been suspended, and land management activities have been completely frozen throughout Ukraine.

At the same time, the Laws of Ukraine "On Amendments to Certain Legislative Acts of Ukraine on Creating Conditions for Ensuring Food Security under Martial Law" No. 2145-IX of 24.03.2022 [1] and "On Amendments to Certain Legislative Acts of Ukraine on Peculiarities of Regulating Land Relations under Martial Law" No. 2247-IX of 12.05.2022 [2] came into force, which had a positive impact on land relations.

Thus, the State Service of Ukraine for Geodesy, Cartography and Cadastre (StateGeoCadastre) resumed its work with certain restrictions, but the Public Cadastral Map is still not open to certified land surveyors. This leads to a number of problems for developers of land management documentation, namely:

- inability to perform a full analysis of a land plot in relation to the rights registered to it in the SLC;
- lack of data for topological coordination with adjacent land plots registered in the SLC after February 24, 2022;
- inability to access the analytical layers of the cadastral map, which provided additional information on registered restrictions on the land plot, the presence of land of the nature reserve fund, water fund, etc.

Partial information on land plots in the SLC can be obtained through the website https://kadastr.live. Although it is not an official source of information, it contains up-to-date data as of February 16, 2023.

The above factors have a negative impact on filling the SLC with information about land plots registered in it during this time.

Let's also consider some changes in the work of land surveyors and the StateGeoCadastre that occurred during martial law:

1. To perform land management work, certified land surveyors need to submit an application in accordance with the Resolution of the Cabinet of Ministers "Some issues of maintaining and functioning of the State Land Cadastre under martial law" No. 564 of 07.05.2022 [3].
2. It is prohibited to conduct land surveying in the areas of hostilities, in the occupied territories, which are determined in accordance with the regulatory legal act "List of territories where hostilities are (were) conducted or temporarily occupied by the Russian Federation", approved by the Order of the Ministry of Reintegration of

the Temporarily Occupied Territories of Ukraine No. 309 of 22.12.2022 [4]. This legal act has been amended (the last one was dated February 20, 2023) due to the gradual de-occupation of the territories of Ukraine.

3. The implementation of state registration of land plots by cadastral registrars was expanded by introducing the principle of extraterritoriality. Today, it is also possible to register the division and consolidation of land plots on this principle.

4. New functionality has been introduced to automatically generate extracts from technical documentation on the normative monetary valuation of land in settlements.

5. Modernization of the SLC was implemented by the StateGeocadastre through cooperation with the European Union and the World Bank.

Thus, it is clear that the work of land surveyors has become more complicated, but the StateGeocadastre has taken important steps to improve the situation.

Analyzing the above mentioned, we conclude that the legislators have taken a systematic approach to issues related to land relations under martial law. There are many simplifications to ensure the functioning of the SLC.

At the same time, there are restrictions on the work of land surveyors in such conditions. We hope that the inconvenience of the restrictions will not last too long.

Restoration of the established legal framework of Ukraine and introduction of new functionalities will help to accelerate the elimination of the consequences of aggression.

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Applicability of coal seams for underground coal gasification. Case study for Western Donbas (Ukraine)

According to the prospected resources, Ukraine ranks the seventh place in the world (34.2 bln tons; total reserves are estimated as 117 bln tons). In this context, crude oil and gas reserves account for 2.4% of coal ones [1]. Due to the limited resources of crude oil and natural gas (currently, output is 8-9.3% of the required production) coal importance for the national industrial complex growth and economic development of Ukraine are closely connected with the progress of coal sector [2].

Underground coal gasification (UCG) with further extraction and use of gasification products, which basic combustible components are CO, CH_4, H_2, is one of the ways to solve the problems of clean coal technologies [3]. However, there is no any unified theory of complex underground processing of coal and mine gases to be acceptable. Consequently, the development of complex environmentally friendly methods to transform coal into new energy sources, liquid motor oils, olefins, and paraffin is an actual goal [4].

Taking into consideration the criteria of coal seam applicability for UCG, mining and geological, hydro-geological, and mining conditions of the seam occurrence are analysed to substantiate the selection of an experimental gasification site. Coal seam thickness, its ultimate composition and grade, physical and mechanical characteristics, structure, texture, and ultimate composition of rocks, enclosing the coal seam, water inflow, disjunctive and plicative disturbances are the basic criteria to make decision in terms of coal seam applicability or inapplicability for UCG. The required design capacity of a site for underground coal gasification as well as its service life is calculated based upon the coal reserves and payback for the construction and operation of gas generators. Ultimate composition (output of combustibles V = 27-36%), structure and texture of coal seams, make them maximally applicable for UCG [5, 6].

It should be noted that there are no unified criteria to evaluate the expediency of underground coal gasification use within the coal deposits [7]. Dnipro University of Technology has applied author's approach to determine the expediency of UCG use for the specific mining and geological conditions. The approach was tested industrially and supported as an efficient one while developing technical documentation of the underground gasification project as well as feasibility study (FS #3858) within Synelnykivske lignite deposit. The calculation of the document was supplemented by the data taking into consideration the current approaches with regards to applicability of lignite and coal deposits for UCG [8].

Based on practical results, the methods can be quite efficient while determining UCG applicability both in terms of manufacturability and economic indices. To

evaluate potential gasification, a deposit is divided into patterns. Their applicability for underground gasification is identified with the help of general coefficient *K* which depends upon the natural parameters of gasification area occurrence relying upon the relevant coefficients.

While identifying the applicability for UCG of the sites of Western Donbas coal seams at the territory of DTEK Pavlohradvuhillia the following parameters were taken into consideration:

– operation analysis of Ukrainian Pidzemgaz stations in the process of coal gasification;

– pursuance of the research using underground experimental gas generator and bench units;

– geological, hydrogeological, and structural conditions of the coal seams occurrence;

– surface topography as well as infrastructural development.

Based upon the practices of Pidzemgaz stations, field experiments, bench tests, laboratory studies, analytical research, and the factors having impact on gasification of DTEK Pavlohradvuhillia coal seams, applicability coefficients, shown in Table 1 have been substantiated.

Table 1. Coefficient of applicability of Western Donbas coal seam for UCG

Mining and technical factor							Coefficient of coal seams suitability for UCG (*K*)
Coal seam	Rock pressure	Coal losses in situ	Blowing and gas losses	Environmental protection	Heat losses	Available consumers of the gasification products	
C_4^1	0.82	0.78	0.80	0.77	0.52	0.83	0.64
C_5	0.80	0.88	0.90	0.87	0.62	0.85	0.70
C_6	0.80	0.86	0.88	0.85	0.63	0.80	0.71
C_4	0.83	0.78	0.80	0.78	0.54	0.84	0.67
C_8	0.85	0.74	0.77	0.74	0.64	0.80	0.68

Given coefficients clearly demonstrate possible success of this technique for mine coal seams of the sites in the case of implementing underground coal gasification method based on proposed operational parameters. An experimental gas generator is recommended to be installed within a coal seam C_5 of UCG site #4 where the infrastructure is considered to be the mostly developed, and applicability criteria for gasification are optimal. Development practices of UCG will help correct the technological parameters for further industrial expansion.

The practical significance of the research is in the fact that the experience of mining the UCG # 4 site of the experimental gas generator allows adjusting the technology parameters for subsequent industrial replication. The proposed approach to select a site and a coal seam can be also tested in other coal deposits with similar mining-geological and mining-technical conditions.

The presented results have been obtained within the framework of the research work GP-511 “Scientific and practical foundation of structural transformations of coal-mining enterprises based on innovative technologies for rational environmental management” supported by the Ministry of Education and Science of Ukraine, No. of State registration 0122U001301.

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Operating Parameters for Underground Coal Gasification in Mining Energy-Chemical Complexes

The modern approach of sustainable mining can provide sustainability of the circular economy in the context of economic security in Ukraine [1, 2]. All types of sources (conventional and unconventional) are critically important for providing stability of power section in the country. The basis for such a complex operation is an unconventional technology for the extraction of energy carriers and a chemical product from carbon-containing raw materials, based on the underground gasification technology [3, 4]. The use of underground gasification in the complex of the technological segment forms the principles for the efficient operation of coal deposits in the mining off-balance and abandoned coal reserves [5, 6].

The development and implementation of resource-saving technological processes, which save not only living, but also materialized labor, is an important factor in the development of production at this stage. At the same time, a very important condition is the reduction of total expenses and social production expenses, which are reflected in an integrated form in the cost price of final products [7-9]. Therefore, a reduction in the coal production cost with a constant deterioration in mining-technical conditions of production, an increase in the depth of mining deposits, as well as decrease in the ecological burden on the environment is possible only on the basis of more efficient use of the subsoil, the use of host rocks, the creation of an integrated energy-chemical production of energy carriers, and the disposal of waste generated.

Thus, the purpose of this research is to study the operating modes of an underground gas generator as a basic segment of the Mining Energy-Chemical Complexes (MECC) based on the introduction of underground coal gasification technology for the mining-geological conditions of the occurrence of State Enterprise "Lvivvuhillia" coal seams on the example of "Chervonohradska" mine.

The mine field geological structure is dominated by Mesozoic and Cenozoic deposits. The deposit productivity is represented by the structural horizon of the Carboniferous period. The occurrence of seams is flat lying with a dip angle from 0 to 5º. Seams dip at slight angles from the southeast to the southwest. Main working seam is n_8 "Mezhyrichanskyi". An area with a coal seam thickness of 0.75 m has been selected for the study. The qualitative characteristic of coal seam within the areas and its geometric dimensions are presented in *Tables 1* and *2*.

Table 2. Qualitative characteristic of coal seam in the studied area

Coal seam	Proximate analysis				Ultimate analysis			Specific weight, t/m^3	Calorific value, MJ/kg
	W	*A*	1.30	37.1	*C*	*H*	(N+O_2)		
n_8	3.5	16.8	3.55	35.4	83.5	5.15	8.6	1.22	34.8

Table 1. Geometrical characteristic of the studied area

Indicator name	Coal seam n_8
No. of the contour	1
Area (*S*), thousand m^2	420
Length of the gas generators (L_g), m	550
Combustion face length ($L_{f.l.}$), m	30
Number of gas generators (*n*)	24
Seam thickness (*m*), m	0.75
Area of gasification (S_g), thousand m^2	396

When conducting research to ensure autothermicity of the gasification process, the injected blast mixture is supplied into the formed gasification channel through a flexible pipeline of the blast injection hole to the combustion face of the oxidizing zone in the modelled gas generator. As the coal seam is gasified under the action of active gasification temperatures, a temperature field is formed behind the stratification in the coal mass at a distance of 4.5 – 5.8 m from the gas generator combustion face in accordance with real conditions. This determines the temperature field influence (180 – 320ºC) on the process of heating the coal seam ahead of the combustion face. At the same time, the average value of the generator gas combustion heat is 6.74 – 8.12 MJ/m^3. The capacity indicators of the MECC gas-generator segment of the "Chervonohradska" mine are given in *Table 3*. The data obtained are adjusted with the results of bench and laboratory experiments, taking into account the process of the coal seam gasification dynamics.

Table 3. Capacity indicators of the MECC gas generator segment

Indicators of the underground gas generator	Injected blast type			
	Air blast	Steam-air blast	Oxygen blast	Steam-oxygen blast
Heat capacity, MJ/h	358560	364320	520200	508320
Energy capacity, MW	99.6	101.2	144.5	141.2

The industrial extraction and processing of valuable chemical products from gas condensate during the gasification of thin and ultra-thin coal seams will ensure the process profitability with the reorientation of the energy direction of the gas-generating enterprise to the energy-chemical one. Extraction and processing of chemical products from gas condensate is performed comprehensively at the surface industrial site for utilization and processing of the MECC.

Capital costs for equipment, preparation, and construction of the MECC gas-generating enterprise will amount to UAH 1729.6 million, and the payback of the

gas-generating complex, depending on the situation in the consumer energy market, will be within 6.2 – 6.7 years.

So, the underground gas generator is the basic segment of the MECC generating various types of energy and meeting the complex's needs for heat and electrical energy. The introduction of underground gasification technology while mining thin and ultra-thin coal seams, makes it possible to continue the production cycle of a mining enterprise. At the same time, gasification technology is focused on obtaining combustible generator gases and heat energy extracted from the bottom and roof of an underground gas generator. Meanwhile, closed cyclical production expanding the application scope of gas-generating enterprises to utilize a technogenic space of coal enterprises, and effective conditions are set for production diversity. This makes it possible to provide more mobile and high-quality energy and meet not only chemical needs of the mining energy-chemical complex but also external market needs to sell chemical raw materials.

The presented results have been obtained within the framework of the research work GP-512 “Co-gasification of carbon-containing raw materials during ultrathin coal seams gasification with a focus on hydrogen production” supported by the Ministry of Education and Science of Ukraine, No. of State registration 0123U100985.

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Generalization of Exponential Inequalities Based on Chebyshov's Inequality

The concepts of "more" and "less", as well as the concepts of equality, arose due to the need of comparing different quantities. The concepts of inequality were used even by the ancient Greeks. In particular, Archimedes (III century BC) calculating the length of a circle, proved that "the perimeter of any circle is equal to three times the diameter with an excess that is less than one-seventh of the diameter, but more than ten-seventy-first." In other words, Archimedes indicated the limits of the number π.

The first geometric inequalities are also well known: "the perpendicular is smaller than the slant drawn from the same point to the given straight line", "the side of a triangle is less than the sum of the other two sides", "the larger side lies opposite the larger angle of the triangle"). They belong to ancient Greek mathematics and were contained in the famous "Principles" of Euclid. Euclid gives a number of inequalities in his famous treatise "Initiation". For example, he proves that the geometric mean of two positive numbers is not greater than their arithmetic mean. However, all these considerations were carried out verbally, based on geometric terminology in most cases. Nowadays, problem statements in many mathematical applications are often formulated in terms of inequalities. In particular, many economic problems are reduced to the solving the systems of linear inequalities with a large number of variables. Often the inequality serves as an important auxiliary tool. It also serves as the main lemma that allows proving or denying the existence of problem solutions, as well as estimating their number, and carrying out classification.

Nowadays, inequalities and systems of inequalities are widely used both in theoretical research and in solving important practical problems. Inequalities are not only an auxiliary tool. Fundamental results in each area of mathematics such as algebra and numerical theory, geometry and topology, probability theory and theory of functions, mathematical physics and theory of differential equations, information theory and discrete mathematics are formulated in the form of inequalities. Neither physics, nor astronomy, nor chemistry can operate without them.

Inequalities occur much more often than equations in many branches of mathematics, especially in mathematical analysis and applied mathematics. Solutions of some practically important equations can only be found directly in the form of a number or formula in very rare cases. Mostly, only the approximate solution can be found and then specifying error estimation is required. This means that proving additional inequalities is crucial for clarifying constitutive mathematical relationships.

In this thesis, the task No. 7 of the All-Ukrainian tournament of 2021 for young mathematicians named after Professor M. Y. Yadrenka is reviewed.

The initial inequality

$(3^b - 3^a)(2^b - 2^a) < \frac{b-a}{2}(6^b - 6^a)$ at $b > a$ (1)

has been proved at the first stage. The method developed for proving represents the generalization of initial inequality (1)

$$(n^b - n^a)(m^b - m^a) \le \frac{b-a}{2}((nm)^b - (nm)^a) - (nm)^a\left(n^{\frac{b-a}{2}} - m^{\frac{b-a}{2}}\right)^2, \quad (2)$$

where $1 \le n \cdot m \le e^2$ і $a, b \in \mathbb{R}$, $n, m > 0$;

$$(n^b - n^a)(m^b - m^a) \le \frac{a-b}{2}((nm)^b - (nm)^a) - (nm)^a\left(n^{\frac{b-a}{2}} - m^{\frac{b-a}{2}}\right)^2,$$

where $\frac{1}{e^2} < n \cdot m < 1$, $n, m > 0$ і $a, b \in \mathbb{R}$.

On the other hand, the following inequalities can be obtained by using Chebyshov's inequality:

$$(n^b - n^a)(m^b - m^a) \le \frac{2\ln n \ln m}{\ln(nm)} \frac{b-a}{2} ((nm)^b - (nm)^a), \quad (3)$$

where n і m are positive numbers that are simultaneous either at least 1 or at the same time not more than 1 and $b > a$;

$$(n^b - n^a)(m^b - m^a) \ge \frac{2\ln n \ln m}{\ln(nm)} \frac{b-a}{2} ((nm)^b - (nm)^a), \quad (4)$$

where n і m positive numbers such that one of them is greater than 1 and the other is less than 1 and $b > a$.

At $n = 3$, $m = 2$ we obtain a consequence from Chebyshev's inequality for the initial problem:

$$(3^b - 3^a)(2^b - 2^a) < \frac{2\ln 2 \ln 3}{\ln 6} \frac{b-a}{2} (6^b - 6^a).$$

This clarifies the problem because $\frac{2\ln 2 \ln 3}{\ln 6} < 1$.

It can be noticed that the inequality (2) is not satisfied when $n = m > e$. The consequence from Chebyshov's inequality is held under this condition, but a constant $\frac{2\ln n \ln m}{\ln(nm)}$ seems to be greater than 1 when at $n = m > e$. Besides n and m are such positive numbers, that one of them is greater than 1, and the other is less than 1. Then the sign of Chebyshov's inequality is changed into the opposite meaning.

Finally, at $m < 1 < n$ and $1 \le n \cdot m \le e^2$ we can obtain a double inequality from inequalities (2) and (4)

$$\frac{b-a}{2}((nm)^b - (nm)^a) - (nm)^a\left(n^{\frac{b-a}{2}} - m^{\frac{b-a}{2}}\right)^2 \ge$$

$$\ge (n^b - n^a)(m^b - m^a) \ge \frac{2\ln n \ln m}{\ln(nm)} \frac{b-a}{2} ((nm)^b - (nm)^a).$$

It should be concluded that obtained results can be used to prove other exponential inequalities to solve problems of applied mathematics.

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Safety in the mining industry

Working in the mine is, obviously, not the safest profession that you can choose. In this research I will point main problems and present the possible ways to solve them.

The problem that we personally consider to be the most dangerous is communication, or the lack of it. In a lot of cases of equipment break down, workers are afraid to inform a section manager about the case. And even section managers do not want to communicate such kind of information to their bosses.

One way to combat the lack of communication is to have lots of structured tool discussions, safety meetings, and company-wide events.

Activities that promote communication and employee engagement are a sure way to improve workplace safety and make employees feel safe by reporting potential threats and preventing incidents.

Next problem that is going to be reviewed is working conditions. In a plenty of cases, to catch up with the mining schedule, security rules are being ignored. This results in higher traumatism chance, more frequent equipment breaks, and which is the worst is lethal outcome risk. One of the ways of solving this problem could be investment in modern machines and equipment.

Occupational diseases are the next big problems especially common for longstanding working miners. Such cases as lung diseases, namely, Pneumoconioses, silicosis and chronic obstructive pulmonary disease are considered the mostly expanded. It can be explained by the fact of using old respiratory masks not having appropriate safety rating or even insufficient comfortability of masks to be applied in most situations. The way of solving this problem is purchasing new masks with appropriate safety ratings or, ideally, designing a new type of mask in terms of enhancing labor protection and comfortable use in conditions of the mine. Fig.1 demonstrates the optimal mask to be applied to achieve the above mentioned goal.

Fig.1. One of the examples of more modern type of mask

The next problem to be covered in this research is the lack of qualified personnel or even the lack of personnel in general. Unfortunately, this problem becomes more and more noticeable with each coming year. It can be explained by a lot of reasons, starting from a bigger salary for the same work abroad, to the fact that the mines are depleting, and young people prefer to choose other prestigious professions.

And there are a lot of solutions for this complex problem. These solutions can be listed as following:

- implementing new mining technologies thus decreasing the number of employees
- providing sufficient payment to the miners thus enhancing worker motivation
- implementing new methods into the issues of labor safety thus decreasing the amount of accidents
- organizing required professional training for qualification improvement.

This research has covered a lot of actual problems to be solved with regards to mining industry. It should be concluded that even if it may seem to be rather difficult and require a lot of efforts as well as time and money, the research proves that none of them are unsolvable.

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Digital technologies at mining enterprises: the example of successful experience

Optimization of resources, use of renewables, digitalization, gradual implementation of bigger number of technologies, all this inevitably leads to the transformation in energy sphere of any country.

Let's consider the way digital transformation is taking place in Ukraine.
In early 2019 the company 'DTEK' launched Modus, a new program of digital transformation. This long-term project implies implementation of innovations and digital systems into all industrial and administrative processes of business. Modus team staff encounters managers, engineers, programmers and designers who create technological solutions for any business task. As a matter of fact, it's an expertise in managing products and projects Agile/Scrum, data analysis (Data Science i Data Engineering), software development (business analysis, UX/UI design, creating digital infrastructure and cyber security.

Modus suggests several waves of digitalization. Within the first one, in order to ensure safety and efficiency at an enterprise, new digital systems are implemented, new tools of control over logistics in energetics, staff choosing are created as well as technologies of monitoring of electrical networks are developed.

The second wave of digitalization comprises modelling of development of deposits and robotization of office processes, in particular: digital purchase, analytics and information management.

And as for the third wave of digitalization concerns, representatives of DTEK are planning to provide customers with digital tools of communication as well as digital technologies of managing renewable sources of energy.

As of today, the company has launched over 30 projects of the first and second waves. Creating infrastructure at the depth of 500 meters at the mine' Yuvileina' (DTEK Pavlogradvuhillia) has become one of the most significant achievements of the Modus program. Unprecedently for Ukraine, the example of laying underground Wi-Fi to the mine allowed to raise the level of miners' safety and optimize the cycle of resources development. For realizing this project there was a need of more than hundreds of kilometers of fiber optic cable, several hundreds of Wi-Fi access points and lots of sensors for monitoring explosive gases. The next step is deployment of the series of projects on the safety in digital infrastructure of a mine. The system of communication will allow to get in real time data from various safety sensors and inform the miners about change in air and gas parameters, monitor performance with the help of video cameras ,and in the emergency, to announce and do evacuation, and mining dispatcher can help an

employee remotely in case of accident ,directing messages to a smart lamp -pager that will become an individual safety system of a miner.

Thanks to new sensors, modern scales and an automated winch controlled by a computer algorithm, DTEK also achieved more efficient loading of wagons with coal. Thanks to algorithms of artificial intelligence, the construction of routes and the distribution of wagons were optimized. The company has also developed new software for monitoring the condition of wagons online, which minimizes the risks of downtime and reduces logistics costs. In total, these developments have saved the company 37+ million hryvnias for the entire time of its operation.

In addition, DTEK specialists began to monitor the state of power transmission lines using a drone and develop automatic systems for analyzing power networks.

The pilot version in the Dnipro power grids (500 km of the network were examined) helped to reduce the number of accidents by three times. In general, by 2025, the result of reducing the duration of outages for consumers by 10-15% is expected when scaling the project to the entire company.As for automation, several TPPs in Ukraine (in particular, Kurakhivska and Zaporizhzhya) have already implemented systems for automatically determining the optimal operating modes of the station's power units, which provide TPP drivers with their recommendations in real time. Here, the use of IoT, Machine Learning, Data Lake technologies to reduce fuel consumption brought an economic effect of UAH 170+ million in 21 months of work.

To conclude, implementation of digital technologies showed its efficiency and practical significance on the example of the performance of the projects piloted by DTEK: the level of miners' safety raised, the cycle of resources development was optimized .There is also a consideration that the development of digital culture and digital literacy of a mine employees is going to be one of the primary tasks for a mine enterprise.

For greater efficiency and practical purposes, while implementing such projects, there is an idea to attract expertise from the outside and form an ecosystem of partners.

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Features of the determination of land plots located under buildings and structures of industrial enterprises

According to Art. 15, 34 of the Law of Ukraine "On the State Land Cadastre" [1] during the geodetic establishment of the borders of the land plot, it is necessary to carry out such measurements, which make it possible to obtain the coordinates of the turning angles of buildings and structures, using the results of mathematical processing of geodetic measurements.

Usually, such contours are used to determine the number of the land plot and calculate the corresponding area. At that time, there are undeveloped parts of the land plot ,which, at best, are concreted or have some kind of covering. Since there is no building, this part of the land plot is not considered land. In this case, an error occurs since the sum of all land areas must be equal to the area of the entire land plot. Therefore, to determine the Land Types Classification Code of these free parts of the land plot, in accordance with Appendix 4 of the Procedure for maintaining the State Land Cadastre, approved by the Resolution of the Cabinet of Ministers of Ukraine [2], one can use the code 011.01 (land under buildings and structures of industrial enterprises).

Obviously, it is essential to take for consideration such a methodology for determining land so that no part of it can be missed. To do this, especially when the area of the land plot is significant and there are a lot of buildings, one should use a topographic plan on a scale of 1:500 and outline all the contours of the buildings on it, and only after that proceed to all the necessary measurements.

After mathematical processing of geodetic measurements and calculation of areas, you can move to the defining the Land Use Classification code and perform control calculations of the sum of all land areas, using the following formula:

$$\sum_{i=1}^{n} S_{Li} = S_{\text{LP}},$$

where n – is the number of plots.

Also, the relevant legal acts do not indicate with what accuracy it is necessary to determine the coordinates of the borders and the area of land. Quite often, there are cases when land and a plot of land have a common boundary. Therefore, the vertices of the turning angles of the lands must be determined at the same accuracy rate as those of the boundaries of the land plot. In conformity with Paragraph 19 of the Resolution "On approval of the Procedure for carrying out land inventory and recognition as invalid of certain resolutions of the Cabinet of Ministers of Ukraine" [3], the root- mean- square error of coordinates in cities of regional subordination should not exceed 0.1 m.

The boundaries of the land plot, lands, buildings and structures must be determined with the same precision. In this matter it may depend on the number of points in the contours, the root- mean -square error and mathematical processing of geodetic measurements. It is also necessary to consider information on the accuracy when determining the vertices of the turning angles and the area error. According to the last paragraph of clause 19 [3], the marginal differences should not exceed twice the values of the permissible root- mean -square errors, and their number should not be more than 10 percent of the total number of control measurements.

When choosing the Land Types Classification Code (LTCC) and Land Use Classification Code (LUCC), some inconsistencies may occur: which exactly code of LUC corresponds to the selected code of LTC? To solve this problem, the example is offered (table 1), in which two codes of LTC were taken as an example and the code of LUC, corresponding to them, was chosen.

Table 1

Purpose of the land plot		**Types of land cover**
LTCC	Name	The name of the land according to LUCC
11.02	For location and exploitation of basic, subsidiary, auxiliary buildings and structures of the enterprises of processing, machine-building and other industries	
11.03	For location and exploitation of basic, subsidiary, auxiliary buildings and structures of construction organizations and enterprises	

Having considered the above, the following conclusions and suggestions can be made:

1.There have been developed approaches for determining all the lands, located on the plot.

2.It has been defined that the accuracy rate while determining vertices of turning angles of land should be the same as that of boundaries of the land plot.

3. There have been suggestions concerning a selection of a proper code of LTC and LUC.

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Application of unmanned aerial vehicles in geodesy and land management

Unmanned aerial vehicles (UAVs, drones) are a reliable modern technology used in geodesy and land management for aerial photography, production of cartographic products (orthophotos, topographic maps and plans), 3D models, digital elevation models (DEMs), monitoring, and solving a range of engineering tasks based on geodata.

The use of drones has certain advantages over traditional technologies during surveying:

- *Cost-effectiveness and speed* of aerial photography by using drones in small areas instead of aircraft.

- *The detail and completeness* of the survey depends on the resolution of the images, which is less than 1 cm per pixel. By recognising the smallest details in the images, processing and analysing them in an automated mode, it is possible to create intelligent geodata products that provide information about the area based on the results of field interpretation of aerial photography with a situational plan and description of the terrain's characteristic points.

- *Quality and safety.* At each stage of geodetic works, technical requirements will be met and quality control will be carried out. At the same time, the number of routes is carefully planned at the design stage of the survey, taking into account their longitudinal and transverse overlap, which will depend on the final accuracy and quality of the results. Also a plan-altitude reference project is being developed to obtain reliable aerial survey data in compliance with the requirements of the current instruction.

- *Flexibility and comprehensiveness.* The results of aerial photography using UAVs are widely used in various industries and areas of professional activity. In construction, the topographic base and situational plan are used, as well as the calculation of earthworks; orthophoto, digital terrain model, 3D model are used to predict flood zones, assess landslide risks (natural disaster assessment), impact assessment and ecology, road and railway mapping, zoning, land use analysis, inventory or audit of community land, etc.

Despite the significant advantages, the use of drones also has disadvantages:

1. There is no law on the use of quadcopters in Ukraine.
2. According to the Air Code of Ukraine [1], which legally regulates UAV flights, the following restrictions on the use of drones are listed:

- a ban on flights near dense civilian buildings;
- near runways and manned aircraft;
- over the state border and over large crowds;

- over various state-owned thermal power plants, hydroelectric power plants, and nuclear power plants;
- over industrial enterprises;
- over nature reserves and areas of strategic importance.
- limited flight height, which cannot exceed 120 m.

3. The speed limit for drones is 160 km/h.
4. The need to register drones if they exceed 20 kg in weight, are used in restricted areas or in an area with flight restrictions above 50 m.
5. The need to obtain a permit before each flight to launch a drone upon submission of an application to the UkSATSE.
6. Fast battery discharge and high battery cost;
7. Short time in the air.

Gradually, humanity began to face new challenges in the use of UAVs that need to be addressed, namely:

- search for sources and types of energy for UAV operation;
- safety requirements for UAVs;
- registration of drone operators;
- tightening control over drones;
- adjust the use of anti-drone equipments.

In Strasbourg in 2015, the session considered the adoption of a resolution on the development of pan-European EU legislation on the use of UAVs. Depending on the purpose for which the drones are to be used, the requirements differ significantly between professional and recreational use.

The development of European legislation is aimed at minimising the risks associated with the use of UAVs in various sectors of the economy. The Riga Declaration of 2015 pays particular attention to the development of safe technologies, protection against UAV hijacking, privacy, protection against damage to UAVs, etc.

Figure 1 shows a schematic of the global and European regulations that must be applied to the use of UAVs. The European Aviation Safety Agency (EASA) regulates UAVs in Europe.

The Joint Authorities for the Regulation of Unmanned Systems (JARUS), which includes 22 European countries, is engaged in the development of technical issues related to the safety of integrating large and small UAVs into European airspace and airfields. Ukraine also needs EU assistance to finally establish rules and regulations for the use of drones and their further integration into the European space.

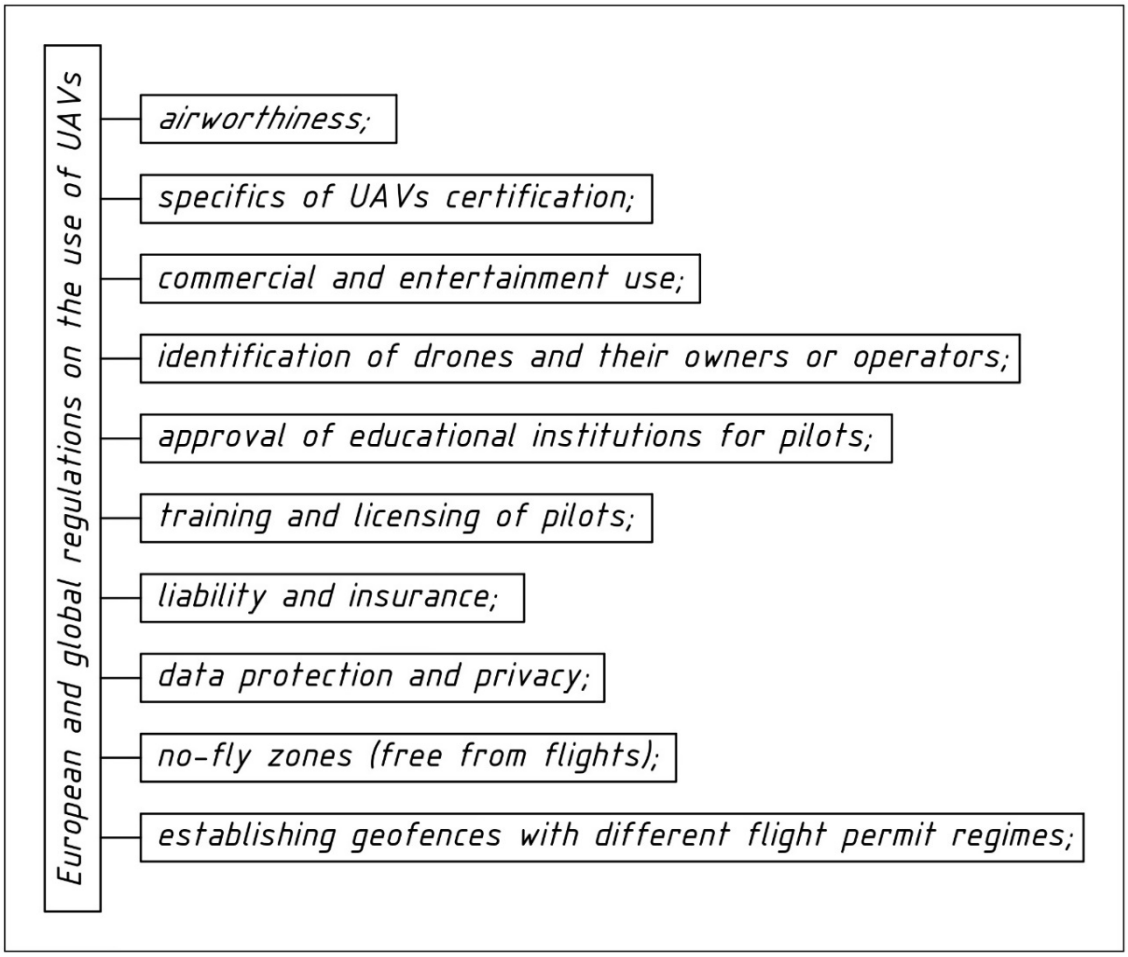

Figure 1. UAVs use in accordance with global and European regulations

Conclusion. Due to the acquisition of ultra-high resolution images and the creation of high-precision DEMs based on them, the use of UAVs in land management has significant advantages over traditional ground geodetic surveying methods. However, for their full use, it is necessary to regulate their use at the legislative level, as well as to introduce certificates for their operation. In fact, Ukraine has everything in place to register UAVs, and it remains to set it all out in regulations. Among the registered aircraft on the website of the State Aviation Service of Ukraine, there is no information about UAVs at all [2].

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Use of heat pumps as an element of energy saving at mining enterprises

Today, more and more attention is being paid to energy saving at mining enterprises. Due to the shortage of fuel resources in Ukraine, the use of secondary and waste heat from industrial enterprises is becoming increasingly important. Water pumped out of coal and ore mines is a powerful carrier of rock heat, but its temperature of 12-26°C is not sufficient for direct use for heating or hot water supply. In order to use the heat of this water for the purpose of heating the mine, it needs to be transformed into heat of a higher potential. This conversion can be done with the help of heat pumps. Heat pump technologies for the use of natural and secondary heat from industrial enterprises have recently become increasingly widespread around the world. The advantages of heat pump technologies are their energy efficiency and environmental friendliness. The main disadvantage is the high cost, not only of the equipment of the heat pump units themselves, but also of the low-potential heat collection systems. In this regard, the use of heat pumps in heat recovery systems for water pumped out of mines and quarries is very attractive, as the additional costs for a low-potential heat recovery system are minimal.

Other advantages include the fact that the heat pump uses the energy input to it an order of magnitude more efficiently than boilers that burn fuel or use electricity, its autonomy and versatility. The operation of a heat pump does not depend on the supply of fossil fuels. Such pumps can be used in any climate and in any location. It is also an environmentally friendly method of heating and air conditioning. During operation, there are no harmful emissions into the environment, such as CO, CO2, SO2, PbO2. In the cold season, heat pumps heat the room, and in the warm season, they remove excess heat or cool it (condition it). The undoubted advantage is also the safety of operation, the absence of fuel - gas, diesel fuel, which eliminates the possibility of fires, explosions, and leakage of substances hazardous to health. They are explosion- and fireproof. The relative simplicity of the heating elements allows them to operate for 20-25 years without major repairs.

The sources of waste heat (low-potential energy) at mining enterprises can be: mine water; ventilation stream; compressor units. The main consumers of heat are: hot water supply and heating systems; air supply shaft heating systems.

A heat pump is similar to a refrigerator in terms of its structure and principle of operation. Operating in a reverse thermodynamic cycle, these machines take heat from a low-temperature source (communicate cold to it), increase the heat potential and transfer it to a higher-temperature source. This process consumes energy in the form of work, which is transformed into heat, which is also transferred to the high-temperature source. The difference between heat pumps and refrigeration machines

is determined by their purpose. The main purpose of a refrigeration machine is to cool a low-temperature heat source, and the heating of a high-temperature source is a side effect.

Fig. 1 shows a diagram of a vapour-compression heat pump and a graph of its operating process in a T,s-diagram of a pilot heat pump unit created at "Blagodatna" mine of PJSC "DTEK Pavlohradvuhillya", which uses the heat of mine water to heat water supplied to the hot water supply system.

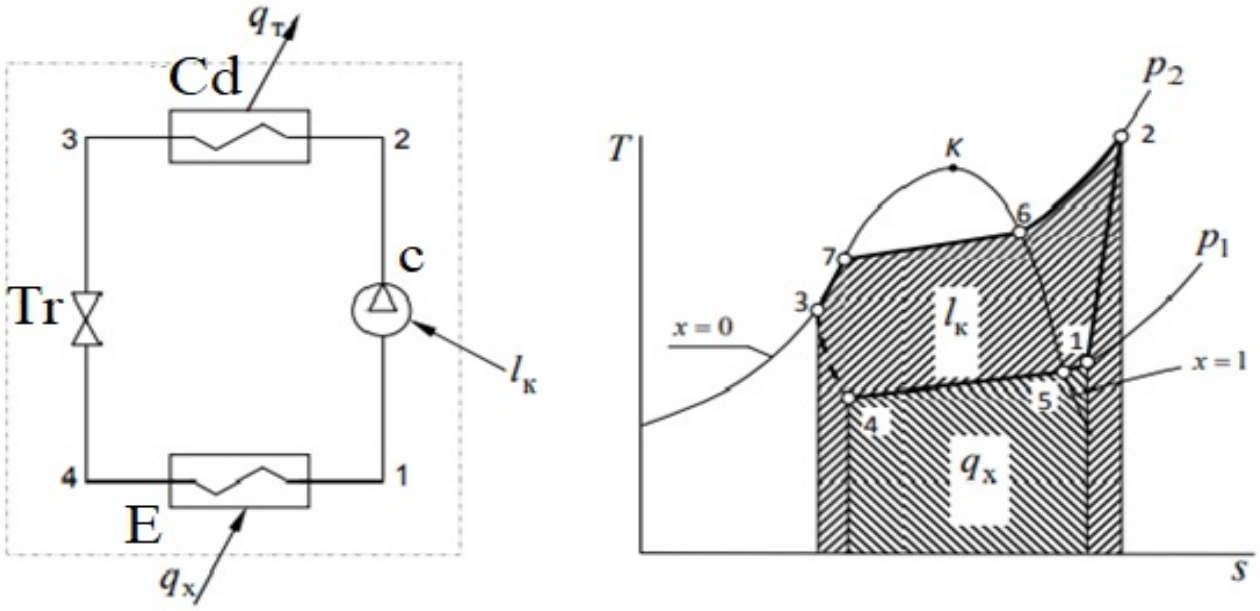

Fig. 1. Schematic diagram (a) and workflow diagram (b) of the heat pump

The main elements of the heat pump are: compressor C, condenser Cd, evaporator E and throttle Tr. Its thermodynamic cycle is depicted in the diagram against the background of lines of saturated liquid, for which the degree of dryness of steam x = 0, and dry saturated steam x = 1, converging at the critical point K, as well as isobars p1 = const and p2 = const, corresponding to the suction and discharge pressures of the compressor. Line 1-2 corresponds to the process of compression of the working fluid in the compressor, 2-6-7-3 - to its cooling and condensation in the condenser, 3-4 - to throttling, and 4-5-1 - to boiling and superheating of freon vapour in the evaporator. The shaded areas correspond to the amount of heat taken from the low-temperature source, (specific cooling capacity of the cycle q_x and specific compressor operation l_k).

Depending on the method of energy transfer, there are the following types of heat pumps: compression heat pumps (use a compression-expansion cycle of the heat carrier with parallel release of heat energy. They are distinguished by their ease of operation and high efficiency); absorption heat pumps (use an absorber-coolant combination. They are new generation devices with high performance. and it is the use of an absorber that makes absorption heat pumps as efficient as possible). Depending on the heat source used, there are the following types of heat pumps:

geothermal heat pumps - extract energy from the ground or water; air source heat pumps - extract energy from the atmosphere; heat pumps are used, which operate on the basis of secondary heat - extract energy from air, water or even sewage. The following types of heat pumps can be found at mining enterprises: «air-to-water» heat pump, «water-to-water» heat pump, and geothermal heat pump.

Mine ventilation air is particularly attractive as a low-potential heat source due to its abundance and almost constant temperature throughout the year. Air-source heat pumps do not require horizontal collectors or vertical louvres. Air-to-water heat pumps can be operated throughout the year, both in winter and summer. The advantages are lower investment costs compared to other types of heat pumps due to the absence of additional excavation work, and the simplicity of the design for heating and cooling purposes. The disadvantage is the temperature limit of a low-potential energy source. Technological scheme of a heat pump unit utilising ventilation air heat, used at the mine of SE «Lvivvuhillya»; technological scheme of a heat pump unit utilising recycled water from the compressor station, used at the mine of SE "SkhidGOK".

Spoil heaps are large massifs of waste rock that accumulate a significant amount of low-potential energy. At the same time, due to chemical reactions taking place inside the spoil heaps, the phenomenon of self-heating of the rock is constantly observed, in some cases leading to spontaneous combustion of the heaps. Horizontal or vertical collectors can be used to extract the accumulated thermal energy from the spoil heaps. The advantage is high heat recovery. The disadvantages are the high cost of work associated with the installation of a ground heat exchanger, and a decrease in rock temperature over time. The technological scheme of the heat pump unit utilising the heat of the waste heap rock used at the mine of SE "Lvivvuhillya".

The best source of low-potential energy for heat pumps is undoubtedly mine water. Wastewater and process water from the water recycling system can also serve as an additional source. For mining companies, investing in a heat pump system already saves heating costs and reduces dependence on district heating networks. The advantages are the stability of operation and the highest heat recovery among all types of heat pumps. The disadvantage is that stable operation requires a constant flow of water of appropriate quality.

A key factor in improving the energy efficiency of production is the development and comprehensive implementation of mechanisms for the rational use of energy resources as part of a unified strategy aimed at energy saving. For example, improving and implementing heat pump technologies at coal and mining enterprises is advisable for more efficient use of energy resources. To this end, mining enterprises have a sufficient supply of various low-potential energy sources that can be effectively utilised by heat pumps.

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Evergreen Point Bridge, the longest permanent floating bridge

A concrete and steel floating bridge may seem very unusual, and at times even impossible, but there are twenty such bridges worldwide, five of which are in Washington State. Four of them are the longest pontoon bridges in the world.

Floating bridges, also known as pontoon bridges, are usually temporary structures. They were built from wood during times of emergency, including war. Wooden rafts and sometimes boats were tied with rope and covered with flat boards, allowing them to cross rivers and bodies of water. Pontoon bridges have been used in many battles throughout history, including World War II and even the Iran-Iraq wars.

The longest permanent floating bridge Evergreen Point Bridge was built across Lake Washington in Seattle (USA). It is on the Washington State Road. The Lacey V. Murrow Memorial Bridge, the second longest in the world, spans the same lake 3 km south and is 2000 m long. So why was a new pontoon bridge needed to be built?

The first pontoon bridge on Lake Washington was built in the 1940s at the suggestion of engineer Homer Hadley and was called the Lacey V. Murrow Bridge. To build this bridge, Hadley came up with the idea of connecting hollow concrete barges together to build it. A second bridge, called the Evergreen Point Bridge, was built in 1963 due to increased traffic in the city. It consisted of 33 pontoon parts with four lanes. In the center of this bridge was located a drawbridge for the passage of ships.

But why exactly were floating bridges built? Let's look at the geographic location of Lake Washington. In the middle it has a depth of approximately 70 m to the bottom line, and below it is still the same thick layer of soft silt and volcanic ash, on which it is almost impossible to place the pillars of an ordinary bridge. It was possible to build suspended, but it would require the construction of columns with a very high height, which would be too expensive.

Evergreen Point Bridge, built in 1963, has been the number one such structure for more than half a century. By the beginning of the 90s, the pontoons had lost their strength, and the bridge became vulnerable to water and wind elements. Its insufficient capacity led to the fact that it was closed, and it was decided to build a similar new bridge next to the old one.

The opening of the New Bridge took place in early spring 2016. During the opening, it was announced that the bridge entered the world record book, beating the achievement of its predecessor by almost 40 m.

The bridge is supported by 77 floating pontoons, 110 m long, 23 m wide and 8.5 m high. In place, this entire structure is held by 58 heavy anchors connected to the bridge by steel cables each of them will be fixed in a hydraulically operated socket, and with the help of remote control, the loads on all cables can be evenly distributed

during storms and earthquakes. With a new load distribution system, the bridge can withstand gusts of wind at a speed of 150 km/h, and earthquakes with a magnitude of 7 to 9 points. The installation of the structure was carried out immediately from both ends and finished in the middle. The last of the pontoons was installed in a permanent place in the summer of 2015, a year before the start of operation. The width of the structure is 50 meters. The bridge has six lanes. In addition, there are paths for cyclists and pedestrians. In the future, it is planned to launch narrow-gauge transport across the bridge.

The longest floating bridge in the world was very expensive, but it cannot be called unprofitable, since 74 thousand motorists use the crossing every day. Given a safety margin of 75 years, the construction of the bridge can be considered a reasonable investment.

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Modern Technologies in Construction

Building Information Modeling (BIM) is one of the most promising recent developments in the field of Architecture, Design, and Construction (AEC). Thanks to BIM technology, an accurate virtual model of the house is created digitally. This model, known as the house information model, can be used for planning, designing, building, and operating the facility. It also visualizes what will be built in a simulated environment for architects, engineers, and designers to solve any design, construction, or operation problems. BIM represents a new paradigm in AEC that encourages the integration of all interesting pages in the project. This article discusses the current trends, benefits, opportunities, risks, and future challenges of BIM for the AEC industry. The results of this study provide useful information for AEC practitioners considering the implementation of BIM technology in their projects. A building information model contains the exact geometry and relevant data needed to support design, procurement, fabrication, and construction, in addition to building realization. Once completed, this model can be used for operation and maintenance. in Fig. 1 shows the types of BIM applications at different stages of the project life cycle.

In the construction industry, 3D printing can create building components or "print" entire buildings. The design lends itself well to 3D printing, has an important part of the information needed to create the item, will exist as a result of the design process, and the industry already has experience with automated manufacturing. thus, the recent emergence of Building Information Modeling (BIM) may contribute to the wider use of 3D printing. Construction 3D printing can enable faster and more accurate construction of complex or custom components, while also reducing labor costs and producing less waste. It could also allow construction to take place in harsh or dangerous environments unsuitable for human labor, such as in space.

A 3D digital model of an object is created using a computer-aided design (CAD) system or a 3D scanner. The printer then reads the design and lays down successive layers of print media that are joined or fused to create the item. The process can be slow, but it allows you to create almost any shape. Depending on the technique used, printing can produce multiple components simultaneously, use multiple materials, and use multiple colors.

With real-time data recording and unique aerial advantages, drones can increase efficiency, reduce costs and optimize workflow. Here are some ways drones are being used in construction. With their ability to map vast amounts of land, drones can exponentially reduce the time spent visualizing the topography of a site. Another common problem is equipment failure. The recording capabilities of drones can be used to remotely detect problems and provide visuals to help communicate those problems. Construction supervisors can also use drone video cameras to monitor the

job site for safety, ensuring that workers are properly balanced and that no structure or equipment is loose or unstable. By replacing heavy machinery and bulky scaffolding, drones can provide a crucial overview. They can be flown around structures to check stability and fine details, as well as capture high-resolution images for analysis.

Among the new construction technologies, virtual and augmented reality has been a big innovation that provides visualization. With the industry forecast to grow to $8 trillion globally by 2030, the use of virtual reality and augmented reality is sure to be significant. With the potential for a 90 percent reduction in construction costs once implemented in 2022, AR/VR technology has been seen in various remote site inspections. It also ensures security, cooperation, and communication between AEC personnel.

Addressing operations management challenges, the digital twin is the latest technology in the AEC industry. It involves the use of modeling when creating a building prototype. The trends and functionality of digital twins encompass the use of intelligent multidimensional digital models. There will be fewer buildings with operational problems in 2023 and beyond, all thanks to the ability of digital twins to model, predict and make decisions based on real-world conditions. Digital twins perform performance analysis by considering occupant behavior using patterns and space.

Additions are becoming more and more the norm in construction, and for good reason. The increased portability of tablets and smartphones provides greater connectivity and the ability to work from anywhere. In particular, data collection software helps construction companies collect data from construction sites faster, more accurately, and with better quality. Integrating this type of technology into your current processes is simple and requires a lower initial investment, but at the same time provides significant benefits, including:

- Significant saving of time and reduction of errors during data entry. Users of data collection applications have reported saving more than 20 field and administrative hours each week, as well as a 50 percent reduction in data entry errors. Wrinkle. Estimate your potential ROI with our free online calculator.

- Advanced workflows. You can automate data collection workflows so that submission of one form triggers submission of another form, and so on until a specific task is completed with all required signatures and data collected. Additionally, some data collection apps offer mobile forms and web form apps so your team can submit forms on their smartphones, tablets, laptops, desktops – virtually any digital device.

- Improved security compliance. Data collection software can facilitate anything from daily equipment inspections to accident reports and comprehensive occupational safety analyses.

- Instant reporting. Whether you need daily job reports, quick completion of client tasks or quick access to legal documents, a data collection application can help you streamline your reporting. You can also easily customize the reports to suit your business needs.

For years, artificial intelligence (AI) has benefited construction projects by improving safety, improving work processes, and getting jobs done faster and better. However, many construction companies continue to navigate and learn how to best apply this complex technology within their organization. Some large companies have begun developing their own AI applications to help with internal decision-making and operations. While others rely on third parties such as AI consultants and solution providers to examine their current practices and identify opportunities for implementing AI and/or machine learning.

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Exploring the use of green technologies in sustainable architecture

Sustainable architecture is a design approach that aims to minimize the negative impact of buildings on the environment while creating livable spaces for people. However, it can be difficult to understand, and while there are various definitions, they do not provide clear guidance on how to put sustainability principles into practice. Moreover, these definitions differ slightly from one another, making it crucial to comprehend the meaning of sustainability when attempting to implement sustainable development. It is widely agreed that sustainability significantly impacts our way of life, and therefore, personal values influence how individuals interpret its goals. Like architecture, sustainability encompasses a broad range of issues, some of which may appear conflicting. Gaining a basic understanding of these issues is the first step towards establishing or clarifying personal values and working towards a more sustainable future.

Green technologies play a critical role in achieving this goal by providing efficient and renewable sources of energy, reducing waste and emissions. One example of green technology in architecture is passive solar design. This approach involves designing buildings to capture and utilize the sun's energy for heating and lighting. This can be achieved through the use of south-facing windows, thermal mass materials, and shading devices that allow sunlight in during the winter months and block it during the summer. Another example is the use of green roofs, which are planted with vegetation and can help reduce energy consumption by providing insulation, reducing stormwater runoff, and improving air quality. Renewable energy sources such as solar panels and wind turbines can also be used in sustainable architecture to power buildings and reduce reliance on fossil fuels. Efficient heating and cooling systems, such as ground source heat pumps and passive ventilation, can also be used to reduce energy consumption and greenhouse gas emissions.

In addition to green technologies, sustainable architecture also emphasizes the use of sustainable materials, such as reclaimed wood, bamboo, and recycled steel. These materials can be used in a variety of applications, such as flooring, roofing, and structural elements, and can help reduce waste and promote sustainable resource management.

Green architecture, also referred to as sustainable architecture, is a philosophy of designing buildings to comply with the principles of social, economic, and ecological sustainability. Sustainable architecture uses a conscious approach to energy and ecological conservation in the design of the built environment [2].

Sustainable architecture involves designing buildings that are in harmony with the natural environment. It includes a holistic approach to design that considers the entire life cycle of a building, from the materials used to the energy and water consumption during its operation and eventual decommissioning. Some of the key principles of sustainable architecture include:

1. Passive design strategies that use natural lighting, ventilation, and shading to reduce energy consumption.

2. Using materials that are locally sourced, renewable, and have a low environmental impact.

3. Minimizing waste by using recycled materials and designing for adaptability and flexibility.

4. Designing buildings to be energy-efficient, with a focus on reducing carbon emissions and reliance on non-renewable energy sources.

5. Incorporating green spaces and landscapes that provide ecosystem services and enhance human health and well-being.

The building and architecture industry have a significant impact on the environment, from the extraction and production of building materials to the energy consumption and waste generated during a building's lifetime. Here are some of the key ways in which building and architecture impact the environment:

1. Energy consumption: Buildings account for a significant portion of global energy consumption, with heating, cooling, and lighting being the primary contributors. Non-renewable energy sources such as coal and natural gas are often used to power buildings, leading to greenhouse gas emissions and contributing to climate change.

2. Carbon emissions: The construction and operation of buildings produce large amounts of carbon emissions, primarily through the use of fossil fuels. Additionally, the production and transportation of building materials also contribute to carbon emissions.

3. Water consumption: Buildings consume vast amounts of water, from the manufacturing of building materials to daily usage. Water-intensive systems such as cooling towers, irrigation systems, and plumbing can lead to water scarcity and contribute to environmental degradation.

4. Waste generation: The construction and demolition of buildings generate a significant amount of waste, including construction debris, packaging, and hazardous materials. Landfills can become overloaded, leading to soil and water contamination.

5. Habitat destruction: The extraction and production of building materials can lead to habitat destruction and biodiversity loss. Additionally, the construction of buildings and infrastructure can fragment ecosystems and disrupt natural habitats.

To minimize the impact of building and architecture on the environment, it's essential to adopt sustainable practices, such as using renewable energy sources, incorporating green technologies, and designing buildings that are energy-efficient and minimize waste. Sustainable architecture can also incorporate natural features, such as green roofs and walls, to provide additional environmental benefits.

Overall, green technologies and sustainable architecture are essential for addressing the environmental challenges we face today. By designing buildings that are in harmony with the natural environment and use renewable resources, we can create a more sustainable and equitable future.

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Specifics of the mineral composition of small urinary stones from the collection of Professor Serhiy Barannik

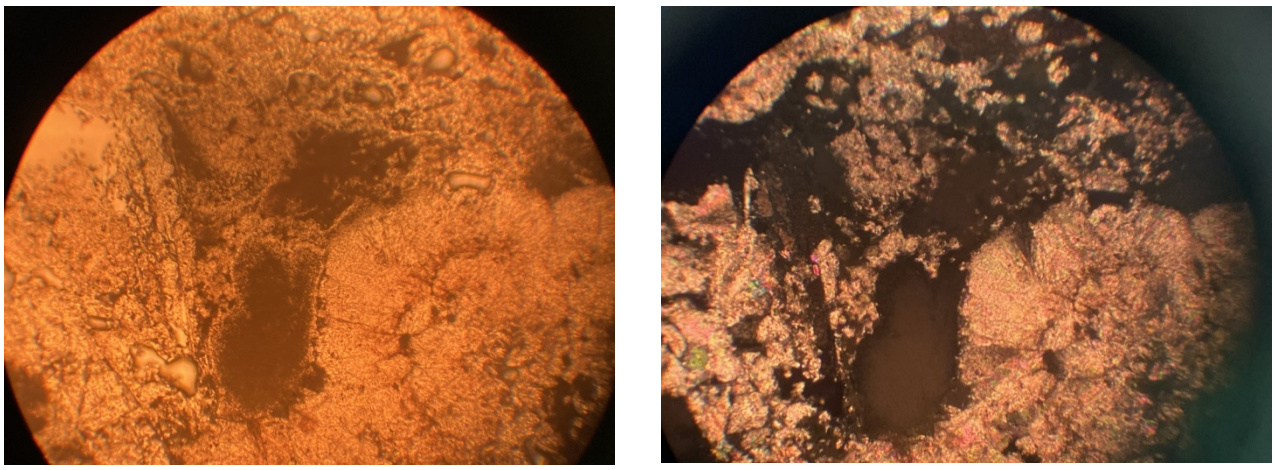
Minerals of biogenic origin are integral elements of the structure of many living organisms. Along with genetically determined formations, pathogenic biominerals are also widespread. Among them are, in particular, urinary stones - uroliths, which are a natural consequence of the development of urolithiasis. Due to the fact that in most cases urinary stones are not mono-, but poly-mineral aggregates, for their correct classification and adequate characterization of the type of urolithiasis, it is necessary to account and analyze the specifics of the ontogenesis of all mineral components [1 - 12].

The purpose of the work is to study the mineral composition of small uroliths from the collection of Professor Serhiy Barannik.

The factual basis of the work was 10 samples of urinary stones up to 6 mm in length, kindly provided by the professor of the Department of General Surgery of the Dnipro State Medical University, Serhiy Barannik.

During the research, all samples were photographed, measured and weighed. After a detailed macroscopic description, petrographic thin sections were made from them, and the waste (small fragments and dust) was subjected to X-ray phase analysis. The produced thin sections were studied by mineralogical and petrographic methods using a polarizing microscope POLAM R-312.

The microphotographs of the "nuclear part" of one of the samples of uroliths with phosphate is shown in figure 1.

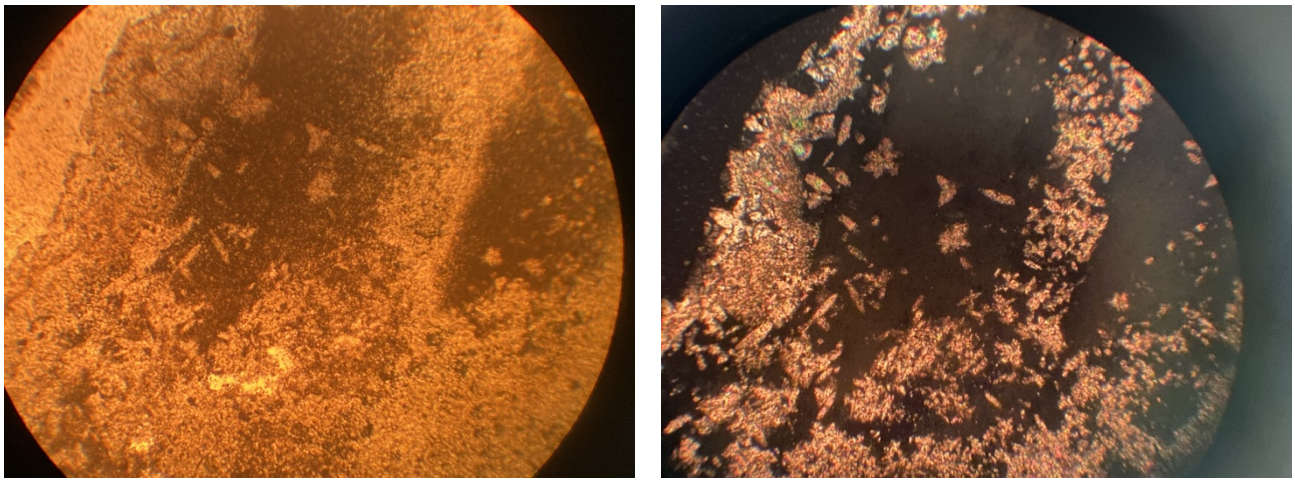


a b

Fig. 1. Specifics of the structure of the central part of the sample with phosphate: a - simple transmitted light, b - polarized transmitted light, magnification 90^x.

In the central part of the micrographs, a large accumulation of organic matter is seen, to which a lamellar aggregate of phosphate (an amorphous variety of hydroxylappatite – collophane) adjoins on the left. Collophane formations are clearly visible in the form of a kind of "shirt" along the perimeter of the organic accumulation. The mineral component of this sample is mainly represented by oxalates (wevellite and much less often weddellite).

Microphotographs of the "nuclear part" of one of the typical samples of uroliths with oxalates is shown in figure 2. In the upper part of the microphotographs, two apophyses of the central "organic nucleus" are located. The organic matter of the apophysis is impregnated with the smallest microblock bimodal crystals of weddellite, which form twins and various intergrowths.



a b

Fig. 2. Specifics of the structure of the central part of the sample with oxalate: a - simple transmitted light, b - polarized transmitted light, magnification 110^x.

The organic matter is mainly concentrated in the "organic core", in the form of the thinnest membrane ("organic shirt") along the surface of the crystals and their microblocks, as well as in the form of numerous finely dispersed inclusions in the microblocks of individual crystals.

The analysis of the performed studies allows us to formulate the following main conclusions:

1) All uroliths had a polymineral composition;

2) The nuclear part of concretions in one case consisted of urate (uric acid dihydrate), also in one case of phosphate (colophan), in all other samples – of oxalates (wavellite, weddellite);

3) The amount of organic matter in the studied samples ranged from 6.4% to 28.3%.

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Le développement de propositions de protection des territoires inondables

Formulation du problème. Le problème clé lors de la construction de zones de stationnement présente l'impact négatif des facteurs naturels et climatiques. Pour la plupart des régions, l'une des principales causes de l'érosion des sols est la saturation excessive en eau des sols et les inondations fréquentes. La prévision des inondations ne réduit que partiellement les effets négatifs des flux d'eau sur les routes. Par conséquent, lors de la conception des routes dans les régions touchées par les inondations, il est nécessaire d'augmenter la demande de sécurité et de qualité de la surface de la route. La recherche et l'amélioration des méthodes de renforcement des pentes des routes permettront de créer des constructions plus durables et résistantes pour protéger les sols. Cela pourrait réduire la probabilité de déformations des routes à l'avenir et réduire les coûts matériels de leur réparation.

Ainsi***, l'objectif de l'étude*** en question est de développer des méthodes alternatives pour améliorer les caractéristiques des sous-sols des routes automobiles qui sont soumises à l'influence des facteurs naturels et climatiques négatifs.

Après avoir analysé les informations sur la protection des pentes routières contre l'érosion, les technologies suivantes ont été identifiées, à savoir, les géogrilles, les revêtements de protection biologiques, les structures en palplanches, les clôtures en béton, les gabions. Toutes ces technologies ont leurs avantages et leurs inconvénients. Parmi les inconvénients de ces technologies, on peut noter les suivants :

1. Coût élevé: toutes les technologies nommées peuvent être coûteuses à installer, surtout si un grand volume de travaux est nécessaire.
2. La nécessité d'une installation correcte: toutes ces technologies doivent être correctement installées et fixées sur place pour être efficaces.
3. L'usure et l'entretien: de même qu'en cas des géogrilles, des structures en pieux, des clôtures en béton et des gabions, nécessitent une maintenance périodique pour que ces systèmes de protection soient efficaces et fiables.
4. Questions écologiques: lors de l'installation de ces systèmes, des problèmes de pollution de l'environnement peuvent survenir, en particulier si des matériaux qui peuvent être nocifs pour la nature y sont utilisés.
5. Les limitations d'utilisation. Vu la situation spécifique, certaines de ces technologies peuvent être inefficaces ou inapplicables. Par exemple, les gabions peuvent être inefficaces dans les endroits avec une capacité portante du sol faible, et les barrières en béton peuvent être trop lourdes pour certains types de sols.

En nous basant sur les idées mentionnées ci-dessus, nous proposons de développer des pentes en plastique mobiles (fig.1) qui représentent des structures fabriquées selon la technologie de moulage par injection, dans laquelle le plastique fondu est coulé dans des moules spéciaux. Cette méthode permet de créer des pièces de haute précision et de forme complexe.

Des options de production de pentes à l'aide de l'impression 3D sont également envisagées. Il faut souligner que le plastique recyclé peut être aussi utilisé comme matière première pour créer des pièces solides.

Le processus de création de talus en plastique comprend les étapes suivantes:

1. Collecte et recyclage de déchets plastiques. Les déchets sont recyclés sur un équipement spécial et transformés en granulés.
2. Fabrication d'éléments routiers. Les granulés de plastique sont mélangés à d'autres composants et ensuite pressés dans des moules pour créer des éléments routiers.
3. Installation des éléments routiers. Les éléments routiers sont connectés les uns aux autres à l'aide d'éléments de connexion spéciaux. En conséquence, une surface de route continue est formée.

Il est prévu que les talus en plastique auront plusieurs avantages par rapport aux matériaux traditionnels. Tout d'abord, ils seront plus résistants à l'environnement car le matériau plastique n'est pas sujet à la corrosion et est résistant aux rayons UV.

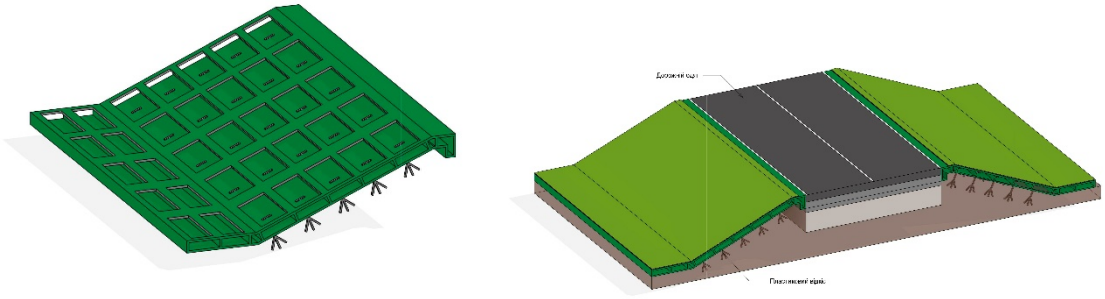

Figure 1. Modèle d'un ébrasement de route en plastique

Il convient de noter que des technologies similaires de la construction des routes deviennent de plus en plus populaires dans le monde entier (Fig.2).

Figure 2. Une structure routière modulaire creuse en plastique recyclé "Plastic Road".

Conclusions:

1. Les technologies utilisées actuellement dans la construction des routes ont leurs inconvénients, ce qui encourage la recherche de nouvelles solutions.

2. Les déchets plastiques nuisent sérieusement à notre environnement car plus de 8 millions de tonnes de déchets plastiques se retrouvent chaque année dans les océans, et ce chiffre continue d'augmenter. L'utilisation de plastique recyclé dans la construction routière contribuera à la préservation de l'environnement.

3. Les bordures en plastique ne nécessitent pas beaucoup d'entretien technique et de réparation, ce qui permet de réduire les coûts de leur exploitation.

4. L'utilisation des bordures en plastique peut considérablement faciliter et accélérer les travaux de réparation.

5. Les bordures en plastique ne se dilatent pas et ne se contractent pas sous l'effet des changements de température, ce qui leur permet de conserver la forme initiale et empêche l'apparition des fissures.

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Section 03 Computer Science and Solutions in IT

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Cyber security risks of using industrial control systems in critical infrastructure

The use of industrial control systems (ICS) in critical infrastructure presents unique cybersecurity risks that must be identified and mitigated to protect against potentially catastrophic consequences. This requires a comprehensive approach that combines technical, organizational, and policy measures to ensure the resilience and security of these systems.

Industrial control systems (ICS) play a critical role in the operation of many of our most important infrastructure systems, including electricity, water, and transportation. These systems are responsible for the monitoring and control of physical processes, and any disruptions to their operation can have serious consequences for public safety and economic stability. However, the use of ICS also presents unique cybersecurity risks that must be addressed to protect against potentially catastrophic consequences. In this essay, we will explore the key challenges and strategies for identifying and mitigating risks in industrial control systems. *Challenges in Securing Industrial Control Systems* One of the main challenges in securing ICS is the complex and diverse nature of these systems. ICS often include a wide range of different devices, software, and networks, and may be distributed across multiple locations. This complexity makes it difficult to identify and mitigate vulnerabilities in the system and also makes it harder to monitor for potential threats. Another challenge is the fact that ICS are often designed with a focus on reliability and availability, rather than security [4]. This means that security measures may not be prioritized, and the system may be more vulnerable to cyberattacks.

Strategies for Identifying and Mitigating Risks Despite the challenges, there are a number of strategies that can be used to identify and mitigate risks in ICS. One key approach is to conduct regular risk assessments, which involve identifying potential threats and vulnerabilities in the system, as well as assessing the potential consequences of an attack. Risk assessments can be used to inform the development of security policies and protocols, as well as to guide the implementation of technical controls, such as firewalls, intrusion detection systems, and access controls.

Another important strategy is to establish strong organizational and governance structures for ICS security [2]. This may include designating a specific team or individual responsible for cybersecurity, developing policies and procedures for incident response and recovery, and establishing clear lines of communication and decision-making in the event of a cyber incident. It is also important to ensure that

employees and other stakeholders are educated about cybersecurity risks and best practices, so that they can play an active role in protecting the system [3].

Finally, it is critical to address the policy and regulatory environment around ICS security. This may include working with industry partners and government agencies to develop best practices and guidelines for securing ICS [1], as well as advocating for policies and regulations that prioritize cybersecurity in critical infrastructure. In addition, there may be opportunities to incentivize ICS vendors and operators to prioritize security in their products and services, such as through certification programs or liability frameworks.

In conclusion, securing industrial control systems is a complex and multifaceted challenge that requires a comprehensive approach. The consequences of a cyberattack on critical infrastructure can be catastrophic, making it imperative that these risks are taken seriously and addressed through proactive measures. By combining technical, organizational, and policy measures, it is possible to identify and mitigate risks in these critical systems and ensure their resilience and security.

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AI influence on education

Today we can observe a total digitalization everywhere with the maximum use of computer technologies to improve and facilitate various types of processes in difference spheres. And education is not an exception. Smart devices and applications have been widely used by both students and teachers as an integral part of the educational process. Months of COVID-19 quarantine reshaped educational methods and approaches. Educational platforms and applications provided learners with the reliable online access to lectures, classes and seminars creating a new learning environment.

This transformation has also provoked a deeper use of the AI in education. And one of the positives of the AI implementation is individual tutoring. The diagram below demonstrates the work of the Intelligent Tutoring System (ITS), which is controlled by the teacher, who shows the AI how to solve some problem in different ways, for example, how to find a sum of two elements. The system gives you a feedback to every step performed.

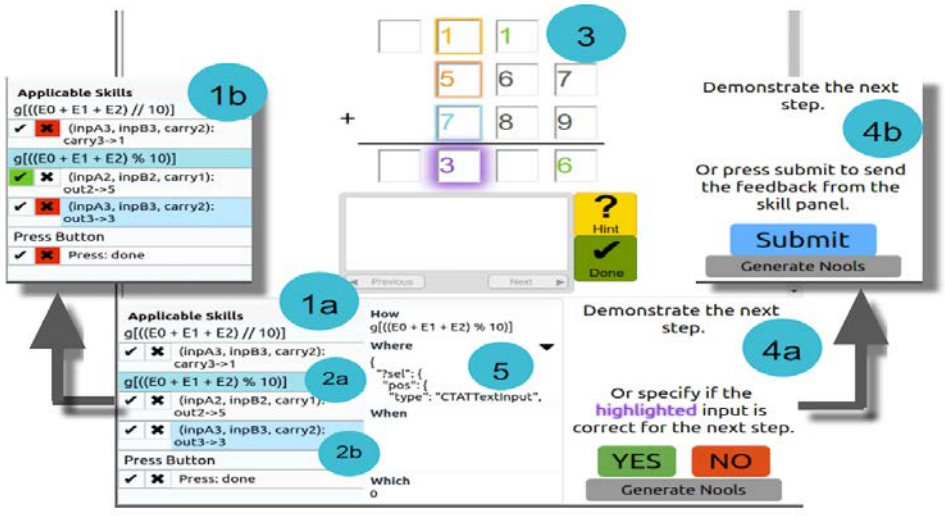


Figure 1. *Intelligent Tutoring System (ITS)*

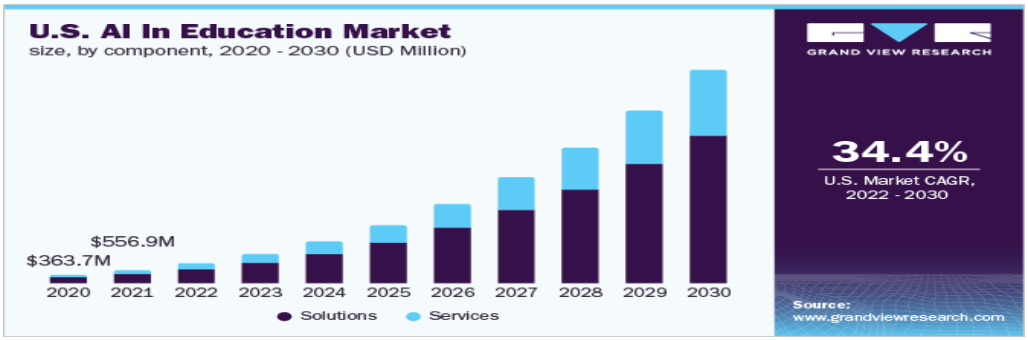
Another AI educational tool, which is currently gaining a snowballing popularity, is Chat GPT released into the common use at the end of 2022. This AI tool makes magnificent things. Its principle of work is very simple: you type your question or describe a problem, which has to be solved, and then Chat GPT answers you collecting and structuring Internet data. The only point is that the data dates back to the period of 2021 and earlier.

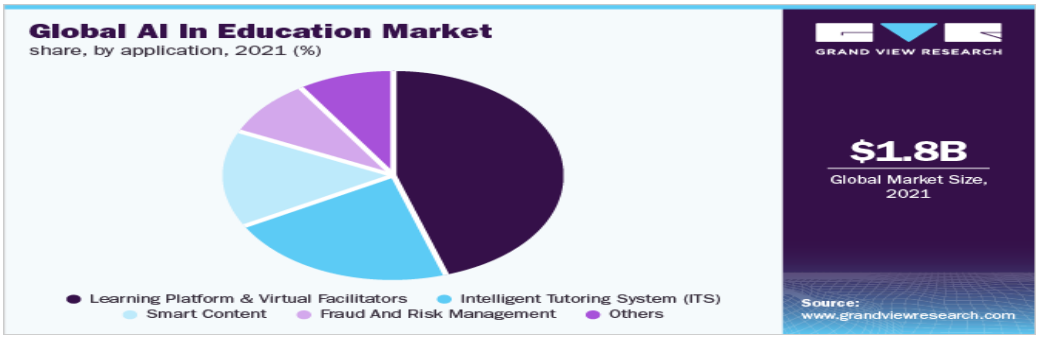
It is becoming more and more popular among students and teachers. According to some Internet research, 89% of students bellow 18 admit that they have already used this tool to complete their assignments. The temptation is strong enough as Chat GPT is able to write essays, code, solve problems, prepare reports, even write a university thesis. But here is one big disadvantage – the students' ability to think and analyze degrades and, in result, the value of education decreases.

In response to this new challenge, some educational institutions, for example, public school networks in New York, Seattle, and Los Angeles, have made restrictions on the use of the Chat GPT. What is more, another research admits that 72% of college students want Chat GPT to be banned at their place of education. So, this AI innovation is a double-sided medal.

IoT (Internet of Things) also plays an important role in the educational sphere. All connected devices collect data of the student school life, the achievements and failures, then they process information to help the student with personalized learning and teaching. Some smart models and devices can be used to simulate the professional environment and improve the education quality. AI also provides the 24/7 access to lessons and teachers everywhere.

According to the report review of the Grand View Research, AI market in education reached a point of 1.82 billion $ in 2021 and it is expected to expand by 36.6% (CAGR) from 2022 to 2030.





To sum up, it is obvious that the use of AI is greatly transforming the educational sphere. On the one hand, Artificial Intelligence creates new opportunities, which will only develop in the future. On the other hand, this trend brings serious risks to the education quality which can be overcome only with the high level of responsibility and enthusiasm from all interested parties.

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Is AI taking over our lives?

The advent of Artificial Intelligence (AI) has changed the way we live and work, making our lives more convenient, efficient, and productive. The use of AI-powered systems is rapidly increasing in all spheres of human life, from personal assistants like Siri, Alexa, and Google Assistant to advanced autonomous systems in healthcare, finance, and transportation. While AI has brought about significant benefits, there is also a growing concern that it may eventually take over our lives, leaving us at the mercy of machines. This paper explores the impact of AI on our daily lives and examines the question of whether or not AI is taking over our lives.

The impact of AI on our lives has been tremendous. In many ways, it has made our lives easier and more convenient. The mentioned AI-powered personal assistants help us to manage our schedules, order groceries, and even control our home appliances. AI has also enabled significant advances in healthcare, making it possible to diagnose diseases more accurately and provide more personalized treatments. In the finance industry, AI has helped reduce fraud and automate many mundane tasks, making it easier for businesses to operate.

However, the increasing reliance on AI has also raised concerns about its potential impact on our lives. Some worry that AI-powered systems may lead to significant job losses, particularly in industries like manufacturing and transportation. Moreover, there is a growing concern that AI could be used to automate surveillance, leading to a loss of privacy and civil liberties.

One of the most significant impacts of AI is its potential impact on the future of work. With the increasing use of AI-powered systems, there is a concern that machines will replace human workers, leading to significant job losses. In fact, some experts predict that up to 47% of jobs in the US could be automated within the next two decades. This has raised concerns about the potential economic and social impact of widespread job losses. Not everyone believes that AI will lead to massive job losses. Some argue that AI will create new jobs and industries, leading to increased productivity and economic growth. In fact, a recent study by Accenture found that AI could add up to $14 trillion to the global economy by 2035, creating new job opportunities in industries like healthcare, education, and entertainment.

As AI becomes more ubiquitous in our daily lives, there are also significant ethical implications that need to be considered. For instance, there is a growing concern that AI could be used to automate surveillance and violate our privacy and civil liberties. There are also concerns about the potential bias in AI-powered systems, which could lead to discriminatory outcomes.

To address these ethical concerns, some experts are calling for the development of ethical guidelines and regulations for the use of AI. For instance, the European Union recently proposed a set of guidelines for the ethical use of AI, emphasizing the need for transparency, accountability, and human oversight in the development and deployment of AI-powered systems.

The question of whether or not AI is taking over our lives is a complex one. On the one hand, AI is increasingly becoming an integral part of our lives, and there is no doubt that it will continue to play a critical role in our daily routines. On the other hand, AI is still limited in its capabilities and cannot fully replace human decision-making and judgment.

It is also important to note that the impact of AI on our lives will depend on the choices how to use it. If to use AI to automate mundane and repetitive tasks, it can free up time to focus on more meaningful work. But if we rely too heavily on AI when making critical decisions, we may be at risk of losing our ability to think critically and make independent decisions.

In conclusion , while AI has brought about significant benefits to our lives, it also raises concerns about its potential impact on our society. The increasing use of AI-powered systems is likely to have significant economic, social, and ethical implications that need to be carefully considered.

To ensure that AI is used in a way that benefits society as a whole, it is essential to develop ethical guidelines and regulations for the development and deployment of AI-powered systems. These guidelines should emphasize the importance of transparency, accountability, and human oversight in the use of AI and should aim to minimize the potential for bias and discrimination.

Basically, the question of whether or not AI is taking over our lives is a complex one, and the answer will depend on how we choose to use AI in the future. While AI has the potential to bring about significant benefits, it is important to ensure that its development and deployment are guided by ethical principles that prioritize the well-being of society as a whole.

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Steganographie

Ein steganographisches System besteht aus einer Reihe von Werkzeugen und Methoden, die es ermöglichen, verborgene Kanäle zur Übertragung von Informationen zu erstellen. Bei der Konstruktion eines Stegosystems müssen Schutzmechanismen berücksichtigt werden, die den Schutz der eingebetteten Nachricht vor Entdeckung gewährleisten und technische Vorteile bei der Entdeckung solcher Nachrichten durch potenzielle Gegner bieten.

Die Verwendung von unbewegten Bildern als Steganokontainer ist ein vielversprechender Ansatz in der Steganographie aufgrund ihrer Verbreitung, ihres großen Umfangs und ihrer Größe, der Abwesenheit von Einschränkungen, texturierten Bereichen und der geringen Empfindlichkeit des menschlichen Auges gegenüber Veränderungen sowie der Entwicklung von Methoden der digitalen Bildverarbeitung.

Im Bereich der digitalen Bilder sind die Verfahren zur Einbettung von Informationen in Bildern am interessantesten, bei denen der Bereich der veränderten Auflösung oder der Frequenzbereich genutzt wird. Insbesondere Verfahren, bei denen der Frequenzbereich zum Verstecken von Daten genutzt wird, sind gegenüber verschiedenen möglichen externen Einflüssen auf das Bild-Container widerstandsfähiger und in dieser Gruppe werden verschiedene Transformationen wie DCT, diskrete Wavelet-Transformation, diskrete Fourier-Transformation, Karhunen-Loeve-Transformation und Singularwertzerlegung verwendet.

Die Prinzipien der Bildkompression beruhen auf der Reduktion von statistischer und psychovisueller Redundanz sowie auf der Nutzung des menschlichen Sehsystems. Der Einsatz von Run-Length- und Entropiecodierung erhöht die Effizienz der Kompression, jedoch unterscheidet sich das nach der Kompression wiederhergestellte Bild vom ursprünglichen.

Die Wavelet-Transformation findet zunehmend Anwendung im Bereich der Bildkompression, was durch die Ergebnisse aktiver Forschung und die Entwicklung einer großen Anzahl von Algorithmen belegt wird.

Wavelets sind kurze Wellenpakete mit null integralem Wert und Lokalisierung entlang der unabhängigen Variablenachse, die in der Lage sind, verschoben und skaliert zu werden. Die Wavelet-Analyse mit Hilfe der Wavelet-Transformation ist ein effektives Werkzeug zur Analyse von Zeitreihen, da sie lokale zeitliche Besonderheiten des Prozessverhaltens aufdecken kann. Wavelets erzeugen ein vollständiges orthogonales Funktionssystem, und es gibt viele verschiedene Arten von Wavelets mit unterschiedlichen Eigenschaften.

Die Technologie der Verwendung von Wavelets ermöglicht die Analyse nichtstationärer Zeitreihen durch die Unterteilung in Abschnitte unter Verwendung von Verschiebungs- und Skalierungswavelets, was es ermöglicht, einzelne und unregelmäßige "Spikes", scharfe Änderungen von quantitativen Indikatoren sowie das Auftreten von Zyklen und chaotischen Schwankungen zu erkennen.

Die Analyse von Methoden zur Einbettung von Informationen in statische Bilder erfordert Vertraulichkeit, Stabilität und Schutz vor gezieltem Abbruch der eingebetteten Informationen, Kenntnis des Algorithmus und einfacher Umsetzbarkeit.

Es gibt eine Vielzahl von Methoden zur Einbettung von Informationen in digitale Bilder, die je nach Art der Containerauswahl, der Art der Containerorganisation und der Einbettungsbereiche eingeteilt werden können, einschließlich der räumlichen, Frequenz- und Wavelet-Koeffizientenbereiche sowie anderer spezifischer Methoden. Jede Methode hat ihre Vor- und Nachteile und kann je nach spezifischer Anwendung verwendet werden.

Die Einbettung von Informationen in den Wavelet-Bereich eines statischen Bildes ist ein vielversprechender Ansatz in der Steganographie, da er eine hohe Beständigkeit gegenüber verlustbehafteter Kompression aufweist und das JPEG 2000-Format, das DWT, verwendet, das im Vergleich zum JPEG-Format einige Vorteile bietet.

Die Einbettung von Informationen mithilfe des Wavelet-Bereichs von Bildern ist eine vielversprechende Richtung der Steganographie, jedoch hat jede Einbettungsmethode ihre Besonderheiten wie die Verwendung von Koeffizientenbereichen, Wavelets und Einbettungsmechanismen. Bestehende Methoden können in solche unterteilt werden, die Informationen direkt in bestimmte Koeffizientenbereiche einbetten und solche, die Informationen als Differenz zwischen Koeffizientenbereichen von zwei oder mehr Bereichen einbetten.

Statistische Methoden der Steganalyse, die auf der Schätzung der Wahrscheinlichkeit des Vorhandenseins einer steganographischen Einbettung im "natürlichen" Container basieren, haben einen unbegrenzten Anwendungsbereich, jedoch besteht ihr Hauptnachteil in der Annahme des Vorhandenseins eines solchen Containers. Diese Methoden zeigen eine hohe Effizienz bei der Erkennung von Einbettungen im räumlichen Bereich von Bildern, sind jedoch nicht effektiv bei der Erkennung von Einbettungen im Bereich der DWT von Bildern. Sie können auf der Analyse verschiedener Regelmäßigkeiten des natürlichen Bildes basieren, wie z.B. den Eigenschaften des Histogramms des Bildes, der Statistik von Nachbarpaaren oder Gruppen von Pixeln im Bild, den Unterschieden zwischen den Werten benachbarter Pixeln und der Beziehung zwischen den Pixeln.

Methoden des maschinellen Lernens sind effektiv bei der Lösung komplexer Aufgaben wie der Steganalyse und haben in den letzten Jahren in verschiedenen Bereichen breite Anwendung gefunden.

Es gibt vier Hauptrichtungen im maschinellen Lernen, darunter das klassische Lernen, das in zwei Kategorien unterteilt wird - mit Lehrer und ohne. Dabei ist die

Methode mit Lehrer genauer und schneller und wird daher häufiger bei Kampfaufgaben wie Klassifizierung und Regression eingesetzt.

In der Cybersicherheitsbranche sind die meisten Aufgaben Klassifizierungsaufgaben, und Steganalysemethoden, die auf maschinellem Lernen basieren, sind aufgrund ihrer Einfachheit und ihrer Resistenz gegenüber Modifikationen der Einbettungsmethode beliebt geworden. Es gibt eine Vielzahl von Methoden, die für die Erkennung eingebetteter Informationen in statischen Bildern entwickelt wurden.

Das Hauptziel des Informationsschutzes besteht darin, unbefugtes Lecken, Zerstören oder Modifizieren geschützter Informationen zu verhindern. Steganographie kann verwendet werden, um versteckte Informationskanäle zu organisieren, die für unbefugtes Informationsleckage genutzt werden können.

Statistische Steganalysemethoden, die für die Analyse des Bildraums entwickelt wurden, sind nicht effektiv bei der Erkennung der Einbettung von Koeffizienten LL, LH, HL und HH in Bildern. Die Bewertung des Ausmaßes verzerrter Koeffizienten, die durch statistische Steganalysemethoden in der LL-Region erhalten wurden, kann jedoch als zusätzlicher Parameter für Steganalyseansätze auf der Grundlage von maschinellem Lernen verwendet werden, die einen Satz von Parametern verwenden, der statistische Momente für die Koeffizientenbereiche LL, LH, HL, HH und die Anzahl verzerrter Koeffizienten umfasst.

Gemäß den neuesten Forschungsergebnissen wird die Steganographie der Zukunft Verschlüsselungs- und Anti-Detektionsmethoden umfassend einsetzen. Große Aufmerksamkeit wird der Entwicklung von Algorithmen gewidmet, die Resistenz gegen die Analyse von Bildern durch maschinelles Lernen und andere statistische Methoden gewährleisten. Darüber hinaus werden neue Steganographiemethoden einen flexibleren und effektiveren Mechanismus zur Kontrolle von Einbettungsparametern und zur Erhöhung ihrer kryptografischen Sicherheit haben.

Steganographie im Alltag: Eine Untersuchung der Bedeutung und Anwendbarkeit verdeckter Botschaften in der digitalen Welt:

In der digitalen Welt ist die Verwendung von Steganographie zur Übermittlung versteckter Botschaften weit verbreitet und hat eine Vielzahl von Anwendungen gefunden. Diese Technik ermöglicht es Benutzern, geheime Informationen sicher zu übermitteln, ohne dass die Übertragung von Dritten erkannt wird. Es gibt zahlreiche Beispiele für die Verwendung von Steganographie im Alltag, wie zum Beispiel in der Kunst, der Musik, der Politik und der Wirtschaft. Die fortschreitende Digitalisierung unserer Gesellschaft führt dazu, dass die Bedeutung von Steganographie in Zukunft weiter zunehmen wird.

Zusammenfassend lässt sich sagen, dass Steganographie eine wichtige Rolle in der digitalen Kommunikation spielt. Allerdings gibt es auch Herausforderungen und Risiken im Zusammenhang mit der Verwendung von Steganographie, wie beispielsweise die Möglichkeit von Missbrauch und illegalen Aktivitäten. Es ist

wichtig, diese Aspekte zu berücksichtigen und angemessene Schutzmaßnahmen zu ergreifen, um die Sicherheit in der digitalen Welt zu gewährleisten.

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Development of neural networks: inevitable progress or danger?

Every year, we talk, plan and dream about what awaits us in the future, not noticing that the future, in fact, has already come. The most modern developments and technologies have closely entered our lives, which until recently we could not even think about, and now we use them every day, no longer imagining our life without them, as if it had always been like this. Could anyone imagine 15 years ago that such a simple and uncomplicated thing as a telephone would completely rethink and change the course of every person's life. The development of the phone segment, which later developed into smartphones, made it easier for people to access almost any functions and speed up the process of obtaining them, now we don't have to go to the grocery store on our own, transfer money to another account when coming to a bank branch, find any information in the Internet by visiting a computer club or, in principle, physically going to work, because all this can be done with a small device that fits in your pocket. The development of mobile devices has completely changed our life, which is now the very "future" of the fantastic works of the 20th century, and we, after all, did not even notice it. But, is something waiting for us after this?

An actively developing branch of information technology in recent years, which is being talked about more and more every day, is artificial intelligence and neural networks, self-learning mathematical models created on the principle of networks of nerve cells of a living organism. That is, what we were afraid of, the creators of stories about the destruction of people by robots that have gained self-awareness is closer than it seems. Or is it still not? Neural networks, first of all, allow organizing the process of machine learning of artificial intelligence, similar to how the human brain works. With the help of a large number of attempts, AI, having an ultimate goal, repeating similar actions over and over again, analyzes previous failed attempts and eventually learns to perform a given action. Thus, we get a unique system that can constantly work and, at the same time, be improved. But what are the so-called "pitfalls" in this?

I would like to note that artificial intelligence and neural networks did not appear yesterday and have been used for several years in places where you could not even imagine. The fact is that neural networks are not an abstract program with a certain set of functions; in fact, it is a separate tool that can be built into various systems and services to automate tasks. Companies such as: "Google", "Meta", "Microsoft" etc. have long been integrating the capabilities of neural networks in their products. For example, "Instagram" analyzes the user's activity, his requests and interests, processing all this data using neural networks, the user receives the most relevant advertising offers in his feed, and "YouTube" uses artificial intelligence technologies for a video recommendation system that takes into account a huge

number of parameters, such as: videos of which authors, on what topics, with what titles the viewer watches; how long did he watch the video; whether a like was placed and whether a comment was left; what a comment. Based on this huge amount of data, the system suggests videos that are more likely to please the viewer, without the use of neural networks, it would be almost impossible to implement this. Thus, we can conclude that neural networks are not something uncontrolled and incomprehensible, it is a tool that needs to be used correctly, which has its pros and cons.

Speaking about the cons, I would like to touch upon the important problem of neural networks aimed at creating text and visual content. The fact is that artificial intelligence, in its current state, cannot think on its own and cannot create something unique, but it can, by learning from a large amount of data from the Internet, create new products from this. Thus, it becomes important to protect copyright and limit the use of personal photographs or other content of people who would not want other products to be created based on their work. Also, in addition to this, an important problem is the substitution of voices and faces of famous personalities and any people in principle, which can carry significant reputational risks. Unfortunately, at the moment this problem has not been solved and needs to be considered by various organizations and states in order to clarify the possibilities of working with this kind of neural networks.

Despite all the advantages of the development of this kind of technology, a large number of people have concerns about whether there will be a situation in the future when human labor remains unclaimed and artificial intelligence can replace ordinary working people. Analyzing the situation, we can turn to history and remember how the industrial revolution took place in the 18th century, when people also stood on the threshold of a new era of socio-economic development and feared that new inventions and machines would take away their work. Despite this, it turned out that human labor was and remained needed, workers were needed for the machines, and people with new knowledge were needed for their maintenance and repair. Thus, society, standing on the threshold of something new and unknown, adapted and continued to work and develop further.

At the moment, we have a general idea of what artificial intelligence and neural networks are, what are their pros and cons, but let's look ahead a bit and think about what prospects neural networks open for us and what their development means for us? First of all, of course, we already see that neural networks do a good job of processing a large amount of information and providing answers to questions that interest us, thanks to this, we can change the understanding of the search engines we know now, because there will no longer be a need to review dozens of sites in order to get an answer to the necessary question, it will be enough just to ask the neural network and immediately get the information of interest. This also applies to simple images, small texts and the like, all this will not have to be searched, but it will be possible to simply generate it, taking into account the wishes of the user, and the resulting content will most likely be unique. Another important industry for neural

networks will be database processing and, most likely, using real-time data. Such interaction will make it possible to more actively develop unmanned vehicles, process economic, government and other requests, the reaction to the data received, from which is the most important criterion, thanks to neural networks, the receipt of such data will become simpler and more efficient. And, of course, in spite of all of the above, neural networks will be integrated into all sorts of other areas of our life that we might not have thought about before, and, thanks to artificial intelligence, various processes will become easier and more convenient for humans.

Therefore, it seems to me that despite, perhaps, sometimes frightening uncertainty, neural networks are rather an inevitable progress, and it is necessary to accept the conditions of the new reality, adapt, work, gain new knowledge, and develop, because, in any case , behind each neural network, people will have to stand, as, once, people first stood behind the machines.

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Risks of cybersecurity in Cloud services

As technology is advancing and becoming more integrated into various industries, cybersecurity risks are also increasing, especially in the healthcare sector. Cloud computing is a popular choice for healthcare organisations because of its scalability, flexibility and cost-effectiveness. However, cloud computing also poses a significant risk that healthcare organisations should be aware of.

Fig.1 Cloud security risks

The typical Cloud security risks one need to know are given in Fig.1. One of the main risks associated with cloud services is data breaches. As healthcare organizations store sensitive patient data in the cloud, such as medical records and personal information, it becomes an attractive target for cybercriminals. To the report by HIPAA Journal, healthcare data breaches in the first half of 2021 increased by 59.7% compared to the same period in 2020, with over 20 million individuals affected by these breaches.

Another risk is the potential for service outages, which can occur due to technical failures, human error, or cyberattacks. This can cause disruptions in patient care and impact the overall operations of healthcare organizations. In addition, cloud

services are often dependent on the third-party providers, which can lead to issues with accountability and responsibility for security breaches or data loss.

To address these risks, healthcare organizations should implement appropriate security measures and protocols when using cloud services. This includes encryption of data both in transit and at rest, regular backups, and access controls to limit unauthorized access to sensitive data. It is also important to choose a reputable and trustworthy cloud service provider that has appropriate security certifications and compliance with relevant regulations such as HIPAA.

Cloud computing has become increasingly popular in healthcare due to its scalability, cost-effectiveness, and ease of access to patient information. However, the use of cloud services also exposes healthcare organizations to a variety of cybersecurity risks, including data breaches, ransomware attacks, and unauthorized access to patient information.

According to 2021 Rport by the Ponemon Institute, the average cost of a data breach in the healthcare industry is $9.23 million, with an average cost of $499 per record. The report also found that the healthcare industry has the highest cost of data breaches compared to other industries.

One of the biggest cybersecurity risks associated with cloud services is the potential for data breaches. Healthcare organizations must ensure that their cloud service provider has appropriate security measures in place, such as encryption and access controls, to protect patient data from unauthorized access.

Another cybersecurity risk is ransomware attacks, where cybercriminals encrypt an organization's data and demand payment in exchange for the decryption key. Healthcare organizations can minimize this risk by regularly backing up their data and implementing robust security measures, such as firewalls and intrusion detection systems.

In conclusion, while cloud services offer many benefits to healthcare organizations, they also come with significant cybersecurity risks. By taking appropriate security measures and partnering with a reliable cloud service provider, healthcare organizations can minimize these risks and ensure the safety and privacy of patient data.

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Using lightweight cryptography for the Internet of Things security

Modern age has brought a lot of inventions for humanity: artificial intelligence, neural networks, 3-D printing and animation, breakthroughs in medicine such as mind-controlled implants, ecologically safe replacements of the old machinery and industry methods.

One such invention is the Internet of Things (IoT), the network of devices and systems, connecting and exchanging data between themselves over the Internet. As shown in Fig. 1, billions of devices worldwide are IoT connected, and they range from small auxiliary gadgets like a smart watch or a fitness tracker to smart household devices, variety of sensors, vehicle-control systems, “smart house” systems, and smart city infrastructure elements. All of the above gather data, exchange them with other devices, take directives and report back to the users via the Internet, or sometimes make autonomous decisions.

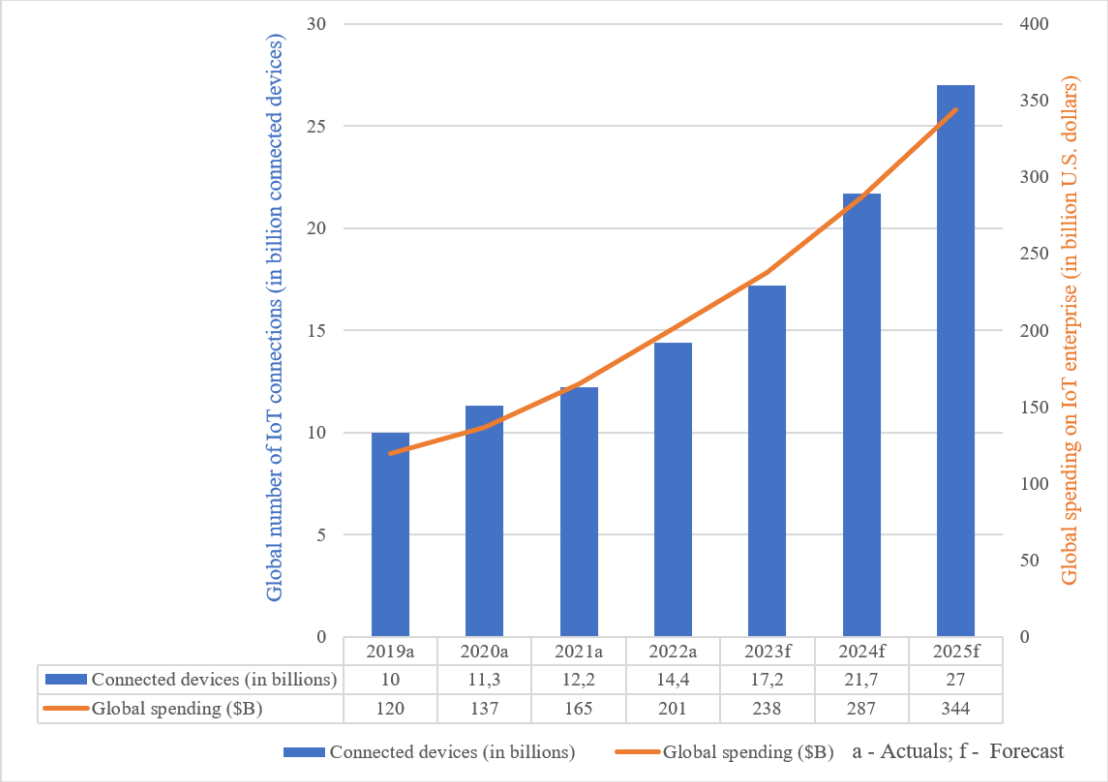

Fig. 1 Global number of IoT connections to global spending on IoT enterprise [adapted from 1,2]

The Internet of Things is widely used in many spheres of our life, like industrial IoT, public IoT or healthcare IoT. In industry, IoT is the core of huge

sensor arrays installed in production equipment that sometimes cover entire facilities and track everything useful to return this information to the supervising devices.

Healthcare IoT is also very perspective. Various medical implants are already being used to track personal condition and inject medicine, if needed, often using wireless connection to receive directives from user himself.

Therefore, opportunities are huge, but here the problems arise, because IoT devices often use insecure communication channels. It is dangerous because during the data transfer, leakage or falsification can occur, when hackers may use techniques like “Man in the middle (MITM) attack”. Most of the devices used in the Internet of Things are restricted in technical capabilities and energy, they react in real time and are small in size, so there is not much place to fit powerful hardware or capacious battery [3]. Because of that they do not have enough ability to handle advanced defensive algorithms used today. However, bypassing security of IoT devices imposes a big threat to a whole network and could lead to disastrous consequences: from information leakage or falsification to equipment damage and injuries or even death.

Making the work of IoT devices secure requires methods, different from traditional ones. Branch of cryptography named “lightweight cryptography” is focused on developing solutions to defend low-power devices and systems by adapting “traditional” or designing new algorithms that are not heavily dependent on computing power or energy, but still are effective to repel possible breaches [3].

The important factors and the specifications of the device, considered in implementing of lightweight cryptography are: size (circuit size, ROM/RAM sizes), power and its consumption, processing speed (throughput, delay) [4].

Regarding security, an encryption method with low device configuration requirements and adequate security level would be fit for IoT devices. To achieve this in lightweight cryptography algorithms, computationally heavy elements are often replaced with lighter ones, like optimization of structure, simpler encryption operations, changes in the length of the key and block size [3]. The cryptographic coprocessors are sometimes installed alongside main processors to provide processing capability and a means to securely store cryptographic keys, and are used, for example, to secure financial PIN transactions [5].

Table 1 shows the comparison of “heavyweight” AES cypher with “lightweight” PRESENT cypher, which is important to see some of the fundamental differences between traditional and lightweight solutions.

Table 1. Comparison of AES and PRESENT block cyphers [adapted from 7]

	Key size	Block size	Cycles per block	Throughput at 100KHz (Kbps)	Area (GE)
AES-128 [6]	128	128	1032	12.4	3400
PRESENT-80 [7]	80	64	32	200	1570

For almost all block cypher applications AES is a strong and preferred choice. However, as shown in Table 1, an ultra-lightweight block cypher PRESENT has a much lower footprint with smaller key, block sizes and area (GE – Gate Equivalence), and provides high throughput, which gives a good energy-per-bit. Regarding structure, PRESENT uses a single 4-bit to 4-bit S-box (substitution-box, basic component of symmetric key algorithms [8]), that makes the cypher more compact [7]. All in all, while both cyphers are effective at completing their purpose, PRESENT is designed with solutions that make it lightweight and more suitable for low-power devices.

In conclusion, lightweight cryptography is very crucial for the Internet of Things security, especially considering the spreading speed of IoT devices worldwide, and their rising importance and future perspective. Probably, they would cover most parts of our life in the near future. Lightweight cryptography fits perfectly in the modern world providing optimized, relatively cheap and secure solutions for the widely used low-power devices and systems.

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Responsible use of the Internet in the face of common encryption and malware masking techniques

It's no secret that the Internet is full of various threats, including the risk of losing personal data, accounts, funds, espionage and blackmail by downloading malware from a dubious resource and infecting your computer with it. According to Check Point, leading provider of cybersecurity solutions to enterprise, the number of attacks using malware increased by 26% in 2022 compared to 2021. In addition, Check Point notes that the number of attacks using various types of malware, such as Trojans, botnet distribution, and ransomware, also increased in 2022. For example, Wired claims that nowhere has more data-destroying code samples been used in one year than in Ukraine in 2022. The attacks were both sponsored, targeting state resources and Ukraine's critical infrastructure, as well as attacks on ordinary internet users. Almost every Internet user has heard the advice to use anti-virus software at least once to protect themselves from various threats. According to Statista, in 2021, 90% of internet users in the US use antivirus software. At the same time, in countries such as India and Nigeria, the percentage of antivirus users can be much lower - from 20% to 60%. But even using antivirus software does not provide one hundred percent guarantees that your device will be protected.

Nowadays, there are many methods of encrypting a malicious file so that the antivirus does not react to it and considers it safe. Encrypting a file is not illegal, and is often used by pentesting specialists to test a system. However, if an attacker encrypts a file with the intent to distribute it unimpeded, it is illegal. Malware cryptography is hiding the malicious payload of a program, which protects it from interference and scanning by anti-virus software. It is mostly used to encrypt various viruses such as RATs, Stealers, Loaders, cryptocurrency miners, etc., thereby allowing the virus to infect the victim's PC without any problems. FUD (Fully Undetectable) is often used to encrypt a file. This is the name given to software that encrypts .exe files using the technology of multi-layer encryption of the binary .exe file and obfuscation of the code. After completing this procedure, a new, already encrypted file is created. When the new .exe file is activated, the binary file is decrypted into small pieces of data. This information becomes infected or malicious code is embedded in it. The malicious file is also attached to various programs that add functionality that prevents the virus from running on the virtual machine and reaching the host device through the virtual machine process. In addition to these actions, to bypass antivirus programs, attackers also often change the structure of the malicious code in the file to bypass the data already available in the antivirus databases on this infected file. As a result, the victim downloads the file and it runs freely on his or her device, executing its malicious code and stealing data, passwords, and stored bank cards in the browser. The victim may not even know anything, as the

antivirus did not react to the file, which means that the file is safe, according to the victim, but the malicious file bypassed the multi-stage antivirus protection and ran to the computer. Even if the antivirus databases are updated in the near future, this does not save you. For example, the first launch of an attacker is enough for the malicious program to get its hands on such data as a screenshot of your desktop at the moment of launching, cookies of all your browsers, saved auto-entry text from your browsers, saved passwords and bank card data, and login tokens for various services, which allow the intruder to enter your account session without entering your password and, therefore, without going through multifactor authorization, if it is enabled.

To summarise, it should be stressed that antivirus should be used in any case, because it is additional protection of your device from various kinds of threats, but above all, the main responsibility for the safety of your personal data lies directly on the user, and you should know that every day criminals find new and improve existing methods of circumvention of anti-virus protection, malicious file behavior is becoming more sophisticated, which allows to remain unnoticed during antivirus file checks. Keep in mind that you may not even know your friend's account has been compromised. The Internet is not only about freedom of information, it's also about responsibility for its use. Let's be responsible in our actions and protect our online safety, and then we can lower the statistics of cyber attacks.

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Modern architectures for building iOS applications

Nowadays we cannot imagine our life without smartphones. We use them for viewing the news, chatting with friends, buying goods in the online stores. Mobile application development has become a separate field in the world of computer science and software engineering with its own approaches and best practices, rapidly evolving in the last decade.

Architecture is a set of rules how you design your system. In the context of mobile development when we are talking about architecture, we decide how we bind user interface to data model. The first architecture commonly used in iOS development is MVC or Model-View-Controller. While it was introduced in 1978, thousands of applications have been written with this approach. Even Apple encouraged developers to use MVC in their official documentation. [1] The main benefit of MVC is fast development, so everyone can write an app in a day and submit it to AppStore. It is easy to understand for newcomer developers without enough experience. However, the main concern developers should take care about is a risk of so called Massive-View-Controller issue, when the controller which works as a mediator between view and data becomes too large and hard to maintain. This solution works fine for MVP, but not scales well for big projects.

The second one architecture is MVVM suggested by Microsoft in 2005. Model-View-ViewModel remains MVC a little bit, but controller object was replaced by view model which works like a glue between view and model. In the context of iOS development which has a separate UIViewController class, controller now just holds the view. Communication with data layer occurs in view model so controller's code becomes thinner and enhances future scalability. When we are talking about MVVM we usually consider tools for bindings. For a long time developers used third party frameworks like RxSwift or ReactiveCocoa to achieve bindings and declarative approach. Apple finally resolved this issue by introducing a separate framework SwiftUI which implies declarative approach for building UI, and Combine, which provides ability to work with data as a set of streams. MVVM is the most used architecture in iOS development, it works fine for the majority of projects. Potential drawbacks of MVVM is that it is more complicated for new commers and might not be the fastest solution for MVP.

VIPER is another architecture which is a representation of so-called clean architecture and was suggested by Robert Cecil Martin, a famous American software engineer, promoting many software design principles. [2] VIPER consists of the View, Interactor, Presenter, Entity and Router. View is related to user interface, Interactor and Presenter are responsible for business logic, Entity holds logic for

managing data, Router maintains navigation between use cases like screens in mobile application. The main advantage of this architecture is that it encourages developers to modularize their application and implies strict separation of responsibilities. This approach can be used for the enterprise applications and can be applied not only to mobile applications. At the same time it may lead to a quite big codebase and doesn't work well for small projects.

FLUX was introduced by Facebook and provides unidirectional data flow. This is a brand-new architecture, it is quite popular in web development and has its adoption in mobile as well. [3] Some applications like Facebook have so complicated logic that is hardly possible to build them with simple architecture. They have thousands of events and dozens of screens, complicated data flow and tones of user interactions. FLUX implies unidirectional data flow so all events go through one stream and application state is always synced with user interface. While web developers have tools for building FLUX applications like Redux out of the box, in iOS development there are only some attempts to replicate this approach and usually teams build their own solution. FLUX is a powerful approach but it requires much more experience from team and it is not suitable for small applications.

To summarize, there is no silver bullet. Each architecture has its own benefits and drawbacks. The key point is a delivery of product and business goals. Perfectly written code won't provide economical value if product is not delivered in time. It is worth to mention that team size and team experience should be taken into account while choosing architecture.

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Artificial Intelligence helps in combating disinformation

People have been using disinformation for ages. It’s not a new threat. However, it has become a real problem for the last several years. The root cause of it is the speed of its spread. False news spread faster than real news. Fake news is more emotional they’re usually less boring than real news. Cailin O'Connor and James Owen Weatherall state in their book that "false beliefs can spread quickly and persistently, and have profound consequences for individuals and societies. Understanding how and why this happens is crucial for tackling a wide range of problems, from conspiracy theories and fake news to medical misinformation and political polarization" [1]. Bad actors started spreading misinformation to sell something online and now it has elevated to the level of corporate and government threats. What social networks are doing to combat disinformation spread enough? Is AI a saviour tool here, or is it a buzzword that masks the problem under an extra layer?

One of the aspiring milestones when tackling most of the issues is the ability to automate it. With the computation power of modern computers, we can add a layer of artificial intelligence to our tool and think that our job is done here. One of the essential advantages of AI is that it can be trained once on a big amount of data and then only adjustments to the initial mathematical model are needed. We can run a lot of examples of fake news through the artificial neural network and hope it will successfully spot disinformation in the wild.

To combat fake news and disinformation AI relies on several methods:

- analysis of language patterns or text structure. It can also check metadata that can be dates, author number of likes and shares, and location (if available);
- classification: using the main text and its metadata AI can put articles into different categories to help single out potential fake news;
- fact checking facilitation: by getting the main context of the text AI can provide information from trusted sources so the reader can spot some misalignment.

While it may sound easy in theory, practice can add more complexity. Disinformation is being spread in many languages. It takes a lot of resources to train models per one language or sometimes even per one topic! [2] Yet some scientists have managed to create models which support different languages. Being trained in English, the model was able to spot some fake news in Chinese. [3]. This can be achieved by teaching the model to retrieve sentiments from the text or emojis and punctuation.

Combating fake news is a rather new problem, and there is no standardized solution yet, opposite to secure internet and HTTPS connection. When we see a lock icon in our browsers we know there is a safe enough zone, contrary to the dark net. And it works across the board on all platforms and devices in the same way. Each company, country, and social network can have one or many solutions to tackle fake news. Most of them work behind the scenes so customers are not aware of safe triggers. (Lock icon metaphor in a browser indicates safe connection). Companies like NewsGuard (https://www.newsguardtech.com) combine automation tools and a team of experienced journalists. They create a curated list of trusted news, brands etc. This approach correlates with Melissa Zimdars's thoughts: "The fight against fake news requires a multifaceted approach that involves media literacy education, fact-checking initiatives, regulatory action, and cooperation between different stakeholders. It also requires a commitment to transparency, accountability, and integrity" [4].

To sum up, there is no silver bullet among tools that automate fight against the disinformation. But they are efficient facilitators, which can speed up its registering. And time to react is very crucial. For the country, it can be the special department, which monitors and reacts to misinformation spread. For business, it can be part of the PR department.

And social media platforms can add some built-in tools and revise how the share button works to control, for example, the velocity of sharing some posts to the bubble outside of a person’s mutual friends.

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Mechanisms for protecting pages in Instagram

Social media is now a model of advanced human technology, where we can find our friends, colleagues, parents, celebrities and bloggers. It is also a way of communicating between people, which we all want. But to ensure that communication goes well and without obstacles, we need to protect our pages from fraudsters and cybercriminals. Let's take Instagram as an example.

Instagram is one of the most famous social networks in the world, with about 1 billion active users who share their data, photos, and documents every day.

Typically, Instagram page hijacking happens in the following way: a fraudster or cybercriminal has a verified Instagram page, the profile of which states that it is Instagram Technical Support, but today such pages are used for phishing purposes. They then send a link, usually with a wrong web address, to a person who thinks there is nothing suspicious and clicks on the link, where they enter their Instagram username and password, hoping that it is all for verification. This way, the fraudster has free access to the user's account. [1]

Please note that Instagram technical support will never send a personal message with a link in it in case of any defects with the page, but will notify or warn about the defects in the form of a notification. [1]

Phishing is a type of data theft that targets gullible and inattentive users. The criminals send an email or a personal message containing a link in which users are asked to reveal confidential data from their pages or accounts. [2]

If somehow you have lost your Instagram account due to fraudsters, do not waste your time and write to Technical Support, but this is a rather long procedure for returning the page, which takes a lot of time, so you should follow the mechanisms of profile protection provided by Instagram.

Enabling two-factor authentication is an effective method of protection against criminals. How it works: even if the crooks have received the password to the page, they will not be able to log in to the account. You can set up two-factor authentication in Instagram's security settings. When you log in to the page, you will be sent an SMS with a code that you need to enter during authentication. But this will not always protect your page from hacking. [3]

Configure your Instagram profile privacy. In the privacy settings, turn off the network status, as fraudsters often choose people who have been online for a while. Also, in the privacy settings, you can close your profile, thereby denying other users access to your photos, which may include your face, which can also be used in various blackmails. [3]

Make backup codes. This is one of the mechanisms for protecting your Instagram page. Backup codes are usually a set of five codes that you can use instead of SMS authentication, but keep in mind that one code is used only once. When setting up backup codes, take screenshots so that you can find them if you need to. [4]

Also, come up with a complex password for your page, which can also prevent your page from being hacked by software that selects different password combinations for your page. [4]

So, after spending 2-3 minutes on the security of your data and page, you will be sure that you significantly reduce the likelihood of threats being realized.

But you can't always lose your data because of your inattention, in November 2018, Instagram developers informed some about a new security bug that leaked some users' passwords to the public, which raised questions among security researchers about the effectiveness of Instagram's security measures.

This happened due to the inattention of Instagram developers to security issues. The mistake was related to a tool that Instagram introduced to allow users to see how much of their personal data the site has collected. [5]

I believe that every company that creates social networks should be involved in protecting itself from cyber threats as much as possible. To do this, you can open your own departments that will deal with security and data privacy issues, on the basis of which a reliable strategy for protecting user pages and data will be built.

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Using of neural networks in work and study

A neural network is a computer algorithm that imitates the conduct of the human mind while processing data. Faced with an unfamiliar object, the neural network, like a person, studies it, draws conclusions and uses the information received in the future [1].

When using neural networks, a person does not create an algorithm on how to solve a problem, but they learn to do it themselves based on different data. Over time, the neural network identifies patterns and generates new solutions based on them. At the same time, artificial intelligence (neural network) cannot come up with something unique it acts only within the framework of the information that it has studied. An example of a neural network is the voice assistant Siri. Over time, it begins to recognize the voice, understand preferences, and recommend more relevant content.

The principle of operation of neural networks was invented in the middle of the 20th century, but humanity did not have enough information and computing power to train the models. Neural networks began to be actively used in the 2010s, due to the large amounts of data that appeared. Since then, neural networks have learned a lot: they can write texts, draw, read aloud, make videos and even music that can greatly simplify the process of creating the basis for the further development of the idea.

A neural network is made up of artificial neurons, or nodes, which are small programmes that perform calculations. There are many such nodes, so they are combined into layers: input, where the data comes from; one or more hidden ones, where calculations are made; output, where the data goes outside [2].

Each node connects to its neighbours; their connection is called a synapse and has a certain weight. The higher this value the more important the connection between two nodes. If the output of any node exceeds the specified value, that node is activated and sends data to the next layer of the network. Otherwise, the data is not passed on.

Now, knowing what neural networks are, we can imagine the possibilities of their integration for learning and work, for example, using networks to compile summaries to define concepts used in writing papers or to calculate and predict trends. Also, the modelling of images and diagrams can be taken as a basis for their further refinement and demonstration. Workflows can also be greatly simplified thanks to the analytical capabilities of neural networks: rough calculations based on previous data, creating logo concepts or designs according to current trends. The problem is that overuse can destroy the process of creating something new; overreliance on technology has already caused scandals on the grounds of intellectual property authorship. The overuse of such technologies is already a problem, but it

could become more terrifying. The desire to simplify the process leads to sad consequences, inhibiting the knowledge of the new.

There are many types of neural networks: they differ in complexity, use cases, structure, as well as in how artificial neurons are modelled, and in the connections between nodes. Three types of neural networks are considered the most popular: perceptron, recurrent, convolutional.

The simplest and oldest form of neural networks is perceptron. It consists of a single neuron that performs two operations: it takes input and applies an activation function to it. Perceptron does not contain hidden layers and can only be used for those tasks where you need to split the data into two classifications. Due to its simplicity, this type of neural networks is almost never used anymore.

Recurrent neural networks are used for text generation, speech processing and translation. These are networks with cycles, the main feature of which is the use of memory. The model will move the data forward and return it to the previous steps in order to complete the task as best as possible [3]. Most often, convolutional neural networks are used to classify images and videos, recognize objects and faces. If a regular neural network consists of three types of layers, then a convolutional network consists of five: input; convolution; unifying; fully connected; output.

Such networks give a stable result, even if you change the angle and scale of the photo. Each layer examines a certain part of the image, and connects all the received data to the output.

There are several basic types of tasks for which neural networks can be used:

– Classification. For recognition of faces, emotions, types of objects: for example, squares, circles, triangles, also, for pattern recognition.

– Regression. To determine the age of a photograph, make a forecast of exchange rates, assess the value of the property and other tasks that require a specific number as a result of processing.

– Time series forecasting. To make long-term forecasts based on a dynamic time series of values. For example, neural networks are used to predict prices, physical phenomena, consumption volume, and other indicators.

– Clustering. To study and sort a large amount of unlabelled data in conditions where the number of output classes is unknown, that is, to combine data by features. For example, clustering is used to identify image classes and customer segmentation.

– Generation. For automated content creation or transformation. Generation using neural networks is used to create unique texts, audio files, videos, colourise black and white films, and even change the environment in a photo.

The main problem with the use of neural networks can be the replacement of a person as a specialist. At the moment, this is almost impossible, but progress does not stand still and technology is rapidly developing. The problem at the moment is to replace human knowledge with those that artificial intelligence can provide, decision-making and their use still remain with the person, but the process of obtaining the result fades into the background. Because of this, it is possible to miss non-standard solutions.

In conclusion, the benefit of neural networks is obviously great. The way to skip some steps and speed up production and decision-making is key. The danger is in the complete replacement of the process of creating a new one. Easy access to a large amount of ready-made information eliminates the thought process and limits development. Thus, the advantages of using this technology are:

– fast processing of information and bringing it into a convenient form;

– the ability to create a basis for the further process of creation;

– finding ways to optimize existing processes;

– exclusion of stages difficult for human implementation;

– the possibility of introducing programmes into the learning process that can improve themselves;

– introduction of control of the working environment and elimination of errors due to the human factor;

– replacing a person in dangerous or difficult processes that require a lot of time;

– modelling proposed solutions that will become the basis for human thought.

The disadvantages include:

– danger of job loss for a person, depending on the development of neural networks;

– damage to human learning or development due to the simplicity of the proposed solution;

– excessive reliance on machine solutions, which, if wrong, can lead to dire consequences;

– problems in the author's field related to the generation of neural network solutions based on existing content.

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Systems development life cycle

Systems analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives. It is a problem-solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose. So, systems analysis can be defined as a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. This analysis specifies what the system should do. A good instrument for solving a problem could be the systems development life cycle (SDLC) which is focus on this paper.

SDLC is a conceptual model that is designed to help in solving problems. In this process, the aim is to plan, create and ultimately test the proposed information system to assess its usability.

To develop this lifecycle, several different people have to get involved to give their input. This would include software engineers, system engineers, and a project manager, along with an established development team. Key steps of SDLC are given below.

Although the cycle can be molded to be used in different ways depending on the needs of the business. The key steps involved in the SDLC are as following:

1. Investigation and Analysis: here, the problem we have discussed is identified and analyzed to know how far it goes and what it needs to be fixed.
2. Requirements Identification: here, the purpose is to identify the short fallings of the current systems or lack of systems to know what is actually required.
3. System Design: now, people get to work on designing the proposed system. All the work needed in terms of construction, communication, operating systems, security, hardware, software, etc., is mapped out.
4. Development: the system is finally developed and then handed over to end users.
5. System Testing: the end users, as well as the creators, test the system repeatedly to identify potential bugs, glitches, and crashes.
6. Evaluation: once the system clears the tests, it is evaluated to know whether or not it should be fully integrated.
7. Maintenance: the system is regularly checked and updated as it is used.

The first two steps are extremely critical because they lay the foundation for what is to be built and used. As every organization has selected resources that can be exhausted at one point in time, it is only possible to fix the biggest problems that will benefit the most overall.

Moreover, knowing exactly what the plan will be like to achieve this is also critical. Being cautious in the first two steps is going to reduce the amount of waste both in terms of resources and time.

Extensive feasibility reports are also made for every system or change that is proposed. After all, it is always better to be safe than sorry, especially when it comes to business. This cycle can be widely used by business systems analysts, who must thoroughly understand the industry practices as well as market dynamics that the organization exists on, so that they have a grip on what they are working on. One of their main tasks is to identify all primary and secondary stakeholders, to understand the internal and external environment of the organization, and to realize the capabilities and talents of the people working there.

Business systems analyst can be hired to recommend changes for a specific project, or they may want the specialist expertise for a much larger scale that spans multiple departments. This is why the worker of such area also need to work on strong communication skills because, in many instances, they will have to coordinate between several different people and departments.

The systems analyst`s work would be to understand their vision and identify all the hindrances and hurdles that exist which stop them from achieving their goals.

To conclude, SDLC is appropriate and important for various businesses and relevant fields of work. There is no shortage of opportunities to fix existing or emerging businesses by implementing the right changes. The described development life cycle makes it possible to save resources, time, and effort, making it an especially important need for every organization.

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Development of optimal diet modelling software in C#

A rise in blood glucose levels brought on by a partial or total deficiency of the hormone insulin is known as diabetes mellitus. Many illnesses, including harm to internal organs, blood vessels, the brain system, etc., can be brought on by diabetes.

According to the study, 537 million people (20-79 years old) will have diabetes by 2021 [1]. It is predicted that there will be 643 million diabetics worldwide by 2030, and 783 million by 2045. Adults with diabetes account for three out of every four people in low- and middle-income countries. Almost one-half of all diabetics (240 million) do not have a diagnosis. Diabetes claimed the lives of 6.7 million people and was responsible for at least USD 966 billion in medical costs, accounting for 9% of all adult healthcare expenses. More than 1.2 million children and teenagers have type 1 diabetes (0–19 years). Pregnancy-related diabetes affects 21 million live births (or one in every six). The risk of developing type 2 diabetes has risen among 541 million people.

Type 2 diabetes (also known as non-insulin-dependent diabetes or adult-onset diabetes) is caused by the body's inefficient use of insulin [2]. Type 2 diabetes affects more than 95% of all diabetics. This type of diabetes is primarily caused by excess body weight and inactivity.

Thus, it is possible to prevent or delay type 2 diabetes by keeping a nutritious diet, doing regular physical activity, maintaining normal body weight, and abstaining from tobacco use [2].

Your doctor will probably suggest that you consult a nutritionist to assist you in creating a healthy eating plan if you have diabetes or prediabetes. The plan assists you in managing your weight, controlling heart disease risk factors like high blood pressure and blood fat levels, and controlling your blood sugar (glucose) levels [3].

Also, the nutritionist can advise you on how to change your eating patterns, such as by picking portions that are appropriate for your size and level of activity. Use these nutrient-dense meals to make your calorie count: choose wholesome carbohydrates, foods high in fibre, seafood, and "good" fats.

Carbohydrates have the most effect on your blood glucose level since they break down into glucose. You might need to learn how to calculate the amount of carbohydrates you consume so that you can change the insulin dosage to help control your blood sugar. It's critical to monitor the carbohydrate content of each meal and snack.

Let's use the activities of a consumer who intends to buy a lot of items in one day as an example after considering what has been mentioned. There will be items

$x_i, i = 0,1 \ldots n-1$, with price p_i. The buyer sets aside hryvnias for the purchase of goods. The ratio (1.1) should be used to connect the supplied values.

$$\sum_{i=0}^{n-1} p_i x_i = z, z > 0 \quad (1.1)$$

Uncertain products can be obtained at the price z. As a result, the consumer should pick the finest buying option available.

Thus, the buyer must choose a procurement strategy (1.2):

$$z \to min$$
$$\mathrm{P}_1 < \sum_{i=0}^{n-1} x_i * \mathrm{XO}_i < \mathrm{P}_2 \quad (1.2)$$

here P_1 – minimum number of carbohydrates,

P_2 – maximum number of carbohydrates,

XO_i – i-th product's number of carbohydrates.

The technique used to optimize the mathematical model was the sequential version of the least squares method from the quadratic programming approach.

Finding the values of the variable x in such a way that each of them at the first iteration is as near to a specific value $y_i, i = 1 \ldots m$, as possible is the goal of the least squares method.

The statement below captures the essence of the least-squares approach (1.3).

$$\sum_i e_i^2 = \sum_i (y_i - f_i(x))^2 \to \min_x \quad (1.3)$$

The architectural design template Model-View-View-Model (MVVM) facilitates the separation of the program's visible elements from the internal logic that supports their functionality [4]. The proposed software application is meant to be an implementation of this architectural design template.

Each component of the model is responsible for performing its own duty:

1. The model [4] describes the data that is used in the application. Although they can include logic for data validation, models shouldn't specify the logic for how this data is presented or how it interacts with graphical interface elements.

2. In contrast, the view serves as a graphical depiction of the user's interface. The positioning and hierarchy of graphical controls, as well as the reasoning behind command-based user interaction, are all specified by views.

3. The view-model serves as a kind of bridge between the model and its representation, despite the fact that it is a representation model.

When data changes in the model, the presentation model updates the graphical interface to reflect these changes. Data entered through the graphical interface is transferred to the model, and vice versa. Moreover, the representation model implements commands for graphical interface interaction, including the command to change the representation (navigation).

Finally, the software application will allow customers to improve their diets and set up system accounts to track optimization outcomes. Those who need to or desire to control their blood sugar levels might utilize it in their daily lives.

Such software will enable you to optimize your diet and set up a system account to record the outcomes of optimization. Customers will also be able to add unique food products and usage restrictions by logging onto the system, add new custom food items and adjust the dietary constraints.

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Why SSDs are better than HDDs

This article proves that using an SSD on a computer is a better way to store data than using a hard drive.

Solid-state drives (SSDs) are rapidly becoming the preferred storage option for many computer users due to their numerous advantages over traditional hard disk drives (HDDs). This essay describes how SSDs provide significant improvements in performance, reliability, and durability, and why they are becoming the new standard for computer storage. The main information on this topic will be taken from the website “crucial.com”.

One of the principal advantages of SSDs over HDDs is speed. SSDs use flash memory to store data, which allows for much faster read and write times compared to HDDs. This means that booting up your computer, loading applications, and accessing large files takes significantly less time with an SSD compared to an HDD. This makes SSDs an excellent option for users who require fast performance for demanding tasks such as video editing, gaming, or running multiple applications at once. For example, for an HDD, the maximum read speed is 90 megabytes per second, while for a new generation of SSD (Non-Volatile Memory Express (NVMe) SSD), the read speed can reach up to 8 gigabytes per second. The speed of NVMe SSDs is a result of several factors, including the use of the high-speed PCIe interface, optimized controllers, NAND flash memory, and the NVMHCI protocol (Non-Volatile Memory Host Controller Interface Specification). These features work together to provide fast and reliable storage performance, making NVMe SSDs an ideal choice for demanding applications that require fast storage access. If you're looking for the fastest, most convenient and most efficient storage solution, an NVMe SSD is definitely worth considering [1].

One more advantage of SSDs is their reliability. Since they have no moving parts, SSDs are less prone to mechanical failure compared to HDDs. This makes them an excellent choice for those users who need a storage option that is less likely to fail, especially in high-stress environments such as laptops where they may be subjected to frequent bumps and vibrations. Additionally, SSDs are more resistant to physical shock and extreme temperatures, making them a more durable option for users who require reliable storage on the go. This advantage is especially noticeable when you use SSD on your computer. Because of vibrations your HDD while it is in operation can cause damage to the drive and lead to data loss. HDDs have moving parts, such as spinning disks and read/write heads, that can be disrupted by physical shocks. When the drive is shaken, these parts can collide with each other or other

internal components, causing damage or even breaking. Furthermore, the read/write heads can become misaligned, making it difficult or impossible for the drive to access data. As a result, shaking a computer while an HDD is in operation is generally discouraged, and it is best to handle the computer carefully and avoid any sudden movements while the drive is in use. So, we can definitely say that SSDs are generally considered to be reliable storage devices due to their lack of moving parts, longer lifespan, lower failure rate, resistance to environmental factors, and faster access time. While no storage device is completely immune to failure, SSDs are a reliable option for those who want to minimize the risk of data loss or corruption. But as with any storage device, it is important to back up your data regularly to avoid losing important information in the event of a failure [1].

Even after the fact that SSD drives are more reliable than HDD drives, many people still believe that if an HDD is not shaken and not placed next to magnetic sources, it will be more reliable than an SSD. There is some logic in this reasoning, but recent statistics from BackBlaze, a company that deals with cloud storage and data backup, show otherwise. In their recent report, they collected statistics on failure rates of their internal drives and decided to share it. They divided the internal drives into two different tables - one for SSD drives and one for HDD drives. In the table for SSD drives, the failure rate was less than one per cent per year. In the table for HDD drives, the failure rate was typically between 1.5 to 3 per cent per year. Therefore, even the raw statistics indicate that SSD drives have a much lower failure rate on average than HDD drives [2].

Durability is another key factor that makes SSDs better than HDDs. With no moving parts, SSDs are less prone to fail and can last longer than HDDs, especially in demanding environments. Durability is a critical aspect that sets solid-state drives (SSDs) apart from hard disk drives (HDDs). Unlike HDDs, which have moving parts, SSDs are built using a combination of electronic components and flash memory chips. This means that SSDs are not susceptible to mechanical failure due to physical shocks, vibrations, or magnetic interference. HDDs are also less susceptible to temperature changes and magnetic fields, which can cause data corruption. Additionally, the lack of moving parts in SSDs leads to less wear and tear, which can significantly extend their lifespan compared to HDDs. Therefore, when it comes to long-term reliability, SSDs are the better choice due to their superior durability. This makes SSDs a great choice for users who need to store large amounts of data and want to ensure that their data remains safe and secure over time. SSDs are also known for their ability to resist radiation. HDDs, which use magnetic disks to store data, and SSDs store information on flash memory chips. This type of memory is much more resilient to radiation than magnetic storage media. Radiation can cause bit errors or data corruption in HDDs, potentially resulting in the loss of critical information. However, SSDs can withstand high levels of radiation exposure without suffering any damage to their data storage capabilities. This makes them ideal for use in applications where radiation is a concern, such as aerospace, military, or medical fields. Overall, SSDs' resistance to radiation is a significant advantage over traditional

HDDs and underscores the importance of choosing the right storage technology for specific use cases [1].

In conclusion, SSDs offer several key advantages over HDDs that make them a better option for many computer users. With high performance, increased reliability and durability, the ability to resist radiation, and reduced power consumption, SSDs are quickly becoming the preferred storage option for many users who demand the best from their computer memory. If you are looking for a faster, more reliable, and more efficient way to store your data, SSDs are the way to go.

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Automation testing for project quality control

The IT market is growing and developing, and a huge number of competitors are emerging. In such circumstances, a high-quality score is required for a product to be placed among the popular apps. Therefore, the project cannot stand still; it must develop and release new versions simultaneously.

With each new release, the risk of critical bugs becomes higher and higher, and the structure of the code becomes more complex. It is almost impossible to keep track of all the nuances without continuous testing. The more serious the IT product, the more money will have to be paid for defects found by end users on production (Fig. 1).

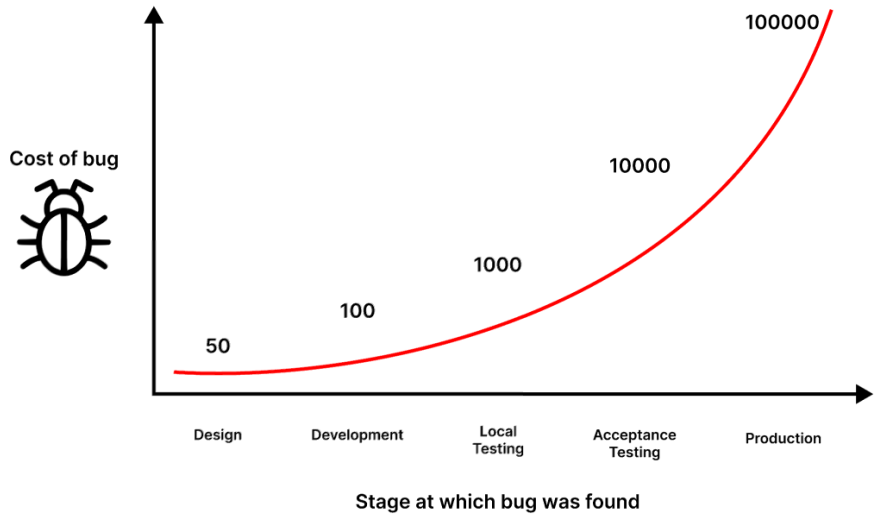

Fig. 1. Diagram of growing cost of bugs [1]

As an example, an ambulance call management application had a critical bug that cost the lives of several dozen people. The application failed to send free ambulances to calls; instead, it sent those that were already busy.

Argument 1. There are several levels of test coverage, and one of the most important for growing projects is the lowest level - unit and integration testing [2]. These tests allow testers to check if the code behaves adequately when it receives the expected (processed) requests. The tests also can track the impact of new features on old functionality and make sure that other modules have not been affected.

Tests at this level are usually written by developers with the support of a QA representative. This type of testing does not give a 100% guarantee that there are no defects, but it reduces the risk of critical ones provided that the developer really understands how this functionality should work.

To illustrate how such tests work, a bottle of water is considered as an example. It could be opened by taking out the cork, or could be closed by putting the cork in. Now imagine that instead of a bottle cork, we put an elephant named Cork. Despite the obvious ‘resemblance’ to the lid, we call the elephant Cork on purpose. Any incorrect data can be mocked and made it correct for the application. In such a case, we check that any object classified as a "cork" will open and close the bottle (Fig. 2). It may sound unrealistic, but such tests allow developers to check what parameters are needed to classify the data as valid and process the request in accordance with the definition of the object.

If the elephant had not been named Cork, the program would have generated an error. That is why other types of testing are needed, which check the possibility of slipping an elephant instead of a cork.

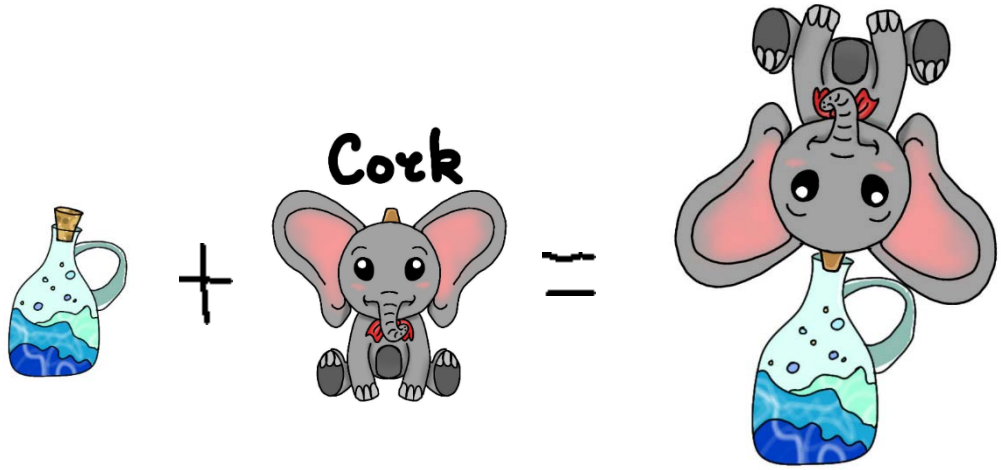

Fig. 2. Demonstration of mocking in unit tests

Argument 2. Higher levels require a specialist in test automation - a quality control representative. Higher levels test user behavior by imitating it in one way or another. Such automated tests allow you to check that the old functionality works stably, without noticeable delays, and that integration of the code was successful. This type of testing, in contrast to the lower-level tests, involves verification after the application is built. Thus, a program written by such a specialist will insert a text into fields and click on the objects in the application. Unfortunately, this type of testing is not always possible, for example, in the case of games.

Sometimes writing an automated test will be more expensive and take longer than manually checking the performance of an application. If it is possible to automate at higher levels, then it will provide profit in saved time and money for finding bugs. Continuous testing and Test-Driven Development assume a much higher degree of quality.

Argument 3. For example, suppose you must pass all regression test cases [3] in two days, and there are a few thousand of them (Fig. 3). If most of them are automated, it will cost less compared to full manual testing. You only need to pass manual test cases while waiting for those automated tests to run. As practice shows, automated test cases are much more successful in finding bugs because the computer does not deviate from the test plan by skipping steps of the test cases.

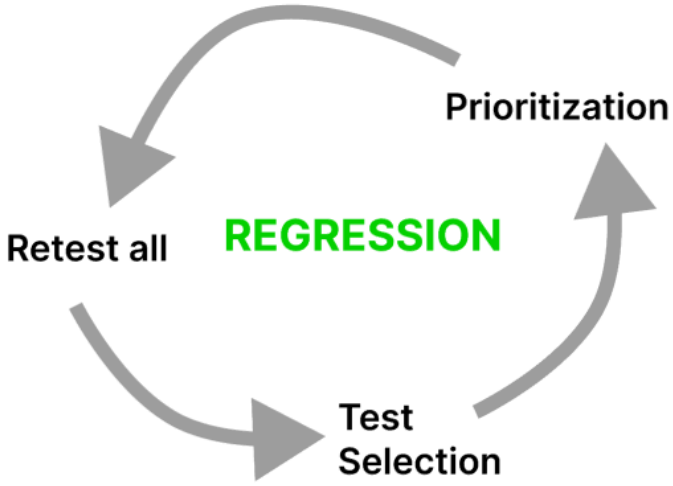

Fig. 3. Regression testing

To ensure a successful project, it is crucial to maintain quality by ensuring code coverage with feasible tests, especially automation on higher levels that imitate user behavior. By automating as much as possible, time and money on bug detection and verification can be saved. To summarize, investing in code coverage and automation testing is essential for any growing IT project. Our recommendation is to implement these practices in any project to achieve higher quality and faster delivery.

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Inner time manager as a social dilemma solution

Nowadays, people spend a great deal of time on social networks on the Internet. Every person with a smartphone could have a potential lack of time problems.

The present study analyses the prevailing content categories, and compares the new account with the existing one for making conclusions worth it or not.

According to the Datareportal 2023 January research, people are online for 6 hours and 45 minutes on average per day. The highest figure belongs to people from South Africa (9 hours 38 minutes), and the lowest one belongs to Japan (3 hours 45 minutes) [1]. Talking about social networks specifically, a human wastes 2 hours 31 minutes on average, 4 hours 36 minutes in the case of Nigeria and only 51 minutes in the case of Japan [1].

Personal values of the author's time spent on smartphone and Instagram per day during a week are shown in Figure 1.

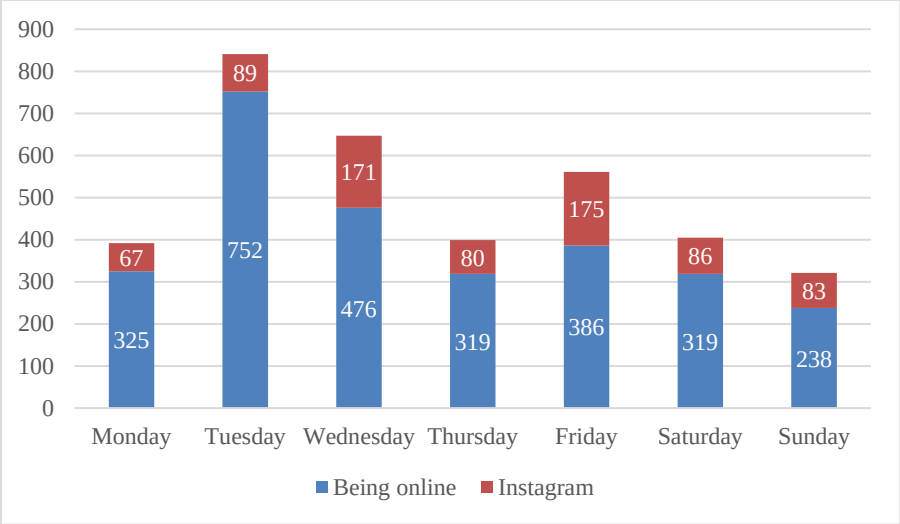

Fig. 1 Analysis of the time spent online per week in minutes

The total values are 46 hours 55 minutes and 12 hours 31 minutes for Instagram, which is almost two full days and more than half of the day. The average numbers are 6 hours 36 minutes and 1 hour 47 minutes, but the more current six weeks' statistics display it as 7 hours 6 minutes and 2 hours 3 minutes.

To "solve a social dilemma" and "wake up an inner time manager" the analysis of the data recommended on Instagram was made. The content was divided into 60 categories. One thousand posts for the basic account were analyzed. The same analysis was made for the existing account.

To work with data in Excel, the Python utility was designed using openpyxl, datetime, msvcrt, and os modules.

To avoid subjectivity, the following recommendations were taken into account:

1. Use a new account, so AI (Instagram) does not know about the favours.
2. Do not save any posts watched during the experiment.
3. Choose a different category for the next portion of the content to disorient AI.
4. Pay only 10-15 seconds of attention for watching on average.
5. Refresh a page after all ten posts watched.

The results of the data array of non-trained AI are shown in Figure 2.

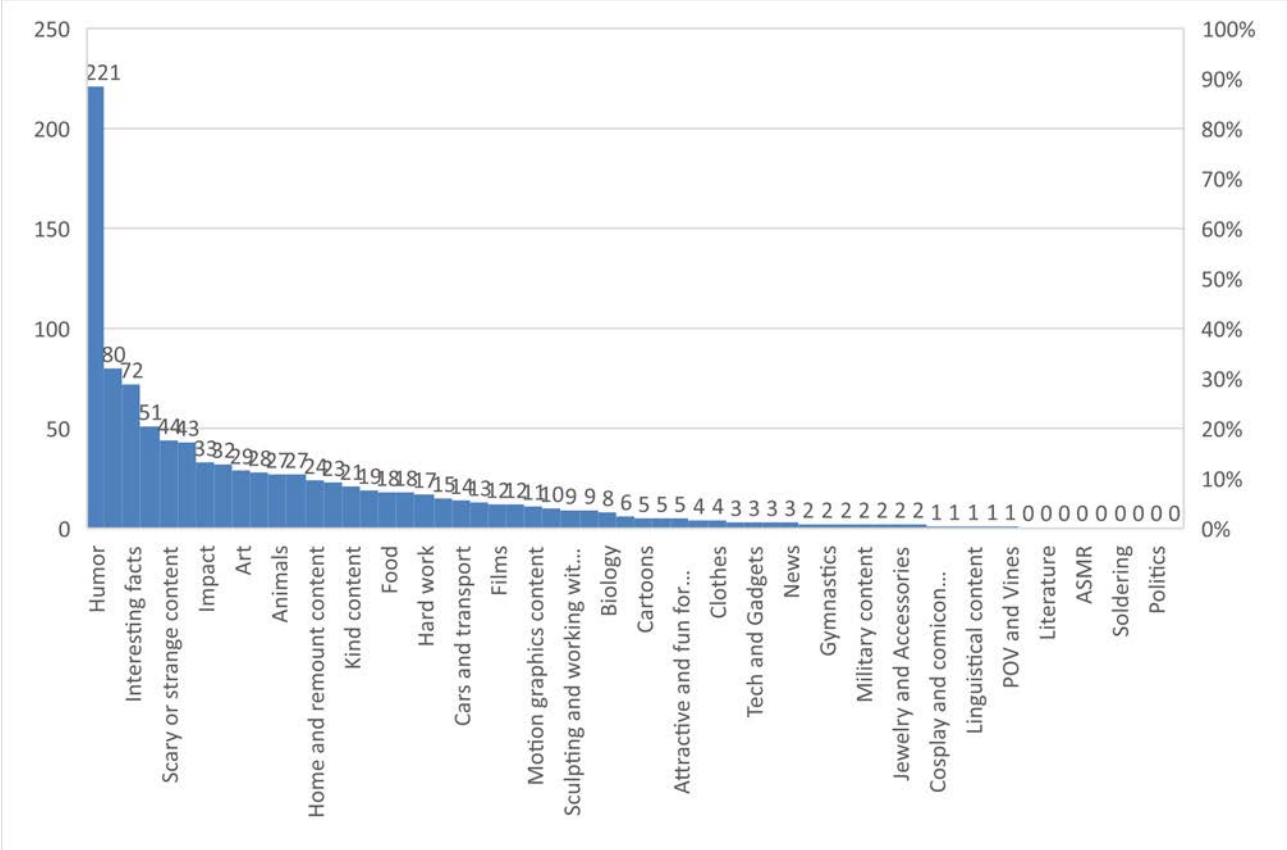

Fig. 2 Basic Instagram account categories analysis in minutes

Some conclusions about the secondary account are given below:

1. AI recommends the most emotionally solid categories such as “Humour” to make the connection with a new user as fast as possible.
2. The second category (“Interesting facts") can give a feeling of importance for memorising something without reason, so it is a step to procrastination.
3. Instagram gives a user the most likeable and general types of publications even in the case of mixing different kinds of content.

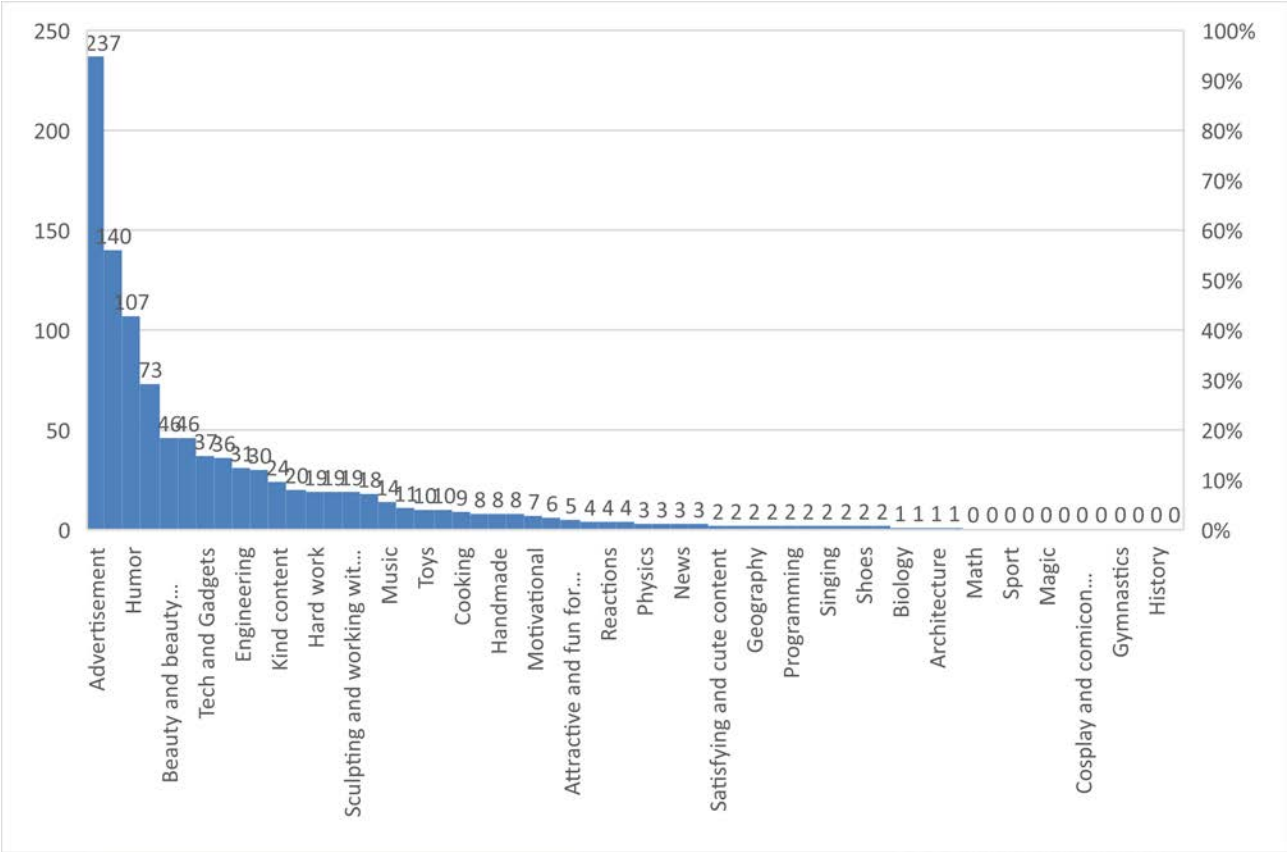

Fig. 3 Main Instagram account categories analysis in minutes

After data analysis about the primary account (4-year account), the following conclusions can be made:

1. Advertisement category takes the biggest part of all data traffic (almost one-fourth).
2. The number of advertisements is even higher than the sum of the "Programming", "Soldering", "Engineering", "Cars and Transport", and "Tech and Gadgets" categories, 237 posts compared with 161.
3. It takes 21 minutes out of 3 hours 11 minutes to watch all content from the sum of categories mentioned above.
4. Instagram does not show advertisements on the new accounts as much as on the old ones, 237 compared with 5.
5. Solid emotional categories such as "Humour" are still reliable and in the second position.

It is possible to make some general conclusions for the whole experiment:

1. Recommendations on Instagram do not give very comprehensive results compared to the search systems.
2. Instagram is a massive resource for procrastination.
3. Instagram has tricks to attract users.

Further research is needed to find out when AI will recommend the same publications on the secondary account as on the primary account, with the frequency of categories' arrival calculated.

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Industrial Internet of Things and methods of implementation in enterprises

A device that can be connected to the internet and controlled or monitored from a remote location is called an IoT device. Due to smaller and more powerful chips, almost all products can be IoT devices. Control over devices allows for more precise control of devices, which will result in a better-quality output [1].

Industrial Internet of Things (IIOT) is a network of intelligent devices with their own computing capabilities that are connected to systems that collect, track, share and analyse data at the industrial level. IIOT is concentrated on industrial applications such as manufacturing, power plants, agriculture, oil and gas [2].

The Industrial Internet of Things is part of a subset of the Internet of Things. Smart devices a most important role in IIOT, which help to better communicate important information, as well as analyze and collect data in real time. In fact, by using IIOT, business decisions can be made faster and more accurately, and it helps companies grow by better understanding their business processes so that their processes become more efficient.

The difference between businesses with and without IIOT is huge. The first of foremost advantage is that devices constantly transmit information about themselves and the environment, which allows for a qualitative assessment of the current state of the enterprise and customization for a specific process. An enterprise without the Internet of Things is much more difficult to adjust to the technological process, as it takes a lot of time and effort to manually calculate all the subtleties, but even so, the enterprise will not be able to quickly correct the fine settings of devices that change during operation.

Also, an enterprise with IIOT can find an error in production much faster, which will allow it to be quickly corrected and continue to produce products at a normal pace [3].

Let's look at examples of existing implementations of IoT in the enterprise and the results obtained.

Due to wireless devices that support the IP protocol, it is possible to create production facilities that are more flexible and more cost-effective than those that do not use this technology.

Here is an example of the implementation of Philips technology. The equipment of the razor manufacturing plant operates in an unlit room with 128 robots. The entire staff consists of nine employees.

Harley Davidson's project can be considered the best example of IoT implementation. Before connecting IoT, they had a problem with a slow response to

customer requests. In 3 years, the company carried out a large-scale reconstruction of its production sites. As a result, a single site was created that produces 5 types of motorcycles with the possibility of customization, while the customer is offered a choice of more than 1300 options.

To monitor the production process, they developed a system using controlled sensors, each actuator, each part has a radio tag that identifies the product and its production cycle. The data received from the sensors is transmitted to a centralized data processing platform that acts as an "integration bus" for collecting data from the sensors and various internal production systems. As a result of the implementation, the production cycle was reduced from 21 days to 6 hours. That's 84 times faster than it was before the integration.

Assessment of the enterprise and factories is the main mission to create a modern system based on IoT. First of all, an enterprise needs to choose which method of implementation is necessary for it. These methods are as follows [4]:

- preventive maintenance of industrial equipment;
- productivity growth due to real-time demand;
- energy saving;
- security systems;
- expert system for the production shop.

To make a qualitative assessment, the following factors should be taken into account: weaknesses and threats, strengths and opportunities.

Security can be considered a threat because the system is connected to the Internet and is vulnerable to attacks by hackers and intruders. Therefore, organizations must ensure that their systems are secure and all data is protected.

Weakness is the accuracy of the sensors, the wrong choice of the sensor can lead to errors in the technological process, which will lead to the creation of a lower-quality product. Strength is the real-time analysis of the information received, which allows for quick production reconfiguration. Another opportunity is rapid expansion. There is no need to completely reconfigure the system to add new sensors.

In connection with the above, a set of recommendations are developed:

1. Analyse existing solutions of systems with IoT technologies;
2. Conduct a full analysis of the existing system and evaluate possible improvements to the system using IoT;
3. Create a theoretical model of the system with IoT technology;
4. Select equipment for the enterprise;
5. Analyse the process of implementing IoT into an existing system and calculate the cost of implementation;
6. Develop an action plan for further implementation of sensors and devices;
7. Evaluate further improvements in the system.

Expanding an existing system requires less cost, as the essential elements are already installed, so you only need to determine what is needed for the enterprise and connect and configure them.

To summarize, IoT technology offers businesses many benefits, including increased efficiency. IIoT can be used in a variety of applications, from asset tracking and monitoring to automated buildings. However, there are also challenges associated with implementing and managing the system, such as the need for a reliable network infrastructure and potential security risks. Enterprises must therefore ensure that their systems are secure and that all data is protected.

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FOSS as an important part of IT world and analogue for proprietary or unlicensed software

Within the thesis the positions of FOSS in development were explored: How people feel about the FOSS, do they use it or prefer proprietary software? How often FOSS is used in IT development? Why developers choose open source tools?

Keywords: FOSS, open source, proprietary software, unlicensed software

FOSS (Free and Open Source Software) is software, that's being distributed under free license, what allows people to use software for free and also change source of it as they like and then distribute it. Term “Open source” was proposed by Christine Peterson, Eric Raymond and Bruce Perens as analogue for “Free software”, which gave commercial companies wrong idea about free software (“free” as freedom here, not priceless). And the idea of “Free software” itself belongs to Richard Matthew Stallman, the founder of GNU project. The FOSS refers to both of “Open source”, which gives access to source code, and “Free software”, which gives freedom to change and distribute.

The purposes of research is investigating:

1) FOSS popularity among the common users and future developers using simple survey with closed questions (yes/no or suggested options);

2) FOSS usage in IT projects/products development via analyzing the latest StackOverflow’s survey for developers;

3) FOSS advantages over proprietary software using benchmarking.

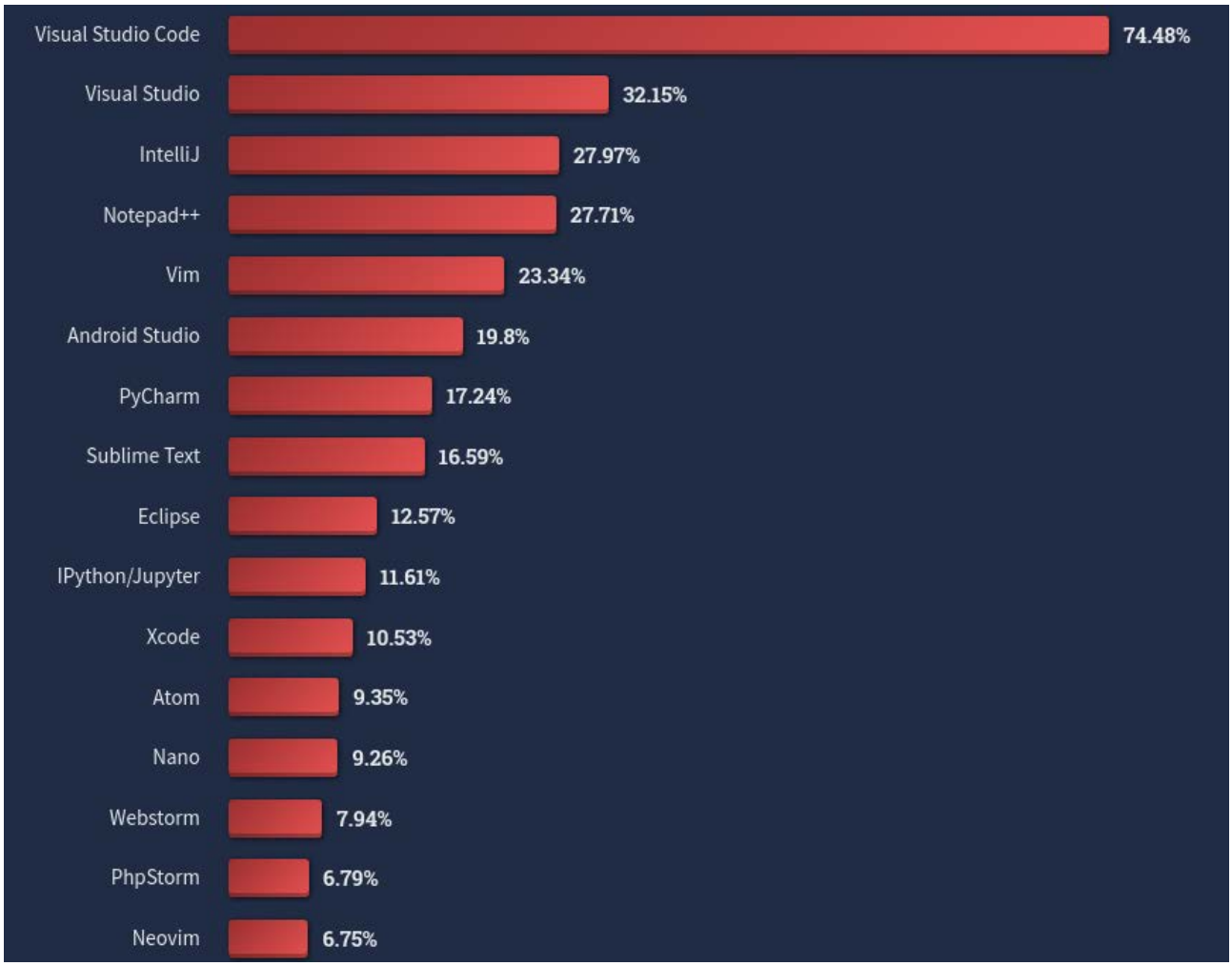
Google Forms were used for survey, the respondents are students of the faculty of information technology from different universities over Ukraine (118 respondents in total).

The survey results. There is just 15.3% of respondents who know what FOSS is, 84.7% - do not. The 74.6% do not have an idea about any of FOSS representatives: GIMP, Krita, Godot, Blender, Eclipse, Oracle VB - 16.1% have an experience, and 9.3% stated that they are familiar with this software. The 84.7% respondents are ready to distribute software using proprietary license, 15.3% - using free license. The 83.9% do not have an idea about GNU as desktop and 86.4% also have no idea about BSD as a desktop, so most of respondents do not have interest in

open operating systems. The 57.6% do not know if they have licensed Microsoft Windows installed on their PC! The 55.9% do not know if all software installed on their PC licensed, and 10.2% care about license purity.

Analyzing the results, approximately 3/5 of respondents do not care about license purity and do not mind using unlicensed software. Over 4/5 would like to earn money on proprietary software, which means that FOSS potentially can disappear in future in respect of the fact that 3/5 potentially prefers unlicensed software instead of open source software.

The lack of open source software knowledge among students of FIT will definitely affect the future development where FOSS is widely and successfully used. The most clearest example FOSS usage is code editors considering the fact that development environment is developer's main tool.



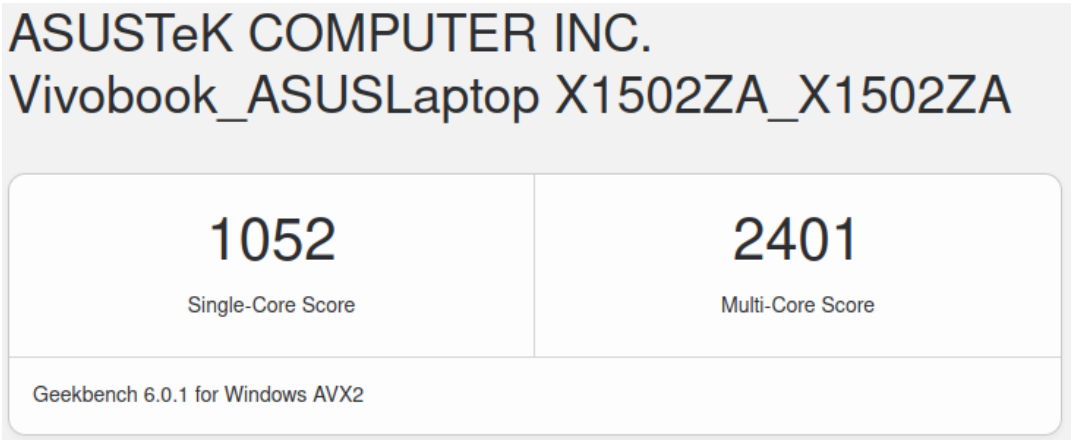
IDE segment of StackOverflow's survey for developers. 2022

The VS Code is top 1 on this list and there is several reasons why. First of all, VS Code operates well with huge amount of programming languages and supports a lot of extensions (approximately 46,000). VS code distributes under MIT license partly what provides the ability to create custom extensions for comfortable and efficient developing. There is also representatives of Jetbrains IDE's, Xcode which

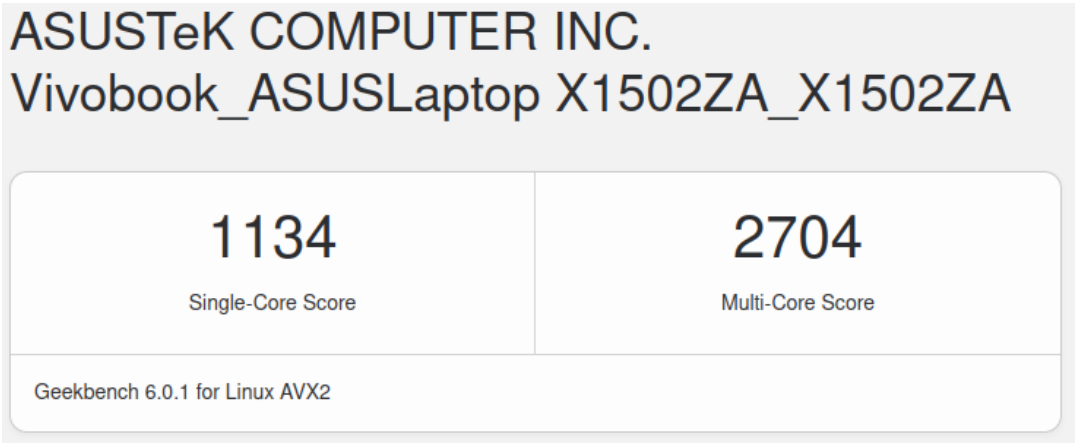
takes less leading positions in cause of narrow focus of usage and weaker ability to customize developing process due to proprietary license.

So developers choose open source software over proprietary often to extend potential, optimize the performance.

Benchmarks' comparison of stock proprietary Microsoft Windows 10 Professional and stock open source Fedora GNU/Linux 37 on the same machine showed below to demonstrate performance difference between closed and open software. The benchmarking tool GeekBench 6 was used. Microsoft Windows has 7.3% loose to Fedora GNU/Linux 37 on "Single-Core" and 11.2% "Multi-Core". The reason for phenomena is the fact that open systems take patches from other developers (provided the changes was approved) as well as from maintainer.



Microsoft Windows 10 Professional



Fedora GNU/Linux 37

Results of investigation clearly show that, FOSS is underestimated by common PC users, and the reason of that is unlicensed software existence that allows users to have desired tools for free. But open source software is widely used by developers for it's flexibility and performance now. But unfortunately open source software is endangered because of most of future developers do not take FOSS seriously and prefer proprietary, probably unlicensed software meaning that there is a chance that the range of technologies to pay for will increase in the future what will slow down

IT evolution and make people refuse to exploit most of the software or the computer itself. More attention should be paid to spreading FOSS, informing the relevant target audience (schoolchildren, students) about possibilities of using this particular software, introducing special topics in the academic disciplines where people would learn about alternative systems and software.

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The ethical aspect of artificial intelligence

Today, it is hard to imagine the modern world without artificial intelligence (AI): search engines, image and speech recognition systems, machine translation, smart chatbots, smart assistants, even in a regular smartphone. According to the IBM Global AI Adoption Index 2022 [1], 35% of companies use artificial intelligence in business, and another 42% are exploring the possibilities of its application. According to the American consulting company Gartner [2], in 2018 the global value of business related to artificial intelligence was estimated at $1.2 trillion. In 2022, this figure increased to $3.9 trillion. It is expected that by 2030, the contribution of artificial intelligence to the world economy will reach $15.7 trillion.

Artificial intelligence is a super-broad concept. Basically, it is any system that imitates the human ability to judge, learn, and self-correct. Now it is not even artificial intelligence that is changing the world, but highly specialized intelligent systems that specialize in a single function. Some of these systems have already significantly surpassed human specialists in their fields. Intelligent systems recognize many types of images faster and better than humans, make some diagnoses more accurately than doctors, and are about to start driving cars more safely than drivers

Deep learning technologies, the implementation of which became possible thanks to modern computer hardware, became the impetus for the wild success of AI. Artificial intelligence is the name of the entire field, machine learning is one of the branches of artificial intelligence. Neural networks are one of the types of machine learning. Deep learning is the architecture of neural networks, one of the approaches to their construction and training.

Neural networks of deep learning solve various tasks in the most diverse areas of human activity. This is how scientists recreated parts of Rembrandt's "Night Watch" painting, which were cut off in 1715 [3].

Neural networks are used both for the restoration of canvases and in matters of determining authorship. In 2021, using a convolutional neural network, intellectual property lawyer Stephen Frank and his wife, art historian Andrea Frank determined that a 16th-century portrait of Jesus (the Savior of the World) was most likely created by da Vinci. At the same time, according to the predictions of the neural network, da Vinci is the author of only the head and shoulders of Jesus, and the right hand in the portrait was painted by his assistants [4].

In addition to the da Vinci painting, the Franks used their neural network to analyze another painting with disputed authorship, "The Old Man in the Golden Helmet," which since 1985 is believed to have been painted by one of Rembrandt's students. The neural network determined that its author was Rembrandt.

The DALL-E 2 neural network from the OpenAI company (developer of ChatGPT), introduced in April 2022, is gaining immense popularity, and it literally knows how to "draw" everything the user asks it to. She got her name from the merging of the names of Salvador Dali and the touching robot WALL-I from the Pixar cartoon of the same name. The neural network "finished" classic paintings, turning Mona Lisa into a full-length portrait and adding the surrounding landscape to Vasyl Vereshchagin's canvas "Apotheosis of War", and the Cosmopolitan magazine team, led by digital artist Karen X. Cheng, generated the image for the cover of the issue with her help [5].

In the first week of the full-scale war, the Sirens Gallery [6] project, created on the basis of the open-source Disco Diffusion model from OpenAI, appeared in Ukraine. About 2,000 pictures were generated based on textual descriptions of the most important events of the war. 1991 ~~the~~ paintings were ~~was~~ put up for sale as an NFT. The project collected more than 250,000 USD for the reconstruction of the country.

Journalists and critics are increasingly talking about a revolution in art, as a result of which a machine can replace a person in creativity.

But some uses of neural networks cause a lot of controversy regarding the ethics and feasibility of their use. So the developers of the DALL-E network added the "Outpointing" function to their artificial intelligence model. Now the system can generate new visual effects that expand the boundaries of any image and allow you to rework world masterpieces [7]. In September 2022, the artist with the nickname Images AI using the Stable Diffusion neural network modernized world masterpieces of painting [8], including Leonardo da Vinci's "Mona Lisa" and Johannes Vermeer's "Girl with a Pearl Earring" and others, believing that they were "made carelessly ".

In December 2022, a user with the nickname Lauryn Ipsum published processed photos through the Lensa application, on which the signatures of artists were noted [9]. Lensa is a photo editing app that reportedly earns a million dollars a day from internal purchases [10]. Lensa works on the basis of a modified model with deep learning - Stable Diffusion. During Stable Diffusion training, hundreds of thousands of images from all over the Internet were used and later combined by an algorithm into new images.

In November 2022, the DeviantArt social network announced the completion of its own DreamUp artificial intelligence and its availability to platform users[11]. Immediately with artificial intelligence, policy changes were added to the site. The platform will leave a reference to the artist in the works created with the help of artificial intelligence if he has given permission to use his own works in the training of artificial intelligence. All works created with the help of artificial intelligence and published on the platform will have the hashtag #AIArt. Some of the users were not satisfied with the addition of artificial intelligence. Discontent became even greater after one of the artists saw in the HTML files permission to use their own works for training artificial intelligence by default [12]. DeviantArt immediately changed its policy after that, but trust in the site fell.

In January 2023, Kelly McKernan joined a lawsuit with two other artists, Sarah Andersen and Karla Ortiz, against Midjourney and two other AI generators, Stable Diffusion and DreamUp[13]. All three artificial ones use LAION-5B, a non-profit, open-to-the-community database that contains about five billion images from all over the Internet, including the works of many artists. The cause of the legal action was Kelly McKernan's listing on the Metaverse Post as the basis for Lord of the Rings-style AI imagery. Kelly McKernan's name has been mentioned over 12,000 times in the Midjourney AI Discord chat.

According to a CNN study [14] 300 million full-time jobs worldwide could be automated in some way thanks to the latest wave of artificial intelligence that has spawned platforms like ChatGPT, which could lead to job cuts and higher unemployment. The question of the ethics of using and developing artificial intelligence remains open.

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Tendencies in cloud computing development

In recent years, researchers have become increasingly interested in cloud computing. A great deal of emphasis has been placed on using cloud computing in business.

Cloud computing has characteristics that make it flexible, scalable, and cost-effective. It has a number of features, including Resource Pooling, Rapid Elasticity, On-Demand Self-Service, Simplified IT Management and Maintenance etc [5, 6]. The computational resources of the providers are used by multiple tenants. If needed, they can either expand or reduce resources to adapt their applications to workloads. Computational resources can be requested without human interaction with the service provider. Besides, customers do not have to spend time and money on maintenance and repair of hardware. These tasks are handled by the cloud service provider.

The present study analyzes the up-to-date tendencies in cloud computing development.

Cloud computing market is growing. According to Precedence Research, the worldwide cloud computing market is estimated to be worth USD 446.51 billion in 2022. It is projected to grow at a rate of 17.43% between the years 2022 and 2030 [1] (Fig. 1). Furthermore, tech companies heavily invest in cloud computing technology innovations. Cloud was ranked as a top investment area for organizations investing in Data and Analytics [3].

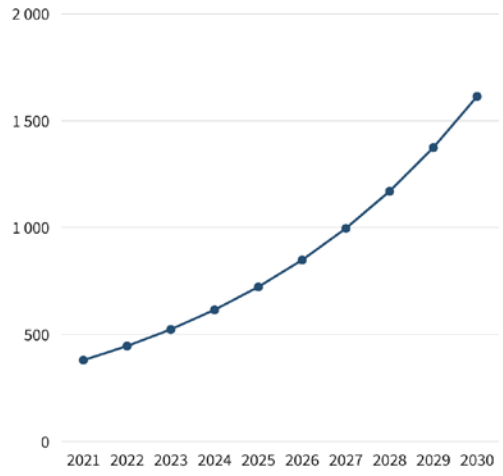

Fig.1 Cloud computing market size (2021-2030, USD billion)

Corporate data in organizations worldwide are increasingly stored in clouds. Since 2015 onwards, the percentage of corporate data stored in the cloud has gradually climbed from its initial 30% level and reached 60 percent (Fig. 2).

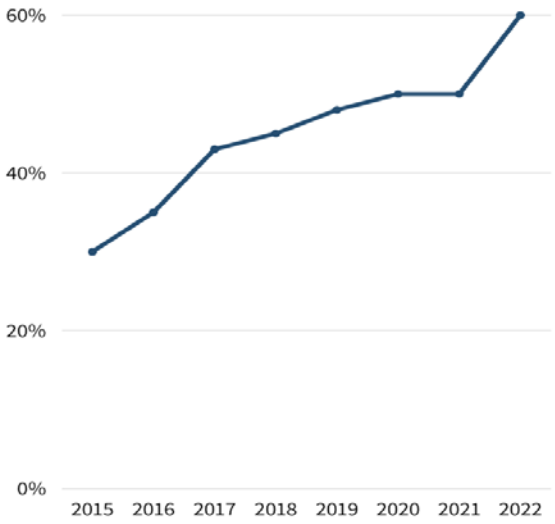

Fig. 2 Cloud storage of corporate data in organizations worldwide (adapted from Statista [4])

Cloud security concerns are various. Cyber threats such as malware, data breach, and DoS-attacks are just a few of the challenges organizations are facing when using cloud computing.

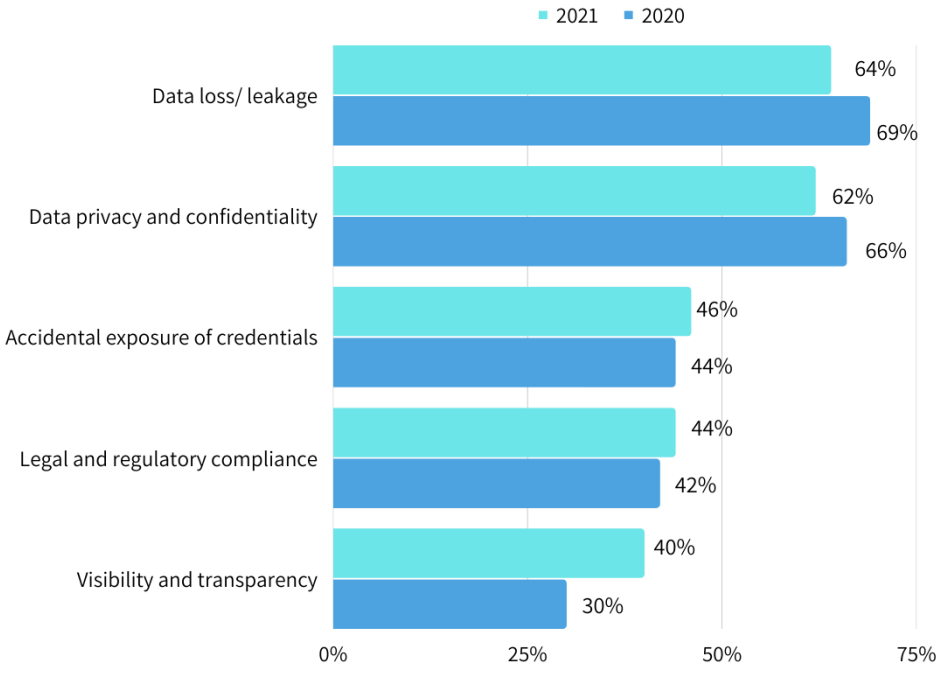

Fig. 3 Cloud security concerns

Data loss or leakage was the biggest security concern in 2020-2021 [2]. In fact, 64% of organizations considered this as their greatest cloud security concern in 2021. Issues with data privacy, confidentiality and accidental exposure of credentials took the second and the third places, respectively. Besides, over 40% of organizations

were worried about potential challenges with legal and regulatory compliance. The figures for visibility and transparency concerns rose considerably and reached 40% in 2021 (Fig. 3).

According to Synergy Research Group, Amazon Web Services, Azure and Google Cloud Platform accounted for 66 percent share of the cloud infrastructure market in the third quarter 2022 [7]. Amazon Web Services is the leading vendor. It has almost a third of the worldwide market share. Meanwhile, Microsoft Azure is the second-largest cloud provider. Its market share is more than twenty percent. Google Cloud Platform has more than ten percent of the market share. IBM Cloud, Alibaba Cloud, and Salesforce have much smaller market share as is shown in Figure 4.

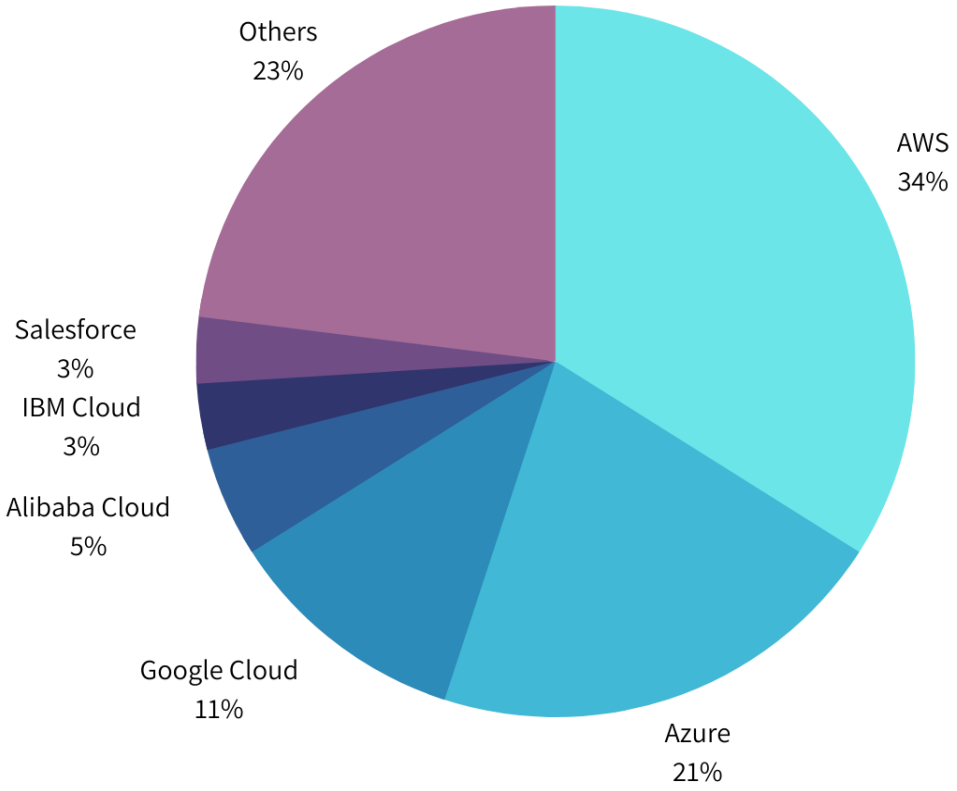

Fig. 4 Cloud market share

As can be seen from above, cloud computing offers businesses flexibility and scalability. It reduces expenditures on hardware. The analysis has found that cloud computing has increasingly grown in popularity over the past few years. The widespread usage of cloud storage solutions is a bright example of new tendencies in cloud computing development.

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System analysis as a direction in the study of control processes

System analysis is a scientific and methodological discipline that studies the principles, methods and means of studying complex objects by representing them as systems and analyzing these systems [7]. Thus, in system analysis any object is considered with regard to its systemic nature, that is, not as a whole, but as a complex of interrelated constituent elements, their properties and processes.

The most widespread use of system analysis is in management theory and practice - in developing, making and justifying decisions related to the design, creation and management of complex, multi-level and multi-component artificial systems. The importance and perspective of applying system analysis in the field of management are analyzed in the works of the researchers in the field of system analysis von L. Bertalanffy, Y. Chernyak, and J. Sterman. They define the main goal of system analysis in an organization as the development and implementation of such a management system, which is chosen as a standard that meets all the requirements of optimality [1-3]. Clearly formulated goals for the development of an enterprise are the basis of a system analysis and research development program.

The elements of science and practice are closely intertwined in systems analysis. Therefore, judgements based on personal experience and intuition are allowed. An important feature of system analysis is the unity of formalized and non-formalized research tools and methods used in it.

System analysis is particularly useful in the design of control systems for complex, large-scale systems such as power plants, transportation networks, and manufacturing plants. These systems often involve multiple subsystems that interact with each other, making their analysis and design a challenging task. System analysis techniques can be used to develop models of these complex systems and to evaluate different control strategies to optimize their performance [5].

System analysis is a subset of the study of control processes. It involves the use of such techniques as modeling, simulation, and optimization to analyze and understand complex control systems. By doing so, researchers can identify ways to improve the performance of these systems, that can have wide-ranging benefits in fields such as engineering, economics, and environmental science.

The system analysis identifies the following characteristics:

- the role and place in the industry;
- the state of production and economic activities;
- production structure;
- management system and organizational structure;
- interaction with suppliers, customers and parent organizations;
- innovations needs;

- forms and methods of stimulating employees.

The most optimal approach in studying the control system is the system approach that helps to comprehensively assess any production activity at the level of specific characteristics. This will help to analyze any situation within a particular system and identify the nature of the input, processing and output problems.

A system approach based on market research first examines the "output" parameters, i.e. goods or services, namely what to produce, what quality indicators, in terms of any costs to be determined, in what time frame to sell and at what price. The answers to these questions should be clear and timely. The "output" at the end has to be defined by a competitive product or service. In turn, "input" parameters are defined as information, raw materials, technology, capital, and human resources. We also need to define the "process" parameters: transformation, operations, management, and employees work. (Fig. 1).

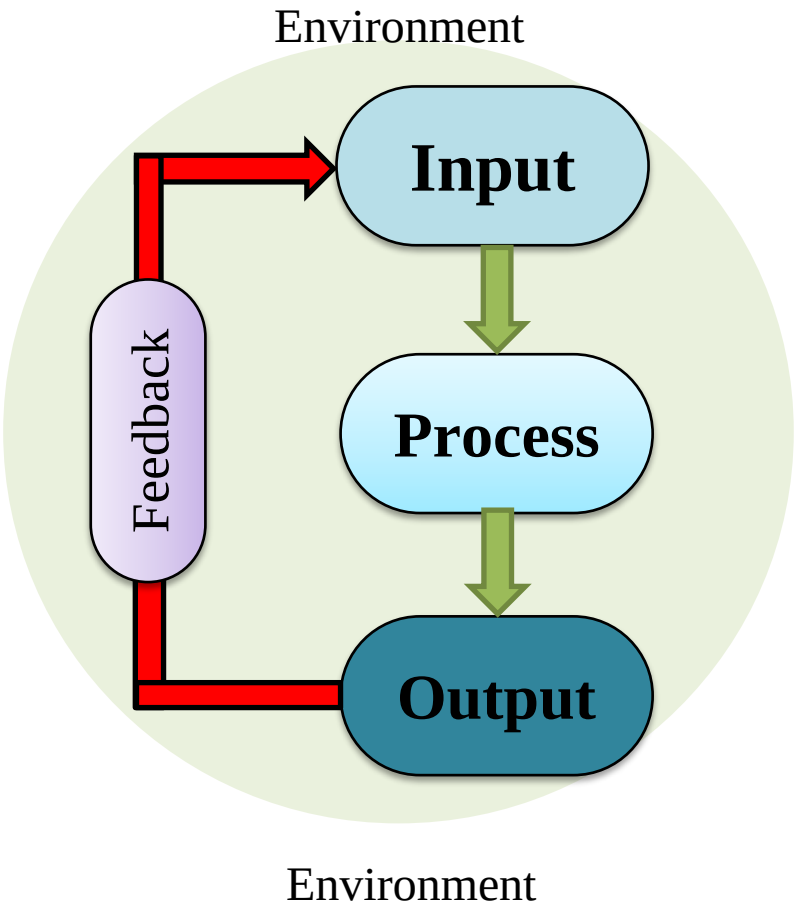

Figure 1 - Model of System Theory for Organization Management (adapted from [6])

This approach is considered in the analysis of both the internal and external environment of the organization. This means that we must consider not only internal but also external factors - economic, geopolitical, social, demographic, environmental and other factors that are important aspects when analyzing organizations [8].

Thus, it can be concluded that the need to turn to a system approach in enterprise management is caused by complication of the internal structure of management objects, expansion and branching of relations, rapid and continuous growth of the volume of information, environmental instability, and increased competition.

Holism, interdependence, hierarchy, and multiple perspectives are the main principles of the system approach. This approach has five main objects of analysis, such as management structure, management methods, management style, development strategy of the organization, and technological features of the production process. Therefore, this approach recognizes that the behavior and performance of a system depend on the interactions among its components rather than on the individual properties of each component.

To sum up, system analysis is a critical direction in the study of control processes, and it has broad applications in many fields, including engineering, economics, and environmental science. The insights and techniques developed through system analysis research can help improve the efficiency, reliability, and safety of control systems in a wide range of applications.

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Artificial intelligence: an addition for programmers or their complete replacement

Artificial intelligence (AI) has become an increasingly important addition for programmers in today's technological landscape. As AI technology advances, it provides programmers with new and innovative ways to develop software and applications.

One of the main benefits of integrating AI into programming is that it allows for the automation of tasks that were previously time-consuming and required human intervention. AI-powered tools can now analyze data, recognize patterns, and make decisions with high levels of accuracy and speed.

Moreover, AI can be used to enhance existing software applications, making them more efficient and effective. For example, chatbots powered by AI can provide customer support, while image recognition technology can automate the process of categorizing and organizing visual data.

In addition, AI is also being used to create entirely new software applications that were not possible before. For instance, machine learning algorithms are now used to develop self-driving cars, and natural language processing technology is being used to develop virtual assistants.

As AI technology continues to evolve, it is becoming an increasingly important tool for programmers to be in their arsenal. By integrating AI into their programming workflows, developers can create more powerful and sophisticated software applications that can automate tasks, enhance existing functionality, and even create entirely new products and services.

While AI is an incredibly powerful addition for programmers, it is important to note that it will never replace the need for human programmers. Despite its advanced capabilities, AI still requires human oversight and direction in order to function properly.

Programmers are responsible for designing, developing, and implementing AI algorithms and systems, and ensuring they are operating as intended. Additionally, human programmers are needed to constantly monitor and update AI systems, as well as to address any issues that may arise.

Furthermore, programming requires a wide range of skills that are beyond the capabilities of AI, such as creativity, critical thinking, and problem-solving. While AI can automate certain tasks, it cannot replace the creativity and ingenuity that human programmers bring to their work.

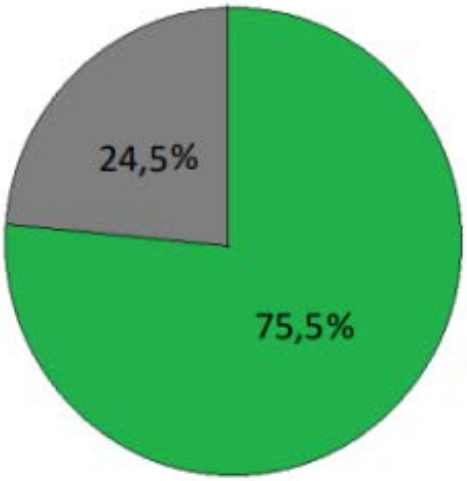

Fig.1 The percentage of questions ChatGPT answered

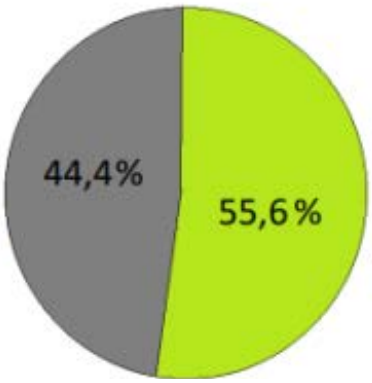

Fig. 2 Percentage of correct answers

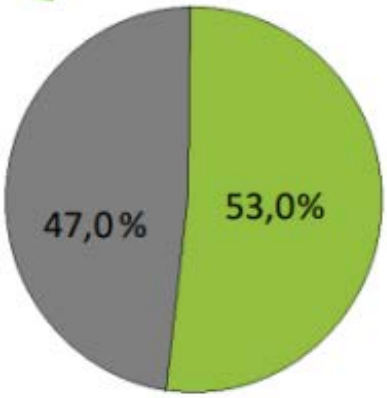

Fig. 3 Percentage of correct explanations to answers

- The percentage of questions answered by the AI.
- The percentage of questions that the AI answered correctly
- The percentage of questions for which the AI gave the correct explanation
- No answers provided or they are incorrect

It can be stated from the charts above that a system that gives correct answers to questions in no more than two-thirds of cases cannot become a full-fledged replacement for most professions, in particular, software developers.

To sum up, AI is a valuable addition for programmers that can enhance their work and create new possibilities for software development. However, it is

important to recognize that AI is not a replacement for human programmers, but rather a complementary tool that can be used to improve their productivity and effectiveness.

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Security of data collection in social networks

Nowadays, mobile devices and social networks have become an integral part of our daily activities. We share photos of our trips and purchases on Instagram, express our political views on Twitter, and watch hundreds of videos on TikTok every day. And without knowing it, we leave a huge information trail on the Internet, by which one can learn almost everything about us. That is why there is a privacy policy for this. The aim of this paper is to clarify the role of a site privacy policy, especially in social networks.

A privacy policy is a legal document that explains how a website, application, or organization collects, uses, and protects personal information from its other users or customers. It typically includes details such as the types of personal data collected, how they are collected, the purposes for which they are used, how they are stored and protected, who has access to them, and how users can exercise their rights over their personal data. A privacy policy is important for building trust with users, complying with data protection laws, and ensuring transparency in data processing practices.

There is a set of questions which bothers any user of a social network. The most typical are as following: What kind of data do companies collect about us? What exactly do they know about our lives? Different applications can collect different types of data about their user, depending on their purposes and functionality. However, some of the most commonly collected categories of data include:

1. Identification data: name, email address, phone number, and other data that allows the application to identify the user.
2. Geolocation data: data about the user's location, which can be used to provide location-based services such as searching for stores or restaurants.
3. User activity data: this can include information about how the user uses the application, such as which features are most frequently used, which products or services are viewed or purchased.
4. Device data: this can include information about the user's device, such as model, operating system version, IP address, browser type, and other technical data that can help optimize the performance of the application.
5. Social data: many applications can collect data from social networks such as Facebook or LinkedIn to allow users to use their profiles to log in to the application, share content, or connect with friends.

It is important to understand that collecting user data may only be permissible if the principles of confidentiality are adhered to and the user agrees to the collection and processing of their personal data in accordance with the application's privacy policy.

However, with the widespread use of social media, there is a risk that personal data will be collected and potentially misused. Naturally, the following question arises: How to protect your data? A few ways to increase the security of social media data collection are given below.

- Be careful with the information you share. Limit the amount of personal information you share on social media, including your full name, date of birth, home address, and phone number. The more information you provide, the easier it is for someone to potentially use that information for malicious purposes.
- Check the privacy settings of your social media accounts. Make sure you're comfortable with the visibility level of your posts and consider changing your settings to limit who can see your profile or posts.
- Use strong and unique passwords for your social media accounts and turn on two-factor authentication to add an extra layer of security.
- Be aware of the types of data social networks collect about you and read the privacy policies of the platforms you use. Some social networks may collect information about your location, device information, and platform activities, which may be used for targeted advertising or other purposes.
- Regularly check and manage the apps that have access to your social media accounts. Some apps may collect data from your profile or activities on the platform, so it's important to regularly check and block access for apps you no longer use or trust.

By following these steps, you will help protect your personal information and minimize the risk of data being misused or shared on social media.

Unfortunately, most users do not even think about their security. They are calm, because their data is stored by such giant corporations as META, ByteDance (TikTok), Twitter. a huge responsibility weighs on them and they will not violate the privacy policy. Is it so?

On June 17, BuzzFeed published a report based on 80 leaked internal TikTok meetings which seemed to confirm access to US TikTok data by Chinese actors. The report refers to multiple examples of data access by TikTok's parent company ByteDance, which is based in China.

The methods of data collection on TikTok include collecting lists of user contacts, accessing calendars, scanning hard drives including external ones, and tracking device geolocation every hour. Robert Potter, co-CEO of Internet 2.0 and one of the editors of the report points out that when the app is in use, it has significantly more permissions than it really needs, it grants the mentioned permissions by default. When a user doesn't give it permission TikTok persistently asks. The report labelled the app's data collection practices "overly intrusive" and questioned their purpose. It is well-known that if you tell Facebook that you don't want to share something, it will never ask you again, but TikTok is much more aggressive that is proved by Rafqa Touma's analysis of TikTok aggressive data harvesting shared in *The Guardian* in 2022."

ByteDance has denied a connection to the Chinese government in the past and called the claim “misinformation” after various leaks suggested it censors material that does not align with Chinese foreign policy aims or mentions the country’s human rights record. But he said Internet 2.0’s research found “Chinese authorities can actually access device data.” By sending tracked bots to the app, Internet 2.0 “consistently saw data geolocating back to China.”

If you choose to keep using TikTok, it is recommended to be careful about the level of permissions you give to the app by setting them manually through in-app and device settings. It is also important to regularly monitor these permissions as they can be changed with app updates. Users should ignore requests for sharing information and avoid using TikTok for sensitive conversations.

In conclusion, we can say that global companies collect a lot of information about us, ranging from our preferences and worldviews, ending with our location and even information about what we ate for dinner yesterday. Thanks to the privacy policy, we can be calm, but we never know for sure what data collection can be used for, so it is very important to maintain information hygiene and secure as much personal data as possible.

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Information technologies and their influence on life

This paper analyses the trends of implementing information technologies in human life and their influence on it.

Information Technology nowadays is the use of any computer system to operate the data or any kind of information [1]. So, it can be used everywhere, for example, in medicine, banking, the service sector etc.

One of the most significant impacts of information technologies is in the area of communication. The Internet has revolutionized communication giving us access to a wealth of statistics and resources.

The Internet has made it easier for individuals and organizations to share information, collaborate, and communicate with one another regardless of geographical barriers. The availability of email, instant messaging, and video conferencing has made communication more efficient and convenient than ever before. This has led to a global place where people can exchange ideas or share experiences.

Examples of this phenomenon are social media platforms such as Facebook, Twitter, Instagram and Telegram. These platforms allow interaction in real time on a global scale. People can now easily connect with others across the globe and share information.

Mobile devices like smartphones have also revolutionized the way to communicate. This influence has advantages and disadvantages. The main advantage is the possibility to connect with people despite their location. It helps to stay in touch with close people. On the other hand, the main disadvantages are addiction to virtual messaging and reduction of communication in real life.

Media platforms are filled with different information, and the human mind constantly needs a new variety of information. So, it is simple to find information, but not always it is useful. It especially affects teenagers. According to Newport Academy research [2], frequent use of such kinds of resources can be harmful to teenagers' mental and physical health. Inadequate sleep, exposure to cyber bullying and lack of physical activity are primary factors of the social media effect. Also, teenagers are stressed out about how they look.

It seems these problems affect not only teenagers and older people too. Information flows are filled with stressful information today, so even stress resistance people can be hurt. Also, all online messaging requires increased attention to user privacy.

Another area where information technologies have had a huge influence is education. The availability of online courses, e-books and other digital resources has made it easier for people to access education. Information technologies provide remote access to educational materials. These technologies have also made education more efficient by making it easier for teachers to manage their classes.

For example, learning management systems such as Canvas provide teachers with a centralized platform for posting course materials, grading assignments, and communicating with students. With the advent of online learning platforms, e-books, educational apps, and virtual classrooms, education has become more accessible and personalized, allowing students to learn at their own pace and in their preferred learning style. These systems not only save teachers time and energy but also allow them to provide timely feedback to their students, which can improve learning outcomes.

Moreover, information technologies have made education more engaging by incorporating multimedia and interactive elements into the learning experience. For instance, virtual and augmented reality technologies allow students to visualize and interact with complex concepts in ways that were not possible before. This type of immersive learning experience can help students to better understand and retain information, as well as make learning more enjoyable and memorable.

Today, online education, caused by Covid-19, became one of the main trends in the world. For this purpose, many online platforms and education programmes became free. In terms of remote access to educational material, informational technologies influenced positively. However, it can't continue always. It needs to combine distance learning and face-to-face learning for the best result in education.

Finally, information technologies have had a significant impact on entertainment. With the rise of streaming services, video-sharing platforms, and social media, entertainment has become more accessible and personalized, allowing users to consume content anytime, anywhere, and on any device. Nowadays, there are many streaming services such as Netflix, Amazon Prime, Twitch, YouTube etc. Listed services make it possible for people to get access to movies, music and other forms of entertainment. Digital advertising and targeted marketing have made it easier for entertainment companies to reach specific audiences and promote their content.

Meanwhile, data analytics and machine learning have made it possible for streaming services and other entertainment providers to personalize recommendations for users based on their viewing habits and preferences.

In addition, information technologies have enabled new forms of entertainment, such as video games and virtual reality experiences. Video games have also become increasingly popular among online gaming communities connecting players from various parts of the world. These technologies have also facilitated the creation and distribution of many types of digital content, such as music, podcasts etc. that provided new opportunities for artists, content creators and consumers.

An example of another possibility is access to a wide range of audiences. Information technologies have transformed the way we experience entertainment. Virtual reality and augmented reality technologies are allowing users to immerse themselves in new worlds and experiences, blurring the lines between reality and fiction.

Meanwhile, interactive entertainment such as video games and online quizzes allows users to engage with entertainment in new and exciting ways. Overall, information technologies are transforming the way people consume and experience content. On the other hand, these changes also are associated with the use of these technologies.

In conclusion, information technologies have had a profound impact on life, transforming all of the spheres of human life.

Also, these technologies change the way people interact with each other, access information and carry out daily activities. The benefits of information technologies are numerous, but it doesn't forget about the negative aspects of actively implementing these technologies. There are problems such as privacy concerns, cyber security threats and the digital divide between people. Also, because information technologies contain an enormous amount of information, it often is hard for the human mind to analyse it. It causes a high number of stressful situations. It is, therefore, essential to find a balance between the benefits and challenges of information technologies to ensure that they continue to enhance human existence.

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Artificial Intelligence in the field of Information Security

Artificial intelligence (AI) is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision.

Currently, the number of attacks is increasing and the threat landscape is changing at lightning speed.

For example, Kaspersky products prevent more than 700 million online attacks per quarter worldwide, and Cisco blocks 20 billion network attacks per day. Undoubtedly, with such a volume of criminal activity, perpetrators actively use means of automating cyberattacks, including using artificial technologies intelligence for their improvement and transformation, as well as for bypassing known means of protection[1].

In recent years, AI has become a critical tool for enhancing the work of human information security teams. AI provides much-needed threat analysis and detection that cybersecurity professionals can use to reduce the risk of hacking and improve security as humans can no longer adequately defend a dynamic corporate attack surface. In security, AI can identify and prioritize risks, quickly detect malware on the network, lead incident response, and detect intrusions before they happen.

An AI system allows machines to perform tasks that would normally require human intelligence, such as visual perception, speech recognition, decision making, and translation from one language to another.

Applications of AI in cybersecurity include:

- Intrusion detection: AI can detect network attacks, malware infections and other cyber threats;
- Cyber Analytics: AI is also being used to analyze big data to identify patterns and anomalies in an organization's cybersecurity system;
- Secure software development: AI can help create more secure software by providing platform developers with real-time feedback on whether their code is closed or not.

Cybersecurity professionals have been using AI-based solutions for some time now. However, with the rise in cyberattacks, they see the need for better tools and technologies to keep up with the attacks.

The use of artificial intelligence in information security is due primarily to two factors:

1. The need for prompt response in the event of a cyber incident;
2. Lack of qualified specialists in cyber protection.

AI has the potential to change everything about how we live and work, including how we protect ourselves from cyber threats. It will allow us to understand

risks more accurately than ever before and make decisions quickly without sacrificing accuracy. It will allow us to detect new attacks faster than ever before. In addition, she will determine how best to defend against them without waiting for human intervention. In some other cases, such as when writing and generating content, you can also use the AI detector to check if the content is fully auto-generated or not.

AI cannot replace humans, but it must play its part in the fight against cyberattacks. Here's how AI helps defend against the next cyberattack[2]:

- Automated Threat Detection;
- Machine learning;
- Predictive analytics;
- Anomaly detection;
- Security Automation;
- Security orchestration.

There are also threats to use of AI in the field of information security[3]:

- Reliance on Big Data;
- Third-Party Data Exposure;
- Target for Hackers;
- Inadequate AI Cybersecurity Knowledge;
- No room for Creativity and Spontaneity.

Artificial intelligence technologies open up new prospects for the development of modern means of protection information As a result of the latest trends in the field of digitization, information security analysts are noted steady growth of both volume and complexity of data generated in the information space.

In addition, cybercriminals have seriously transformed their methods and techniques for conducting attacks. Most modern DDOS attacks are built on the principle of "smart" botnets, which, without centralized management, are able self-organize and solve complex calculation tasks. Social methods have also improved significantly engineering: criminals have learned to automate mailings through various channels, where the information looks very true for users. In this regard, most companies faced the fact that traditional technologies ensuring information security become ineffective or completely ineffective and unprofitable.

Currently, all over the world, structures are in a state of tipping point, due to the use of more modern equipment and software for the purpose of information countermeasures software. Foreign specialists in information security expect that information and technical and informational and psychological influence has significant potential in the conditions of rapid development of artificial technologies intelligence.

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Security of electronic wallets

Electronic wallets are the latest innovative payment method used concurrently with cash and credit cards. They are becoming increasingly popular during last decade. They have some benefits: e-wallets store payment information and make it easy and convenient to pay for purchases on the Internet and|/or in stores or malls. That is why usually a question arises among their users: How safe e-wallets are? And how their security can be improved?

First of all, it would be appropriate to start with defining what an electronic wallet is. Commonly electronic wallet is referred to as an electronic payment method that stores your payment information and allows you to make payments offline and online in stores and malls. If you recognize the names Apple Pay, Google Wallet, or Samsung Pay, it is likely that you have already been using an electronic wallet.

To use these electronic wallets at retail store, all you need is to simply hold your phone near the device at the checkout (just like we do with a card). If these are online sellers, you often have to enter data that is stored in an electronic wallet. Here the other question arises: is it safe? We can answer that yes, it is safe to use e- wallets, but they are safe only if their owner knows all the rules for use and storage banking data.

Some rules of the safe use of e-wallets are given below:

1. a gadget. i.e., a tool where the wallet is stored, must be protected with a password and/ or biometric personal data such as a fingerprint or a facial recognition;
2. the wallet itself must also be secured with a password, so that if the phone is suddenly stolen, access to electronic money could not be provided;
3. never show your passwords to anyone, do not share them in the social networks to prevent hackers access to your wallets;
4. if someone calls, claiming to be a bank employee, and asks for your wallet data or personal information, do not provide anything, and do not give any personal data. A real bank would never ask such questions by phone.

Actual payment details (credit card number, CVV code, bank account number) are never shown. This data are not visible when we make a payment using our personal electronic wallets. The data is encrypted that makes them unreadable and unrecognizable, therefore, secure. The credit card company and bank are also watching for fraudulent and unauthorized transactions and are likely to block suspicious activity.

If we look at the e-wallets from the perspective of their benefits: they are easy and convenient to use. We have never to worry if we have forgotten a credit card because we have the e-wallet in our phones. E-wallets are fairly safe as the bank cares about

the high protection of each its user. The main thing is to follow the main rules described, which are versatile. E-wallets help us pay any bills while sitting at home, transfer money, they can help with budgeting thanks to the payment history available to their owners. As the result an owner sees what expenses can be cut. Moreover, electronic money never needs to be counted, because the amount stored on the card is immediately written on the screen. All the payment information is stored in the electronic wallet, any completed operation is recorded and can always be seen. E-wallets are often free to us. All you need is to download a special application.

If we look at the disadvantages of e-wallets, the maim disadvantage is that there is always a risk of an e-wallet been hacked, though the bank provides protection. But scammers try to steal data through phishing, malware, social engineering, and use other methods. The other reason for such a risk: a bank's system failure could potentially lead to the loss of electronic funds. One more disadvantage connected with the absence of the Internet on our gadgets due to various reasons: you can forget to pay for mobile Internet, or your mobile operator may have problems with the network. You cannot influence on these in any way, but if there is no Wi-Fi or Internet, you may not be able to access your electronic wallet,

In conclusion, electronic wallets are a simple, moderately secure, affordable, and popular alternative to paying with cash, credit card and/or bank account. Thanks to their convenience, ease of use and versatility, electronic wallets are becoming the popular payment method for many consumers both in-store and online. Although this is a convenient procedure, you should always be aware and follow the best security practices.

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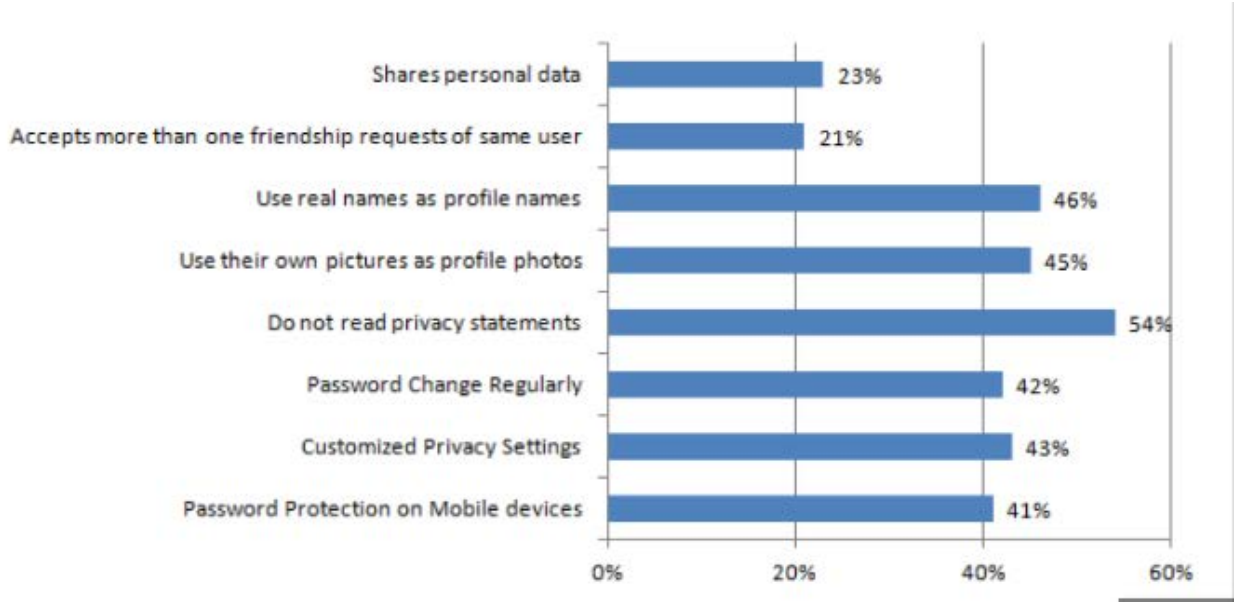
Securing Privacy in Open Networks

Today you can find a lot of personal data on the Internet, which is used for different purposes such as advertising, marketing research, profiling, and many others. There is no secret for anyone that, by comparing your IP address with other data you enter on a website, it is possible to determine your location. And if you access the Internet from your workplace, an interested person can easily identify who your employer is. No matter how big or famous a site is, it can be vulnerable to hacking.

So, we are currently facing an increasing number of privacy breaches and personal information disclosures because of cyberattacks, user tracking and data leaks. For example, in 2013, the Adobe website was hacked, and, in result, the hackers got the names, email addresses, hashed passwords, and credit card numbers of about 153 million users.

And the main reason of the insecurity is the disregard for privacy security. The diagram below illustrates the main reasons of the user carelessness or safety ignorance in open networks.



To protect the important data, it is necessary to learn well-known protection practices and follow these recommenations step by step, avoiding threats, viruses, and false information. Here is a list of some basic tips:

- Using virtual private networks (VPN) ensures privacy and security when transmitting data over open networks. On the other hand, your internet activity

passes through the servers of the VPN provider, therefore, by using VPN, you decide whether to trust this company or not;

- Setting up network firewalls as well as detecting and blocking malicious traffic can help prevent external attacks and limit access to network resources from the internal network;
- Protection against DDoS attacks is achieved by installing special traffic filtering programs that can distinguish legitimate traffic from the harmful one and block the attack. The use of CDN services also allows them to be distributed between different servers.
- Using cryptographic protocols for data encryption and two-factor user authentication provides encryption and confidentiality of data transmitted over the network, reducing the risk of unauthorized access to this data.
- Using user identification by means of passwords and biometric data requires strong and complex passwords, for example, acronyms, or creating your own transformation scheme;
- The use of secure communication such as HTTPS protocol is also recommended.
- Do not share much personal information on the networks, and if there is such an option, skip answering very private questions;
- Choose more secure search engines, such as Tor or Microsoft Edge;
- Limit the use of cookies, or clear them up; it is also effective to use special software (AdBlock Plus, Chostery) which blocks or limits these files;
- Be careful with phishing as the most common way used by attackers to obtain passwords for email accounts and social media pages;
- Keep your software up to date and avoid suspicious programms – security updates are usually much better at protecting against hackers than antivirus software. Also, consider getting rid of apps that you do not use anymore and check the privacy permissions of the ones remained;
- Do not forget about the interception of the connection when using public WiFi access.

Another important aspect of data protection relates to media. Since the direct aggression from the RF, social media has been actively collecting additional information about a user's place of living, location, personal data of the relatives, colleagues, personal preferences, and other private information. Therefore, to protect this type of data, it is required to follow the rules below:

- Periodically review the list of friends in social media. If there are unfamiliar or suspicious people (accounts) among them, you should delete them, as the status of a "friend" usually give access to more private information about a person. In the future, be careful when adding new users to your friend list;
- It is not recommended to use Russian social networks, such as «VKontakte» and «Odnoklassniki», access to which is prohibited, as the latter, on the request of the Russian special military or governmental services, may collect an

provide information about account holders (e-mails, mobile phone numbers, date of registration, IP address, etc.).

To sum up, securing privacy in open networks is essential to protect personal information from being accessed or misused by unauthorized users. The use of secure encryption protocols, such as HTTPS, VPNs, and SSH, can help to protect data transmission. It is also important to use strong passwords and avoid sharing sensitive information in public Wi-Fi networks. Additionally, users should be aware of the risks associated with open networks and take necessary pre-cautions to protect their privacy. By taking these measures, users can ensure that their personal information remains safe and secure while using open networks.

Ensuring the best privacy online is a continuous process that starts with a strong foundation and involves ongoing adjustments along the way. If you are not confident that you can do everything right or are afraid of causing damage to your device through your own interventions, it is strongly recommended to seek for help from a skilled specialist.

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Network Controller Technology

What is Network Controller? It is a software solution for the server; it provides management of network functions. For example: monitor devices in the network, their status; analyse network performance, network security; identify potential problems and threats; automate device operations, such as automatic software updates, with further integration of new capabilities into the network. It works as an intermediary between business and network infrastructure.

So why are network controllers needed to build computer networks?

The computer network is the source of existence of any modern organization. That is why the choice of architecture, infrastructure design and technologies in the implementation of the computer network increasingly influences business success. Nowadays, we clearly know that the number of connected devices to the world web exceeds the population of the Earth, and paying attention to the fact that the shortage of available IPv4 addresses becomes more and more every day, it is necessary to create the new principle of building and organization of computer networks such as programme configuration network (SDN). It is in such networks the basis is network controllers.

Having understood what network controllers are and why they should be used, let's analyse what are the advantages of using this technology compared to other and alternative technologies. Taking into account standard methods and architectures of network construction, we will consider the advantages of a network controller in comparison with them.

Lower operating costs Increasing the number of users and devices connected to the network and the time spent on the network increases the size of manual management and as a consequence the cost of service increases. While the offered technology, optimizes and automates operations that affect scalability, flexibility and speed of processing incoming requests from users.

Increased stability Network traffic collection and analysis identifies potential problems that can pose a real threat to the proper functioning of the network in the future. Analysis of possible causes and warnings of network operators allows carrying out preventive and adjustment measures in time for ensuring uninterrupted availability of the network.

Increase security If external traffic or an unauthorized device is detected, connected to a private network, the controller isolates a threat to which the attacker has connected to the port and restricts external traffic and prevents the spread of the threat by transmitting relevant data to the network operator. Also, when you expand networks or replace hardware, all the necessary settings on network devices are

automatically made, which increases the speed and security of these operations, as this prevents operator and external connection errors at the time of configuration.

Integration When a network controller is used to build a network, you can abstract, prioritize, or improve functionality using APIs on individual devices. These APIs are used to write algorithms that meet business needs, manage some client services, connect with other controllers in different networks of the organization, etc. Compared to cloud controllers, network controllers have both disadvantages and advantages. In cloud controllers, all company data can be stored on different servers in different geographic locations and parts, increasing resilience and increasing data security, although access and control are also provided to the service provider, however, all information is stored on local servers when network controllers are used this can be a prioritized for each business separately.

Based on the analysed advantages, does this technology have a future in the computer network market? The technology of a network controller, which is an integral part of programme networks, becomes more popular and used. Based on past data, HIS Technology 2015 showed a sharp 82% increase in sales of all SDN solutions (switches, controllers, SD-WAN equipment, management and control systems) whereas in 2014 and reached $1,4 billion. In 2020, according to Mordor Intelligence portal, the SDN market was evaluated at $12,6 billion, according to forecasts of the same site at an average growth rate of 30,75% in 2026, this market will reach $63,04 billion. Also, according to the 2020 survey, 40-45% of all network costs are specifically for the development of SDN solutions. That is, we can confidently say, that the main players of this market Cisco Systems Inc, HPE, Intel Corporation, AT&T Inc., and IBM Corporation are sufficiently interested in the development of software-configurable networks and consequently, network controllers.

To summarize all the above material, it becomes clear that network controllers as part of SDN are already quite popular and necessary when building new corporate ones and not only in the network. There is already a lot of software and devices that support it from the manufacturers presented above, in different price ranges, form factors, configurations and related programmes and devices that will help create, organize, and configure the network that is necessary for a particular business. The statistics given in the examples demonstrate a sharp increase in demand for this technology worldwide, which is supported by high expectations for the growth of this direction. It is clear that network controllers will be indispensable components of future computer networks.

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From Malfunction to Manipulation: The Risks of Using Artificial Intelligence

In recent years, artificial intelligence (AI) has grown and become more widespread, with companies and organizations in all industries relying on it to perform a variety of tasks. Artificial intelligence technology simulates human intelligence and decision-making, which makes it useful in areas such as speech processing, image recognition, disease diagnosis, etc. However, like any technological achievement, there are risks associated with the use of artificial intelligence. In this report, I will consider the possible consequences of the use of artificial intelligence in everyday life.

One of the main problems with the use of artificial intelligence in everyday work is the risk of machine failure or errors. Even though they are designed to perform specific tasks, AI systems still make mistakes, which can be dangerous in some cases. For example, a self-driving car that relies on artificial intelligence to make decisions, can malfunction and cause accidents. In the medical field, AI diagnostic tools can misdiagnose patients, leading to incorrect treatment or medication [1]. These mistakes can lead to serious consequences, including injury or death.

Additionally, one of the biggest impacts associated with artificial intelligence is the technology's ability to mimic humans. For example, chatbots and virtual assistants can interact with users in a way that mimics human conversation. While this is useful for customer service and other tasks, it can also be dangerous if the users do not know they are communicating with an artificial intelligence system.

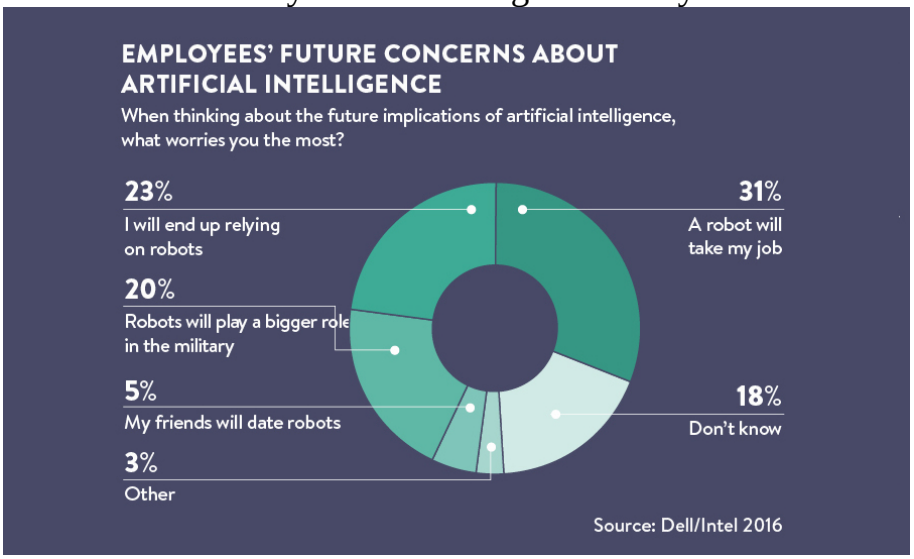
The ability of artificial intelligence to impersonate humans could have a significant impact on society, especially in areas such as politics and media. As AI systems develop, they can be used to dispel misinformation and manipulate public opinion. Deepfakes, for example, are becoming more and more convincing, which makes it difficult to discern what is true and what is false.

The use of AI chatbots is another popular trend across various industries. If chatbots are not developed and deployed securely, they could be vulnerable to cyberattacks, data breaches, and other security threats [3]. If a data breach or leak occurs, the consequences can severely damage a company's reputation and expose it to possible legal breaches, so many lawmakers have already passed regulations restricting how personal data is handled. Protecting the privacy and security of user data is critical to building trust in AI technology and ensuring safe use.

Also, using AI in different jobs can lead to unemployment and inequality. As artificial intelligence systems become more sophisticated, they may replace humans in many industries, leading to significant job losses. This can exacerbate existing

inequalities, especially for low-skilled workers who may find it difficult to find new jobs.

Although artificial intelligence has the potential to revolutionize many industries and improve our daily lives, there are also serious risks associated with its use. There are serious threats to watch out for, from the potential for machine spoofing and theft to the ability of artificial intelligence to impersonate a human. As society continues to use artificial intelligence technologies, it is important to consider the potential risks and take steps to mitigate them. This includes investing in strong cybersecurity measures, regulating the use of AI in certain industries, and ensuring that users know when they are interacting with AI systems.



It is important to establish ethical standards for the development and use of artificial intelligence, including rules to prevent misuse of the technology. Education and training programs can also help users familiarize themselves with AI systems and understand their limitations. By taking preventative AI security measures, we can reduce the risks associated with the technology and gain more.

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Prospects for the use of virtual environments to improve the quality of scientific and education processes

Technology, like time, cannot stand still; besides, there are always new inventions and technologies that are used in various areas of our life.

However, a progressive society already needs to step by step introduce and determine the prospects and methods of applying such promising technologies as virtualization and virtual technologies for scientific and educational purposes to improve the quality of scientific and work processes.

An additional progressive advantage of virtualization and virtual technologies is the convenience of displaying and perceiving information and immersion in environment simulation. Therefore, it makes no sense to be sceptical about such technologies because it is similar to how, at one time, everyone did not take computers or mobile communication seriously. In my opinion, it is already necessary to interact with the existing technologies and apply them in work and educational processes, firstly, to gradually integrate such devices into everyday life, and, secondly, it will help to identify and eliminate defects and improve the quality of these technologies which will accelerate their development in the future.

Despite the novelty of such technologies, they have already begun to prove themselves as effective means of learning. The use of virtual and augmented reality technology allows pupils and students to study subjects more deeply, analyse the consequences of world events, participate in various expeditions and much more, and, most important, do all these things entertainingly. AR and VR allow for experiences students would not normally have access to. However, one of the first institutions in which the positive impact of such technologies on students was noted is “the State University of North Carolina, while virtual reality technologies are widely used during the study of biology, ecology, evolution and other natural sciences”. Compared to previous years, the teachers noted that the use of such technologies deepens the interest and detail of studying the material in these disciplines [1].

In addition, the convenience of using such devices and technologies was also noted by large companies, namely the mobility and convenience of virtualization. It was also mentioned that in this area there are several developed vision concepts for such devices since the main ones used are two types: VR helmets and AR glasses such as Google Glass. So, companies such as GE, Boeing, DHL and Volkswagen in the US, value mobility in such devices, so they implement the use of Google Glass and similar conceptual developments. However, this type of device is less powerful

but fully meets the requirements of such companies. As a result, in those divisions where such technologies are used, employees note the convenience and quick availability of the necessary materials, such as instructions or documentation for the products being created or during their assembly or maintenance, and thereby has an impact on increasing productivity and the number of manufactured products at these areas of production [2].

That is, despite all the current or future advantages of such technologies, they have disadvantages that slow down their advancement and development, primarily the price and perfection of the technology. Indeed, the price is always one of the factors of slow consumption of new technologies, but it will decrease over time. The cost of products is still high because the only two main concepts are VR helmets, which are bulky and immobile and bulky, and AR glasses, which are less powerful but more mobile, are more compact and look almost like ordinary glasses. On the other hand, the perfection of the technology is related to the development of computing components, while currently, in some processor concepts, developers cannot reduce the already created technologies and powerful components for layout in the frame of glasses or a more mobile central unit of calculation in these devices.

Summing up, it should be noted that despite such disadvantages as the price and perfection of the technology, it has a number of undeniable advantages such as convenience, mobility, multi-functionality, and immersion in simulated environments. In addition, if large companies and countries can stimulate investment and interest in these technologies, then in this way it is possible to accelerate the integration of virtual environments in our present and to stimulate a new round of development of digital and microprocessor technologies used in modern electronics.

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Section 04 Humanities: Challenges and Issues (Legal Studies, Social Studies, Philosophy, Pedagogics, Law, Applied Linguistics, Theory and Practice of Translation)

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Variability while translating obsolete vocabulary (on the example of Valerii Shevchuk's books in English)

Every language consists of a system that has different structures and levels. The vocabulary of any language can be considered as a core (units used by all the speakers and in all the styles) and peripheries (vocabulary with restricted usage) [1, p. 84]. Obsolete vocabulary belongs to the periphery of a language system. The main difference between the core vocabulary and the obsolete vocabulary is the time, when it is used – or was used – actively enough. Archaisms and historisms were used in the past. Today they are used rarely, only in some discourses – usually fiction (mostly fantasy, historical novels, and poetry) and historical papers.

Nowadays translation of the obsolete vocabulary from Ukrainian into English is especially important in the context of Ukrainian literature translations because of the raising interest in Ukrainian culture and history around the world.

However, obsolete vocabulary can be a difficult challenge for a translator, especially while considering archaisms that are usually different for different languages (for instance, in English the word *thou* is obsolete, while we do not have an obsolete analogue in Ukrainian – only a usual word *ти*; at the same time, a Ukrainian obsolete word *аз* cannot be translated literally, because the English word *I* does not have any synonyms with the same obsoleteness). Moreover, some historisms are closer to realia because of belonging to a certain area's history: for instance, the word *князь* describes only the reality of Kyivan Rus' (Ukraine) during a certain period of time. Therefore, historisms and archaisms can be translated using various translating transformations, such as lexical (generalization, concretization, modulation), grammatical (addition, omission), and combined lexical and grammatical transformations (neutralization, compensation, explication). Historisms can be also translated using specific realia translation tools (such as transcription, transliteration, traditional equivalents, and calque). The choice of these tools and transformations depends on the context and mostly on some decision of a translator.

Sometimes one unit can be translated in different ways through the text, especially when it is a big text such as a novel. Thus, Valerii Shevchuck's short story "The Devil Who Is (The One Hundredth Witch)" («Диявол, який є (Сота відьма)» in Ukrainian), as well as his novel "Eye of the Abyss" («Око Прірви» in Ukrainian) contain a lot of such examples – both for archaisms and historisms. However, the

texts are different in their language structure, because “The Devil Who Is (The One Hundredth Witch)” describes a period of German history when all the events of “Eye of the Abyss” happen in Ukraine. At the same time, they have quite similar topics connected with religion and fights against “heresy”, so we can compare them in some way.

These works were translated into English by O. Rudakevych that allows us to consider her method of translation using both texts.

Both translated books have variable translations of certain obsolete vocabulary that we can consider as more or less motivated.

Sometimes all the different translations of one unit can be created with one method only despite their difference: for instance, the archaic word *проректи* [3, p. 44] was translated as *reply* [4, p. 48], *speak* [5, p. 92] *declare* [5, p. 158] in different parts of the text. All of these words are not obsolete, but have almost the same lexical meaning that the original word has; therefore, they can be considered neutralization. We can consider them as a generalization in some way, especially the word *speak* because of its less specific meaning. However, the main method is still neutralization because the obsoleteness was lost. And if we need to find the difference in the word choice, we should mention the context – the word *проректи* can have this meaning depending on the context.

One main method is also preserved in the case of the word *шабаш* [2, p. 32]. The issue is so: in Ukrainian, there are two different words – *шабат* as *a tradition of Jewish people* and *шабаш* as *a meeting of sorcerers* (they can be interchangeable sometimes because Jewish people were considered to practice magic during some historical periods, so etymologically these words are connected; but *шабат* is usually associated with religion, while *шабаш* is mostly considered as magic practice). But in English there is no such difference, so the translator needs to use the addition of the word *witch* (*witch’s*) to clarify the meaning of this unit while finding a traditional equivalent (*sabbath*) or generalizing it (*mass*): therefore, we have such translations as *a witch’s Sabbath* [6, p. 248] and *a witch’s mass* [6, p. 244]. Here there is no such difference in contextual usage because it is a historical term of medieval mythology, so the translation could have the same (or even higher) adequacy if the translator used one term only.

Some variable translations can be created with completely different methods. For instance, the word *нечестивець* [2, p. 26] can be translated with explication, as *the godless sinner* [6, p. 233], as well as with some kind of a generalization (that can be even called an omission because it does not contain the lexical meaning of the original unit at all) – as *he* [6, p. 233], in spite of no significant difference in the context of usage.

Or the obsolete word *ложе* [3, p. 6] was once translated literally (as *bed* [4, p. 12]) that can be considered as neutralization because of the lack of obsoleteness; for the second time, it was translated as *resting place* [4, p. 39] that can be considered as explication. This situation can be explained with the context: for the first example, it is a physical bed where the character sleeps (*weak after a day’s work, I fell into bed* [4, p. 12]); for the second one, it is the last place when the dead body

rests (*if he were one of the Cave mummies, escaped from its eternal resting place and out on a journey to view the world* [4, p. 39]), so it should not be translated literally to keep this sense.

In conclusion, we can say that obsolete words are especially difficult to be translated; sometimes variable translations of one unit are possible. They should be explained in the particular context, but sometimes the choice depends on a translator's will only.

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Linguistic means of creating expressiveness in the text of the political memoir “A Journey” by Tony Blair and their translation into Ukrainian

Topicality of the research topic. The paper examines the linguistic features of Tony Blair’s book “A Journey”. It is an autobiographical reminiscence of a prominent British politician, a former Prime Minister of the United Kingdom in which the author describes in detail his political career: ups and downs, political combinations and intrigues. Its translation into Ukrainian was made by Petro Tarashchuk in 2011 [2].

Tony Blair’s work has features that are common to the genre of political memoirs as well as those unique to the author’s style. “I wanted this book to be different from the traditional political memoir,” says Tony Blair [10, p. 9].

As far as we know, the linguistic peculiarities of Tony Blair’s memoirs have not yet received detailed philological coverage, only political studies and individual philological articles on this issue are available, which determines the topicality of our research.

The purpose of the paper is to describe the peculiarities of creating the expressive load of the text of Tony Blair’s memoirs “A Journey” and the means of translating the author’s expressive linguistic means into Ukrainian by Petro Tarashchuk .

The object of our research is Tony Blair’s political memoir “A Journey” as an example of a memoir and journalistic style and its translation into Ukrainian.

The subject of the study is the peculiarities of the creation of expressively coloured linguostylistic units at different levels of the English language system and their reproduction in Ukrainian.

The theoretic and methodological basis of the study is the works of domestic and foreign scientists developing the problems of translation studies – N.V. Bevz, R. P. Zorivchyak, V.V. Zirka, O.V. Rebriy and many others [1; 6; 5; 7]; expressiveness – Ya. V. Hnezdilova, V. I. Hoverdovsky, V. A. Chabanenko and others [3; 4; 8]; political discourse – T.A Van Dijk, A. Beard etc. [11; 112; 9].

The research methods are induction, deduction, comparison, generalization and the continuous sample method (for the formation of the research body).

Translation analysis that has been made in our study involves comparing the original text in English with the translation of the original text into Ukrainian which allows obtaining data on the degree of correspondence of the source text and its Ukrainian translation determining the achievements and losses in the target text.

We have defined expressivity as one of the functional styles of literary language that is emotionally coloured and has signs of personal connotation.

Having considered the theoretical basis for the study of means of translating expressively coloured language units – the way the phenomenon of expressiveness is viewed in general linguistics and in translation studies – we have analysed the specifics of the creation of expressive units on grapho-phoneme, lexical-stylistic and grammatical levels in the English memoir and political text.

Tony Blair creates expressiveness by the linguistic means of the lexical level using homonyms, loan words borrowed from different languages, namely French, German, Latin as well as such special types of vocabulary as dialectisms, slang, abbreviations:

Relations in my office and my close associations among MPs and ministers were always marked with laughter, a certain amused disdain for the absurdities of political life and a definite joie de vivre. To the extent I could choose, I would choose the optimistic and upbeat variety of our species to be around me [10, p. 540].

Стосунки в моєму секретаріаті, а також із моїми близькими друзями серед членів парламенту і міністрів завжди були позначені гумором, повною зневагою до безглуздя політичного життя і безперечною joie de vivre, радістю життя. Тією мірою якою я мав змогу добирати, я зосереджував навколо себе оптимістичні й піднесені екземпляри нашого виду [2, с. 628].

For lots of my fellow politicians, the joie de vivre part was distinctly lacking, and the swamp was mostly what they experienced. I totally understood the desire to escape. And it's nothing really to do with how happy or otherwise your marriage is. It's an explosion of irresponsibility in an otherwise responsible life. Unfortunately, like all such explosions, it has consequences [10, p. 540].

Багатьом моїм колегам-політикам вочевидь бракувало joie de vivre, а найгостріше вони відчували трясовину. Я цілком розумів бажання втекти. Насправді це не має нічого спільного з тим, щасливий чи нещасливий ваш шлюб. Це вибух безвідповідальності серед цілком відповідального в інших аспектах життя. На жаль, як і всі такі вибухи, він має свої наслідки [2, с. 628].

The French set expression "*joie de vivre*" repeatedly used by Tony Blair means a feeling of happiness and great enjoyment of life. When Petro Tarashchuk has to translate the sentence with this set expression borrowed from French without any change of the foreign sound and spelling for the first time in the text of the memoir (loan words proper or alien words), he adds the explanatory Ukrainian word combination "*радістю життя*" after the French "*joie de vivre*". Reasonably enough, when "joie de vivre" is mentioned on the same page again, the translator uses the French set expression in the corresponding Ukrainian sentence not having either to translate or explain it.

The word "*billet*" used by the author in the following paragraph is one of the so-called False Friends of the Translator – the words existing in two different languages that have a similar phonetic form, but denote entirely different meanings. Petro Tarashchuk offers the Ukrainian word of the general meaning "*приміщення*" though it should be translated as "розквартирувала" to convey the meaning of the

noun "*billet*" – "*a place for soldiers to stay in for a short time*" [13] and Tony Blair's stylistic connotation encoded in it.

I was on holiday in the south-west of France at the time, in a little village called Miradoux. We were staying with our friends Maggie and Alan, he having been secretary to the PLP and she an old friend who gave Cherie and me a billet in her house in Stoke Newington when we searched for our first home as a newly married couple [10, p. 292].

Тієї пори я був у відпустці на південному заході Франції в невеличкому селі Міраду. Ми перебували в наших друзів Меггі й Алена, він був секретарем парламентської фракції Лейбористської партії, а вона – давньою подругою, що дала нам із Чері приміщення у своєму будинку в Сток-Ньюїнгтоні, коли ми як щойно одружена пара шукали свого першого дому [2, с. 205].

The complex research methods have allowed studying the peculiarities of the journalistic text expressiveness from different viewpoints and achieving the understanding of the phenomenon as thorough and objective as a comprehensive linguistic analysis can ensure. The analysis of Tony Blair's memoirs suggests that the author demonstrates a large palette of stylistic tools at all language levels that help create a powerful expressive background. A typical feature of the analysed text is the complex combination of a number of linguistic tools in individual text fragments.

The vast majority of transformations performed by Petro Tarashchuk are successful as the text's expressive coloration is preserved in the Ukrainisn target text. The translation losses have been illustrated by the instances of changing the stylistic register of the original text and unsuccessful translation of the words that are known as false friends of the translator.

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Distance Learning during the War

Distance learning is a form of organizing the educational process in which the entire course or a part of it is conducted within the territorial distance of teachers and students using modern information and telecommunication technologies. Distance learning allows for flexibility and diversity of learning, which will help to fully unleash the student's potential and enables those who miss classes for valid reasons (competitions, illness, etc.), especially those who study individually for health reasons, to meet their own educational needs.

Since March 2020, when an extended quarantine was declared due to the spread of COVID-19, it has led to the transition of education in Ukraine to distance learning. The next two academic years were held in a hybrid format (educational institutions were regularly quarantined).

On February 24, 2022, Russia carried out a large-scale invasion of Ukrainian territory, which resulted in the transfer of education to distance learning again. At that point, the teachers already had some experience in organizing distance learning, but training during the war had its own peculiarities, which, of course, also complicated its organization.

During the war, several groups of students were formed: students at home and students who were internally or externally displaced. Of course, the situation of each student is individual, but these groups of students have certain characteristics.

Distance learning in the time of war is arranged in synchronous and asynchronous modes. In the process of studying the issue, the advantages and disadvantages of both modes were identified. Synchronous learning means almost immediate feedback from both sides. The teacher can question the student, evaluate his or her answer, and ask additional questions. Such interaction is better for learning the material because students can ask questions on topics they don't understand. Of course, there are also disadvantages: interruptions in communication, technological problems, and the inability to discuss and work together.

The advantage of the asynchronous mode is the convenience of the work schedule, the possibility of a convenient daily routine and work at your own pace. At the same time, the disadvantage is a decrease in quality, less socialization, and difficulty in receiving feedback. Asynchronous learning requires more effort from students, who must learn to organize their time properly, take their tasks more seriously, and have self-discipline skills.

In the time of war, not every student has the opportunity to study remotely (he or she may be in danger, lacks the digital means to study, etc.) Among the survey participants [1], approximately 90% of those in the non-occupied territories could study remotely, but 95% of students in the occupied territories (even those who

periodically have access to the Internet and contact with a teacher) say they do not have the opportunity to study remotely. At the same time, even those who can study also face problems during distance learning because of the problems with the Internet connection when joining classes, task completion in time and sending online assignments to teachers [2].

The Ministry of Education and Science (MES) of Ukraine was not ready to provide education in wartime [3] as the Development Strategy of the State Enterprise "Ukrainian State Center for International Education" for 2021-2025 in the section "Risk Management"[4] does not even mention a possible military invasion (the risks described are high tolerance for corruption, the continuation of quarantine, the economic crisis in the country and the lack of qualitative changes in the regulatory framework). Of course, online learning under martial law cannot take place in the same way as it did during quarantine. The development of hostilities in Ukraine, the logic and potential of organizing the educational process, which seems to be secondary, allowed us to summarize the main trends in adapting online learning in higher education institutions (HEIs) to the conditions of war:

1) developing the forms of asynchronous interaction between teachers and students with the help of such platforms as Moodle, Google Classroom, etc

2) providing video records and presentations by teachers, that will allow them to watch lectures or seminars in video format;

3) proper timing of classes;

4) use of creative tasks, encouragement of educational and social initiative, etc;

5) tasks and materials that have not been processed due to an air raid interruption are performed asynchronously.

When analyzing the subject area, it is appropriate to consider the main advantages and disadvantages of online learning for teachers and students (Table 1)

	Advantages	Disadvantages
For teachers	- High level of efficiency due to the use of interactive tools; - Easy to track the progress of each student; - You can conduct classes almost anywhere; - No one will be late to class thanks to the mobile version of the app	- Knowledge of using an online learning platform is required; - You need to master the techniques for conducting classes effectively; - You need to prepare carefully for the class; -Sometimes technical malfunctions interfere with the classes.
For students	- Any location is possible; - Ease of contact with the teacher through mail, chat, etc; - Shy students can learn more easily in online classes; -New chances for disabled people	- Lack of contact between the student and the teacher; - Student need to spend much more time to master the materials of the curriculum; - Due to external factors, it is impossible to focus on learning.

Table 1 Advantages and disadvantages of online learning for teachers and students

The mechanism of distance learning under martial law poses several challenges to the educational system. The scientific studies on education under martial law are usually outdated and sometimes date back to World War II. The current study expands the horizons for further thorough analysis of the implementation of e-learning in the areas of military disaster to address the problem of inadequate access to high-quality education.

Yevhen Nikolayev states: "Distance learning is not only a necessary step in difficult conditions. It has a long-term impact on the further functioning of the Ukrainian higher education system in Ukraine. After all, the experience gained will surely be applied after the war is over. It is unlikely that there will be a return to full-time education without partial use of mixed technologies."[5] However, no matter how the events develop, the actual area of research is to control the psychological state of higher education students, work on motivation, creativity and security competencies, and balance the requirements for students with the realities of objective reality.

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The Role of Lacunae in Determining the English Linguistic World Picture during Translation

In the modern world, the problem of mutual understanding and the establishment of intercultural contacts is one of the biggest importance, as, because of the globalization processes, more and more cultures with different history, traditions and language collide and influence each other, thereby developing and changing. However, the process of contact and mutual influence of said cultures cannot but be complicated, as nowadays cultures that do not have common features or differ in terms of distinguishing the main values and attitudes towards certain phenomena also come into contact, and this initial situation makes communication impossible without auxiliary means. Since it is the language that records, preserves and reflects its speakers' ideas about the world, it obviously represents a special difficulty during communication of different cultures or during translation. Considering that such facts become acknowledged precisely during translation, the vast majority of studies devoted to further exploration of units unique to a certain language are based on the contrastive method, i.e. comparing two or more languages, English and Ukrainian in particular. The main task of such research type is to study and fix the problems that arise when different cultures interact, and to find ways to eliminate misunderstandings. It should also be noted that the study of units that are present in the language of only one culture can help when considering the question of whether an equivalent unit of one language should be included in the vocabulary of another. This is especially relevant for the "English-Ukrainian" situation, since it is English that is currently one of the main languages of international communication and, as a result, is widely used to name phenomena that, as a result of globalization, can relate to many cultures and require a commonly understood name. On the part of the Ukrainian language, there is an urgent need for such studies due to the active separation of the Ukrainian language and culture, both in the official field and in everyday communication, from everything russian, including inappropriately copied translation vocabulary and outdated translation strategies when working with English texts, as well as due to the need to expand contacts with foreign languages and global culture.

The most important concept necessary to begin the consideration of any cases of non-equivalent vocabulary is the linguistic picture of the world. It is an image of consciousness reflected by the means of language, inherent in a certain nation. Differences in the linguistic worldviews of different peoples are especially noticeable during translation activities, when there is a need to find a unit in the translation language that will convey the semantics of the word in the source language as accurately as possible: the lack of a completely appropriate vocabulary will inevitably

lead to a gap in a certain aspect of meaning. Examples of this phenomenon can be the discrepancy in the meanings of words for the same phenomenon in different cultures or the absence of a translation of the phenomenon (and, accordingly, the vocabulary that would denote it) in the target language for the corresponding that denotes the phenomenon existing solely in the culture of the source language. Linguists call said phenomenon of the absence of counterparts for concepts in the source language lacunarity, and the gaps themselves lacunae.

The phenomenon of lacunarity has always been noticeable, but few scientists focused on its analysis until recently. This field of translation studies is quite young – the beginning of targeted study of lacunae falls on the 19 th – early 20th century. In addition, it is difficult to determine what exactly a lacuna is. L. Barkhudarov, for example, proposes the term "accidental lacuna", which he defines as "a lexical unit of the dictionary of one of the languages, which has no correspondence in the target language". At the same time, other researchers also say that the lacuna can relate to grammatical or semantic aspects, the classification of V. Belianin, who also includes stylistic lacunae into his research, is well-known too. Generally speaking, any realities that do not coincide significantly in the source and target languages, and linguistic units for their designation, can be considered lacunae, but there are still discussions on this issue.

To determine lacunae, the method of contrastive research is used. Bilingual dictionaries are most often used to both define and fix lacunae. In order to simplify the understanding of texts containing predefined lacunar units by a non-native recipient, transformations are used that fill the lacunae. This process is called lacunae elimination. Elimination is the second aspect that should be taken into account in order to penetrate into the structure of the linguistic picture of the world of another people – it is important not only what the lacunar unit denotes, but also what means it uses for adaptation.

If we consider a standard dictionary sample of lacunar units from English-language dictionaries, the sample will mostly contain words denoting concepts that are present in the culture of the target language, but do not have a nomination due to the peculiarities of the functioning of the Ukrainian language - these are figuratively derived words, in particular, nouns denoting the bearer of the feature. Almost all of these lacunae are substantive. A significant part of the sample is also made up of words denoting nationally specific realities that do not have partial counterparts in the Ukrainian language. These are mostly words for persons and events and, to a lesser extent, proper names. Those units that have partial counterparts make up a small percentage of the total volume.

Based on the study of methods of elimination, we can conclude that among the segment of the English language that we have considered, certain types of elimination prevail in a bilingual situation, when it is necessary to eliminate the lacuna by means of the Ukrainian language. The dominant methods of elimination were the semantic and syntactic periphrasis described in detail by L. Leonova, and elimination using analogous counterparts. The phenomena of borrowing lexical units through transcription and tracing are also present, in some cases these borrowings are

accompanied by a translation explanation or clarification in order to convey the meaning of the lexeme as accurately as possible, as well as in dictionaries, despite the fact that a lengthy descriptive translation is not suitable for all types of texts.

A method completely devoid of clarification is the use of analogues; this tool either finds a match that uses different subject names but has the same semantics, or reproduces the original entity using a partial match. This method is mostly used for fixed units, in particular phraseological units, and in our study it is the least frequent. Cases of unsuccessful elimination of lacunae, stylistic and unfilled lacunae are also present in this category. It is this category that suggests removing a unit if its internal form cannot be conveyed as accurately as possible or if additional techniques require maintaining the general structure and preserving one of the specific expressions is not possible.

Prospects for further research consist in the study of separate categories of lacunar units according to the methods of their elimination; searching for optimal ways of translating stylistically colored lacunar units; the study of the periphrasis method of eliminating lacunar units in order to find such methods of translation that make it possible to approach a concise translation and at the same time fully reflect the semantic features of the lacunar unit being filled.

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Verbal objectification of CAT and DOG concepts

Cognitive linguistics is aimed at the comprehensive study of the problems of language, thinking, consciousness and practical human activity in their close relationship. It operates with units of thought that provide different information about objects or phenomena and can be fully or partially realized in language. There is a term concept to denote these units [1].

The works of the Ukrainian scientists (A. Belov (linguistic and conceptual pictures of the world), L. Belekhova (methodology of explication of archetypes embodied in the English-language poetic texts) is devoted to the study of concepts, mainly as cultural constants.

The study of concepts as constitutive units of the worldview makes it possible to obtain information about the perception of the world by people. Concepts as mental formations that reflect knowledge about the world and correlate with objects, processes and phenomena of reality, mark fragments of the national linguistic worldview. The concept synthesizes with the plan of expression the whole set of different types of language units that nominate and describe the object, therefore the reconstruction of the concept takes place on the basis of multiple means of its explication in language.

The English lexemes cat and dog appear as the names of the zooconcepts CAT and DOG, because they concentrate the generalized idea of these animals in the verbal form, and they are also included in the basic level of categorization, which is particularly significant for everyday consciousness. So, representatives of the English language culture in everyday life operate at a basic level that does not require special theoretical knowledge about the objects [3].

During the study of concepts, it is obligatorily to distinguish language units that function as their material representatives. Among the verbal markers of the zooconcepts CAT and DOG, the units in which the original meaning necessarily represents a cat or a dog, and the secondary meaning is formed by metaphorical transfer to another conceptual sphere (outside the zoosphere) are of interest. The reference to the animal in the primary meaning was determined on the basis of dictionary articles, as well as the interpretation of the word, which usually contained an indication of a cat or a dog (sometimes simultaneously with other realities), and served as a basis for metaphorical transfers that function in secondary meanings based on the time of formation. Secondly, how the representatives of zooconcepts also consider nominations with a primary metaphorical meaning. In the word-forming metaphor, the actualization of the zooconcept also occurs and is accompanied by the word-forming process at the «surface» of the linguistic level. Consequently, zoolexems are further subject to semantic/structural evolution – the processes of metaphorization and word-forming metaphorization, becoming a part of derivatives.

During the analysis of CAT and DOG concepts, it was found that these concepts can be explained in language using direct and indirect nominations.

Within the limits of direct representation, CAT and DOG concepts are explicated, first, by nouns, in particular: the names of the CAT and DOG concepts. Peripheral representation includes nominations by gender (bitch) and age (kitten, puppy), as well as emotionally determined nominations (pussycat – shy man, seductive woman; copy cat – a person who copies everyone; alley cat – a woman of pleasure).

Secondly, CAT and DOG concepts are represented by nominations based on such characteristics as external (that is, by external feature – size / breed / color) lapdog – decorative dog; mongrel, poodle, husky, terrier, Pomeranian dog; among the nominations regarding the color of the animal, the following examples were found: white, gray, black, red, smoky, three-colored, spotted), and functional (barker, hound, hunting dog, watchdog). We also include proper names (nicknames) of dogs that represent an animal (Cerberus) for native speakers. Among the periphery, we differentiate adjectives with the meaning of the animal's belonging (feline – cat, canine – dog) [5].

The following lexemes belong to the indirect representation of CAT and DOG concepts: verbs (to bark, bow-wow, to yelp, howl) and exclamations (meow, bow-wow, woof-woof -haw), denoting the characteristic actions of animals; adjectives that distinguish specific qualities / signs of animals (mangy, shaggy (dog), lame, mad (dog), devoted (dog), cunning (cat)), nouns semantically related to the indicated animals (kennel – dog house) and, in particular, their collective nominations (pack of dogs), metonymic names of parts of the animal (fang).

Indirect representation sometimes manifested itself not from a dictionary definition, but at the level of etymological analysis, as well as the involvement of additional extralinguistic knowledge: to foil (esp. In hunting, to run over or cross (the ground, scent, or track) with the effect of baffling the hounds – to knock a dog off the trail, to coffee-house = to gossip, to indulge in gossip (gossip) < Originally of fox hunters while waiting for the hounds to find a fox! to draw a covert, etc., during a fox-hunt. On the example of the above expressions, it becomes clear that the search for etymological features requires additional historical and extralinguistic information. It is possible that associations with the zooconcept were maintained only at a certain stage of the historical existence of expressions [5].

Therefore, the conducted analysis makes it possible to determine the peculiarities of the lexical expression of CAT and DOG concepts. According to our research, the studied concepts can be explained in English not only by direct notions (cat, dog, canine, feline, bitch, puppy, kitten, etc.), but also by indirect ones (to bark, to yelp, fang, kennel, etc.). The study of CAT and DOG concepts using their lexical verbalization in the English language revealed the significance of the studied concepts for the English language culture, which is confirmed by the large number of linguistic means used to nominate and describe CAT and DOG concepts. However, despite the great variability of the representatives of the concepts, linguistic means convey only a part of the global concept that exists in the mind.

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The use of artificial intelligence in media activities: risks and prospects

The digitalization of various areas of society's life was a concern only for technical workers for some time, but the emergence of artificial intelligence, in particular the Chat GPT bot, has made people in creative professions think about it. It is so far becoming clear that this technology will have far-reaching and large-scale consequences for journalists, communicators, marketers, creators, etc. There are already questions about the originality and authenticity of creative products, the copyright to works obtained from interaction with this application [1].

Chat GPT (Generative Pre-trained Transformer) is a based language model that generates a variety of texts in response to user requests. The main goal of this artificial intelligence created by OpenAI is to optimize people's search and collection of information [2].

Currently, 'thinking' computer systems are actively used not only in working of the particular industries, but also in education. To confirm this assumption, empirical research involving 36 respondents was conducted. It included students of Dnipro University of Technology majoring in "075 Marketing" and "061 Journalism" at the bachelor's degree.

It is clear from the chart that the majority of respondents use ChatGPT in their professional activities and training.

The main advantage of using artificial intelligence, according to the majority of respondents, is that it allows you to quickly and conveniently obtain the necessary information for both tuition and work.

As MIT Technology Review notes, AI language models are programmed so that they know how to answer the next question. However, whether these sentences contain fakes, artificial intelligence is not able to recognize (Why you shouldn't trust AI search engines, MIT Technology Review, 14.02.2023).

A good example of this problem is the story of how online media CNET used Chat GPT to generate messages and articles. In a farewell letter, the former CNET editor said that much of the content written by artificial intelligence was destributed to subscribers of an e-mail notification about cybersecurity. Such messages have had mistakes and fake information that could bring some direct damage to users (Inside CNET's AI-powered SEO money machine, The Verge, 19.01.2023).

Nowadays, student journalists and marketers see great potential in using ChatGPT in their work, because this tool greatly facilitates the process of preparing for an interview, searching for information, etc. The survey shows that 14 students claim that thanks to artificial intelligence, archival information can be quickly found. ChatGPT can be asked to explain a complex topic in plain words, write a plan for an essay, analyze the service market, etc.

Because of this, it can be argued that ChatGPT is a pretty useful tool for learning. Firstly, this program provides an opportunity to gather information much easier and more efficiently than a student does on his/her own. Secondly, even though Chat GPT provides sometimes untrue, this experience can be regarded as a way to develop media critical thinking. Moreover, with the help of Chat GPT you can improve your work, improve your own writing skills and so on. (Don't Ban ChatGPT in Schools. Teach With It, The New York Times, 12.01.2023)

Despite the fact that artificial intelligence can replace a large number of professional functions in different areas of our lives, it is necessary to realize that society must constantly develop and improve. ChatGPT facilitates and automates various processes in work and study. This technology is not perfect, so do not abuse its use, and you should also carefully check the information provided by artificial intelligence.

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Strategies for focusing on study and work

Each of us wants to be successful and smart. To do this, you need to learn a lot of new things, study and work on yourself. But everyone knows that sometimes it is difficult to focus on one thing while studying. And without concentration, we will not be able to capture the essence of the tasks, which means we will not get enough buildings. And knowledge and skills are one of the most important keys to success.

Studying is tough. Whether you are an experienced student obtaining a PhD or someone starting high school, figuring out how to stay focused while studying is a challenge that we all face. Whether your biggest challenge is social media, procrastination, time management, or a combination of all three, we've got a variety of tools and techniques that can help minimize the stress of studying and keep you focused on what matters.

And if you are like most of us – this year is presenting challenges we have never faced before. Learning remotely and losing the motivation and pressure that comes with in-person learning and contact has left many of us fighting off the internet like never before.

Below, we are compiled our list of six expert tools and techniques to help keep you focused. It will also allow you to track your learning progress and provide the motivation you need to keep learning. Each technique can be tailored to suit your preferences and learning style and it is encouraged that you try a selection of them to see which benefits you the most.

1. Have you ever sat at your desk, opened your laptop and thought, "Now what?" Or if you have a very busy life, where you have to do a lot of tasks during the day, then it will be the best solution for you to make a schedule for the day or week. Try to allocate time so that between tasks you have a break of 10-15 minutes, during which you will have time to reboot your brain a little. Setting a study schedule is a fantastic way to tune your development targeted at your aims, set up your everyday activities, and, in addition, to feel satisfied with your day of study [1].

2. The best concentration will be when you give yourself time to complete the task. The main thing in this rule is that in the first 15 minutes, nothing distracts you, and after that, you yourself will not notice how you get involved in the process.

3. There is also such a feature for a person that we are not robots and cannot do the same thing all the time. Therefore, changing activities is a good option to reboot. For example, you can do mental tasks such as writing first, followed by tasks that require physical attention such as sports.

4. To better remember information, you should repeat everything that you have read or learned. As they say, "Repetition is the mother of learning." After some time, it is worth reviewing everything that you have learned before. This will help the brain remember information better and remember it longer.

5. Do not be afraid to reward yourself. When used properly, small but regular rewards can help you avoid distractions while studying and stay focused longer. After all, we all need a little reward from time to time. If good grades are not enough, think about something else. You can use this positive reward during your studies as a reward for yourself when you reach a learning goal, complete a certain project, or just sit at your desk for a long time and work hard. Whatever the reward, the more you associate a good result with school, the more motivated you are the next time you study. To be effective, rewards must make you feel good. Some friends may view going to the gym as a reward, while others may see it as a chore. Choose something that makes you click, like taking a break at the end of a hard week or watching your favourite TV show at the end of a class so that you want to repeat the behaviour in the future.

6. Do not get distracted by social media. Unless you are doing online research about school assignments, stay away from your phone while studying. Keeping your phone close by and checking it as soon as any notification arrives is a big distraction. When you need to study for a math test, Instagram pictures will not help you. You need to prepare for the exam and avoid any distractions. There is a time for everything, and you should know when it is time to study and rest [2].

In conclusion, we can say that staying focused while studying is something that everyone has experienced at some point during their education. But luckily, there are plenty of things you can do to try and help you concentrate and avoid distractions while studying.

As defined in this article, there are many strategies proved by the investigations that are to assist you to harness your power and observe in a manner that is powerful for you.

Unfortunately, there is no one-size-fits-all solution to focusing on studying. You need to experiment with different methods and tools to see which works best for you. However, through trial and error, you can develop habits that will help you stay focused and concentrated while you study.

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Translation and structural-semantic analysis of LSP" SPACE "from the standpoint of linguoculturology

The space nominations are used in many branches of science: geography, geology, ethnology, ecology, history, tourism, etc., which determines their value and importance for study. As scientific and technological progress promotes the development of language and specifically reflects the world around us in the human mind, this reflection is an endless source of various changes that are reproduced in the representations of LSP "SPACE".

The lexical-semantic field (LSP) “SPACE” combines spatial semantics and multilevel linguistic representations. Linguo-cultural representations (hereinafter LRP) are nationally marked tokens, phrases and individual LSV, which are known to realize their ethnocultural value in the text as units of the language system.

It is known that the analysis and description of the field are based on the theoretical foundations of linguistics in general and linguoculturology in particular. And linguo-cultural representations of the field (LRP) are studied using lexical-semantic (to distribute the tokens of space by lexical-semantic paradigms, their description and classification), structural-semantic (to determine the linguistic, cultural and local lore potential and changes in their LRP. semantic-stylistic (helps to characterize in more detail the specifics of the semantics of LRP) approaches that reveal the linguistic and cultural semantics of nominations, as well as the contextual meanings and nuances of space nominations.

The linguistic and cultural personality acts as the creator of his linguistic and cultural space. An example of the development of the importance of the nomination of space in human construction is the transformation of the name of the ancient British building, tower in LRP "skyscraper". That is, the peculiarities of national and social perception are conveyed by figurative associations (linguistic and cultural connotations of stylistic and genre representations of LSP “SPACE”), which contain emotional, additional and figurative coloring of LRP.

Now let's move on to the structural features of LSP "SPACE". It consists of a nucleus and near and far peripheries. The center of the kernel is the noun space, which covers all the features of the field. Various abstract nouns of space are in the core zone of LSP "SPACE". It can be noted that only nouns exhaust all the characteristics of space. For example, natural space: garden / forest / green / park space and others; artificial space: parking / breething / social / air space; localization of the object in difficult terms: wars. spacetrack and folded: cosm. space-craft, space-ship, as well as in the urbanonym amer. Space Needle is the tallest skyscraper in Seattle.

The analysis of the periphery of LSP “SPACE” should start with its structure, which contains several microfields: names of boundless space, names of limited natural space in the TG (thematic group) names of the planet Earth, TG names of aquatic, extraterrestrial, terrestrial, celestial space and microfield artificial space.

The microfield of names of infinite space contains phrases - common astronomical terms based on the noun spase and definitions-concretizers of the outer space of the Earth with prefixes cis-, extra-, trans-, inter-, for example: cislunar / cisplanetary / extraplanetary spase; intermediate space: interplanetary / interstellar / translunar / extraterrestrial spase; space of planets: lunar / moon / solar spase, galactic; gradations of space in relation to the earth: close / deep / inner / middle / outer SPACE / far-out space.

Thus, the microfield of names of boundless space combines scientific, astronomical terms and among them territorial LRP. Astronomical and metaphorical terms, as well as territorial LRP are united by the close periphery of the microfield, ie it is mainly the names of boundless space.

Next, consider the microfield of the limited natural space of the Earth. The TG of land names combines ambiguous synonyms earth, land, ground, soil, which mean "a certain part of the earth's space". Dominant Brit. earth "earth" contains the basic semantics of earth "surface" and "environment"; LSV earth "surface" defines the earth as a two-dimensional space: earth "land".

Thus, the lexical synonyms of the TG of land names located on the near periphery of the SPACE LSP reveal the general meanings of the surface space or the environment of the earth, which are specified in the LSV "place of human activity". These nouns contain narrow contextual scientific, professional and other stylistically marked semantics.

Microfield of artificial division of the Earth. TG of names of administrative division of the earth's surface combines the names of countries, regions with the meaning of nuclear nouns area, place and is represented by nouns in the CP country, state; Wed county, borough, barony, region, district, iceland, ward, territory, dominion, megapolis, parish. The main meaning of the noun country brit. "Country": amer. “Village” differs in contextual LSV and individual semas, including parametric ones, has a British historical LSV “region of the country” with characteristic definitions, for example, brit. chalk country, the fence country, the country of the red-deer, the stag-hunting country. The names of artificial spaces indicate the variability of their LRP and LSV due to geographical, climatic, social and other factors.

The near periphery contains more specific representations of space that come with nationally marked semantics. The far periphery places specific LRP - appellation and toponyms, namely: names of natural and artificial space, terms and figurative LSV.

As the cultures of America and Britain developed together, borrowings took place, and LRPs were formed with additional emotional, pragmatic, and stylistic LSVs and connotations. These neoplasms were motivated by political, geographical, ethnic, social and economic factors, ie common TG dominants and common linguistic processes were formed.

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Ways of translation of computer terminology

The problems of translation of terminology are becoming more and more relevant with the development of technical progress. Although the translation of many terms is not a problem for a competent translator, as there are many sources that can be consulted to help find the necessary equivalents in the target language, there are still many difficulties. Therefore, the translator does not only use terminological translation dictionaries, but also relies on professional references and often consults with experts. Today, the translation of computer vocabulary is the embodiment of high linguistic skill. Due to its narrow specificity, this type of translation is often associated with the application of special knowledge in various technical fields and can only be understood by specialists with extensive practical experience in this field.

Computer terminology is interesting because, firstly, it is formed on the basis of the use of word formations characteristic of the English language, and almost all computer terms have acquired international status and are used in most European languages. A certain part of the computer vocabulary is formed by semantic derivation, for example: *file, controller, mouse, joystick, disk, virus, window*, etc. The neolexical-semantic variants of units existing in the literary language are formed on the basis of semantic changes and as a result of specialization or metaphorical transfer of the initial meanings of lexemes. Thus, the word *notebook* in the literary language means *paper for notes*, and in computer terms another lexical-semantic variant of the word works, it means *portable personal computer*. Semantic neologisms are based on the metaphorical transfer of the meaning of the initial lexeme, since the purpose of electronic devices, according to native speakers, is similar to the purpose of a notebook. In the process of working on a technical text, very often there are terms with unclear meaning. Therefore, in this case, it is extremely important to understand the context of the sentence or the content of the text, and only then, the term acquires its meaning. It is also important to choose the right translation method. Translation of computer terminology can be done in different ways.

Vocabulary transcoding occurs during translation in those cases when the culture and, in particular, the science of the country of the language of translation lacks a corresponding concept and a corresponding translation equivalent, and the translator cannot find a word or words in the translation language that would adequately convey the meaning of the concept and satisfy requirements for term formation. Since a word has one meaning during transcoding, this method of translation is advisable to use when it is necessary to create a clearly unambiguous term in the translated language [1, p. 235]. Transcription translates words like: *gigabit – гігабіт; scanner – сканер; printer – принтер; upgrade – апгрейдити;*

hacker – комп'ютерний зламник; browser – браузер; provider – провайдер; user – юзер; site – сайт; catridge – катрідж.

Due to this technique, the entire form of the term, or its greater part, can be transmitted. Sometimes mixed transcoding is used when most of the transcoded word reflects its sound in the source language, but at the same time some elements of its graphic form are transmitted [2, p. 46]. Mixed and adaptive transcoding is sometimes used. Examples of mixed transcoding: *interface – інтерфейс, adaptor – адаптер, chat – чат, on-line – онлайн. Examples of adapted transcoding: menu – меню, matrix – матриця; card – карта; profile – профіль; command – команда; domain – домен.*

Another lexical way of translation is loan translation. This technique is used to translate complex terms. Loan translation can be used when the translated variant formed in this way does not violate the norms of usage and conjugation of words in the Ukrainian language. Often, when choosing between transcoding and loan translation, preference is given to loan translation, since as a result of transcoding, units that do not make sense in the translated language are often formed, a kind of pseudoword [3, p. 112]. Loan translation is not always a simple mechanical operation for the purpose of transferring the original form into the target language: *infrastructure – інфраструктура; IT companies – IT-компанії; cyber security – кібербезпека; website – веб-сайт; abstract semantic network – абстрактна семантична мережа; access code – код доступу; absolute disk read – абсолютне зчитування з диску; autorepeat – автоматичний повтор; image recognition – розпізнавання зображення; process-handling procedure – процедура управління процесом; disk storage – дискова пам'ять. artificial neutral network – штучна нейтронна мережа; computer network – комп'ютерна мережа; absolute disk read – абсолютне зчитування з диску*.

It is important to remember that this technique is not the usual practice of mechanically translating the original phrase form of the term into the target language.

Interpretive or descriptive translation can also be distinguished among the translation methods of computer lexicology. It is used when a term in the original language is replaced by a word or phrase that descriptively conveys its meaning. It has the following requirements: 1) the translation must accurately reflect the main meaning of the corresponding concept, 2) the description must not be too detailed, 3) the syntactic structure of complex words must not be complex. Descriptive translation is usually used in parallel with transcription and is used when translating terms, unique objects, cultural names, etc. This technique is used when a lexical unit of the original language is replaced by a word or phrase that conveys its meaning: *native mode – режим роботи у власній системі команд; business application – програма комерційних розрахунків; nucleus – ядро операційної системи; native mode – режим роботи у власній системі команд; business application – програма комерційних розрахунків.*

If there is no equivalent of the term unit to be translated in the special dictionary, and other techniques are inappropriate, lexical-semantic or lexical-grammatical transformations can be applied, in particular, concretization and

generalization. Traditionally, multi-component terms are translated by explication, such as the following: *backspace key – клавіша повернення на один символ назад; burning – запис компакт диска; capitals lock key – клавіша включення верхнього регістру; native mode – режим роботи у власній системі команд; freeware – безкоштовне програмне забезпечення; internet application – програмне забезпечення для роботи в мережі інтернет.*

If the meaning of the lexical unit in the original language completely coincides with the meaning of the lexeme in the language of translation, then this method of translation is called equivalent. It is necessary to know and be able to choose equivalents in the native language, since the terms are ambiguous and, depending on the field of knowledge in which they are used, have different meanings and definitions. Equivalence is one of the most important tasks of the translator, which is reflected in the most complete transfer of the content of the text, and the true correspondence of the content of the original and the translation is very important. Equivalence also depends on the origin of the text and its reflection in the translated language. Examples include the following: *access – доступ; adapt – адаптувати; anti-virus – антівірус; social network – соцмережа; electronic digital signature – електронний цифровий підпис.*

Thus, the analysis of means of translation of terms showed that the selection of a lexical component, transcoding, loan translation and explication are the most frequent translation means of translating lexemes from English into Ukrainian. A special difficulty for interpretation is the non-equivalent vocabulary, which is mostly translated by explication, but for the translator one of the tasks is to take into account the technical specifics of the term, its mental English-orientation and orientation specifically to the Ukrainian-speaking reader.

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Le rôle de la langue française aux Etats-Unis

Les États-Unis, historiquement un pays d'immigrants, ont donné le développement aux nombreuses langues et cultures locales, coloniales et celles d'immigrés.

La présence de la langue française aux États-Unis existe depuis les premières années de l'ère européenne en Amérique du Nord, et une grande partie de ce qui est aujourd'hui les États-Unis faisait partie de la Nouvelle France [10]. L'ère coloniale britannique au Canada a permis l'émergence d'un million de Canadiens français en Nouvelle Angleterre, et tout au long de l'histoire, des francophones de nombreuses régions du monde sont arrivés aux États-Unis [10].

La culture francophone est un élément important de l'histoire et de l'identité culturelle des États-Unis. Plus de 9 millions d'Américains sont d'origine française et 1,32 million parlent le français à la maison [2]. Ils se concentrent principalement dans deux régions, la Nouvelle-Angleterre (nord-est) et la Louisiane. En Nouvelle-Angleterre, on trouve des francophones dans les États suivants: dans le Maine — 5,3% de la population; dans le New Hampshire — 3,4%; dans le Rhode Island — 2%; dans le Vermont — 2,5%; dans le Massachusetts — 1%. Ils sont principalement des descendants d'immigrants du Canada — on les appelle les Franco-Américains (Francos) [11]. Ils cherchent à préserver leur identité linguistique et culturelle, ils ont leurs propres écoles, leurs clubs et de diverses organisations d'entraide. Mais d'une manière générale, le français reste pour eux un élément de communication informel.

Le deuxième groupe de francophones habite en Louisiane. C'est la région francophone la plus connue des États-Unis, qui a été sous contrôle français pendant une partie des XVII^{e} et XVIII^{e} siècles [1].

Des communautés francophones existent dans tout le pays, avec plus de 80 000 francophones vivant dans la seule ville de New York [7]. En outre, le français est une langue mondiale, que parlent 300 millions de personnes dans le monde [6]. Le français est la deuxième langue étrangère la plus étudiée aux États-Unis, comme partout dans le monde [9].

De nombreuses universités américaines proposent des cours de français, et les programmes diplômants dans cette langue sont très répandus. En automne 2016, 175 667 étudiants des universités américaines sont entrés dans des cours de français, ce qui représente 12,4 % de tous les étudiants qui étudient les langues étrangères [3].

La langue française et la culture francophone jouent un rôle à la fois économique et culturel aux États-Unis. La France est un investisseur et un partenaire commercial important des États-Unis, et des milliers d'entreprises françaises sont présentés sur l'ensemble du territoire américain, avec plus d'un demi-million de travailleurs américains.

TV5Monde, une chaîne internationale de télévision francophone, a une audience de 1,5 million de personnes aux États-Unis [8].

Des livres tels que « Le Petit Prince », « Les Trois Mousquetaires », « Le tour du monde en quatre-vingts jours », « Vingt ans après » sont très populaires parmi la population américaine et les habitants d'autres pays, y compris l'Ukraine.

Il existe de nombreux films français que les gens regardent dans le monde entier. Par exemple, « Emily in Paris », une web-série comique et dramatique créée par deux pays — la France et les États-Unis [4].

Le français est aussi très utilisé dans l'industrie du tourisme pour communiquer avec de nombreux touristes francophones ou pour présenter une image touristique à ceux qui cherchent à découvrir l'Amérique francophone.

La culture française est largement présente dans l'industrie publicitaire américaine. La Tour Eiffel est un symbole de la France qui est souvent utilisé par de célèbres entreprises américaines comme Coca-Cola pour faire la promotion de leurs produits.

L'influence du français est aussi visible dans l'anglais américain. Par exemple, après que les États-Unis ont obtenu le territoire de la Louisiane, des mots français ont été utilisés pour la description de nombreux aspects de l'expérience de la frontière, tels que *portage, rapids, bayou, butte, peak, gopher, prairie, pass* et *cache*. De nombreux mots français se retrouvent dans l'usage quotidien américain, tels que *croquet, poker, roulette, automobile, garage, lingerie, restaurant, crayon, bouquet, boutique* [5].

Pour résumer, le français joue un rôle important aux États-Unis. Pendant de nombreuses années, les francophones habitant le territoire américain ont introduit leur langue dans des aspects de la vie tels que la culture, le divertissement, le tourisme, les affaires et la politique. Le français a aussi une influence sur l'anglais, la langue la plus parlée du pays. Toutes ces tendances continuent à se développer dans le futur, créant de nouvelles perspectives pour le développement de la langue française.

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British and American legal realia in dictionaries and literary works

The issue of legal vocabulary representation in dictionaries and literary works attracts the attention of many scientists, but it hasn't been resolved. The language of law is characterized by a specialized vocabulary that covers a wide range of legal fields and institutions.

The relevance of the research, therefore, is due to the growing interest of linguists in the problem of translating legal vocabulary, since the community of lawyers is becoming more and more internationalized, there is a practical need to correlate national legislation with international legal norms, to share the experience of the police, court, prosecutor's office and executive authorities of different countries.

The aim of our study is to analyze the peculiarities of legal vocabulary usage in the American and British variants of English in dictionaries and literary works, including the translation of R. Warren's novel "All the king's men" by V. Mytrofanov.

In the survey, the degree of the research on the problem of legal discourse is characterized, and the main lexical and syntactic features of English legal language are described. In particular, the classification by the American scholar David Mellinkoff is given, who among the lexical features of the English legal language defines the following [1, p. 13]:

1) frequent use of common words with uncommon meaning. To illustrate, the common word *action* has an additional meaning "*a legal process that is decided in a law court*" in Ukrainian – «судове слухання».

2) the use of Old English and Middle English words once in common use but now rare, like the words *hereafter, hereof, whereas, therefore* etc.

3) Latin borrowings with their Ukrainian equivalents: *ab initio* – «з початку», *amicus curiae* – «експертний висновок», *certiorari* – «суд вищої інстанції», *corpus delicti* – «склад злочину», *vis major* – «форс-мажорні обставини» etc.

4) Use of Old French and Anglo-Norman words which have not been taken into the general vocabulary. Some of them are given below: *action* – «судове слухання», *agreement* – «договір», *appeal* – «позов, апеляція», *marriage* – «шлюб», *misdemeanor* – «правопорушення».

5) Use of argot like *arguendo* – «аргумент», *black-letter* – «статутне право», *case at bar* – «справа у процесі судового розгляду», *case in point* – «доказ», *chilling effect* – «негативний вплив», *conclusory* – «безпідставний» [2, p. 107].

In addition, the survey deals with the lexicographic representation of legal vocabulary and the comparison of British and American versions of English law. In the research process we described the structure of the dictionary entry, the main components of which include the entry word, definitions and illustrative part. Some entries may contain labels as well: status, regional, functional or subject labels. The following example, in addition to the main components, illustrates the presence of subject label, denoting the field of knowledge the word belongs to.

Indemnify, verb, /in'dem.nə.fai/, ***(law, specialized)*** *- to protect someone against legal responsibility for their actions. Ex .: 1. He cannot sue, because the government had indemnified the company. 2. The state is required to indemnify employees against civil claims relating to actions taken in the course of their official duties* [1].

Taking into account the differences between the British and American variants of English, we came to the conclusion that British and American English are different language variants, that's why they can't be mixed, especially while working in the field of legal issues. So, in the research process we identified several key differences in spelling, orthography, punctuation and vocabulary. Now we would like to pay attention to some of them.

Firstly, in British English a frequent use of hyphens may be observed [3, p. 76]. Their main function is to connect prefixes with the main word (like in the words pre-emption, co-operation or pre-trial). As for American English, they are less common (preemption, cooperation, pretrial).

Secondly, omission of prepositions is a distinctive feature for American English. For example, an American lawyer may say that "this point is likely enforceable", when his British colleague may say "this point is likely to be enforceable" [3, p. 78].

Thirdly, due to the differences in judicial systems, rules and laws, certain words denoting one concept are different in the two English variants. To illustrate, the British word "flotation" has its American equivalent "initial public offering", or American "common stock" has its British equivalent "ordinary shares".

In addition, some concepts existing in one country are absent in another. In the USA there is no *tribunal system*, instead of it there are *niche courts*, which function is to resolve disputes.

Moreover, American English tends to lengthen the existing word, for example, the British word *transport* can be transformed into American *transportation* [3, p. 78].

In the 3rd chapter the features of the textual functioning of legal vocabulary are researched and the transformations used in translation of legal vocabulary in R. Warren's novel "All the king's man" are analyzed.

According to the results of the analysis, the text often had an equivalent translation, taking into account the fact that for legal texts this method of translation is not typical. To illustrate, let's pay attention to the following examples:

1. I didn't come here ***to make a speech.*** – «Я їхав сюди не для того, щоб **виголошувати промови»** [5; p. 8], [6; p. 10]**.**

2. ***Judge** Irwin has **come out for** Callahan.* – **Суддя** Ірвін **виступив на підтримку** Келлегена [5; p. 27], [6; p. 25].

As there are many significant differences in the English and Ukrainian language systems, as well as inconsistencies in language norms, many translation transformations were used. In addition, many words and phrases reflected cultural features, the translation of which required the adaptation of the text to the target reader.

The following example demonstrates the use of such techniques as addition (well, anyway - "та хоч як воно було"; the application for licenses - "прохання про дозвіл на торгівлю"), modulation (when Repeal came - "коли скасували сухий закон"), concretization (had to use - "звозили"), omission (Mack trucks - "фургони"), syntactic transformations.

Well, anyway, when Repeal came and mailmen had to use Mack trucks to haul the application for licenses over to the City Hall, Slade got a license. - But no matter how it was, and when the dry law was repealed and postmen brought vans to the municipality for permission to trade, Slade got such permission [5; p. 15], [6; p. 16].

Another sentence is the example of compensation used to convey the elements of spoken language. *Hit wuz fahr and squahr, but he had a leetle bad luck. He stobbed the feller and he died.* – «Усе було чесно, як годиться, от тільки не повелось йому. Штрикнув хлопця, а той узяв та й помер» [5; p. 7], [6; p. 9].

So, in our research the main features of the English language of law were characterized, the comparison of British and American legal language was provided, and the transformations used while translating legal words in literary work “All the king’s men” were analyzed. The results of the study can find practical application in new possibilities of its use in the study of Ukrainian legal vocabulary translations on the example of literary works and analysis of the legal terminology peculiarities in dictionaries.

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Distortion of Ukrainian syntax due to the translation of international standards

Introduction. The rapid movement of Europeanization and globalization of Ukraine during the national liberation war is felt at all levels of public life. In the official business sphere, new international standards have replaced the outdated USSR ones. And here the problem arises where it always does - in the national consciousness of the translators of those international standards. The influence of one nation on another is reflected in changes in the language system of the subordinate nation. Given that the main function of language is nation-building, changes in the Ukrainian language system can be used to demonstrate the resilience of the Ukrainian nation to the influence of other nations. That is why there is now an urgent need to draw a clear line between the Ukrainian language and French, German, and English; to lay the foundation that will prevent the tendency for Ukrainian syntax, grammar, word formation, and terminology to become interferential with foreign languages.

The purpose of the thesis is to

1) analyze the translation of English modal predicates in DSTU ISO 9001:2015.
2) analyze the translation of English modal predicates in the article "Model of surfaces roughness in turning of shafts of traction motors of electric cars" by the teachers of the Department of Mechanical Engineering and Materials Science.

The scientific language is characterized by the clarification of cause-and-effect relationships between phenomena, and the syntax of each language is a tool for expressing them.

Based on the works of leading linguists and terminologists, K. Horodenska and I. R. Vykhovanets [1; 2] propose a classification of syntactic constructions commonly found in professional Ukrainian texts, study their compliance with the norms of the Ukrainian language and formulate practical recommendations for their use. In [3], the transformational relationship and semantic distinction of syntactic constructions widely used in professional Ukrainian texts are investigated, and the criterion of activity/passivity common to three-member and two-member constructions based on the syntactic function of the object is formulated. It is proved that constructions with verb forms ending in *-no, -to* and the direct object are not passive. In [4], the difference between impersonal constructions with verb forms ending in -no, -to and subject constructions with common-rooted passive participles are investigated and problematic issues of using Ukrainian verb forms on -no, -to are considered with the involvement of grammatical tradition of other Slavic languages [5].

Let's look at examples of translation of some sentences expressing the requirement in DSTU ISO 9001:2015.

English		Ukrainian
	The customer's requirements **shall be confirmed** by the organization before acceptance, when the customer does not provide a documented statement of their requirements.	Orhanizatsiia **povynna pidtverdyty** vymohy zamovnyka pered yikh pryiniattiam, yakshcho zamovnyk ne oformliuie dokumentalno svoi vymohy. (active constraction)
	When the organization determines the need for changes to the quality management system, the changes **shall be carried out** in a planned manner (see 4.4).	Yakshcho orhanizatsiia vyznachaie potrebu v zminakh do systemy upravlinnia yakistiu, zminy **potribno realizovuvaty** u zaplanovanyi sposib (dyv. 4.4). (active constraction)
	Documented information retained as evidence of conformity **shall be protected** from unintended alterations.	Zadokumentovanu informatsiiu, yaku zberihaiut yak dokaz vidpovidnosti, **potribno zakhyshchaty** vid nenavmysnoho zminennia. (active constraction)
	Conflicting design and development inputs **shall be resolved**.	**Potribno usunuty** superechlyvist vkhidnykh danykh proektuvannia ta rozroblennia. (active constraction)

From the examples above, it is obvious that the authors avoided resultant constructions, although they would have been appropriate in the first and fourth examples: "Vymohy zamovnyka povynni buty pidtverdzheni pered pryiniattiam, yakshcho zamovnyk ne oformliuie dokumentalno svoi vymohy", "Superechlyvist vkhidnykh danykh proiektuvannia ta rozroblennia povynna buty usunuta", because they convey the result achieved, while the second and third examples mean a continuous action that is extended over time.

Let's take a look at an example of a sentence expressing permission in DSTU ISO 9001:2015.

English		Ukrainian
Permission: **May+be+ed**	Conformity to this International Standard **may** only **be claimed** if the requirements determined as not being applicable do not affect the organization's ability or responsibility to ensure the conformity of its products and services and the enhancement of customer satisfaction.	Pro vidpovidnist tsomu standartu mozhna zaiavliaty tilky v razi, yakshcho vymohy, vyznacheni yak nezastosovni, ne vplyvaiut na zdatnist chy vidpovidalnist orhanizatsii stosovno zabezpechennia vidpovidnosti svoikh produktsii ta posluh i pidvyshchennia zadovolenosti zamovnyka. (active constraction)

The example above avoids the obvious resultative nature of the phrase, so it is translated with the active constraction. We suggest the resultant construction: "Dozvoleno, shchob vidpovidnist tsomu standartu bula zaiavlena tilky v razi, yakshcho vymohy, vyznacheni yak nezastosovni, ne vplyvaiut na zdatnist chy

vidpovidalnist orhanizatsii stosovno zabezpechennia vidpovidnosti svoikh produktsii ta posluh i pidvyshchennia zadovolenosti zamovnyka".

Let's look at examples of translations of some sentences expressing capability and possibility in DSTU ISO 9001:2015.

English		Ukrainian
	This International Standard **can be used** by internal and external parties.	Tsei standart mozhut zastosovuvaty vnutrishni ta zovnishni storony. (active constraction)
	The PDCA cycle **can be applied** to all processes and to the quality management system as a whole.	Tsykl ROSA mozhe buty zastosovano do vsikh protsesiv i do systemy upravlinnia yakistiu v tsilomu. (active constraction)
	Understanding the internal context **can be facilitated** by considering issues related to values, culture, knowledge and performance of the organization.	Rozuminnia vnutrishnoho seredovyshcha mozhe buty polehsheno rozghliadanniam chynnykiv, poviazanykh z tsinnostiamy, kulturoiu, znanniam i diievistiu orhanizatsii. (active constraction)
	They **can be conducted** separately or in any combination, as is suitable for the products and services of the organization.	Yikh mozhe buty provedeno okremo chy za bud-yakoho poiednannia v sposib, prydatnyi dlia produktsii ta posluh orhanizatsii. (active constraction)

From the above examples, we conclude that the second, third, and fourth examples describe a feature, not an action, so they should be translated with participles: "zastosovanyi, polehshene, provedeni". Thus, these sentences will be resultative.

Let's look at some examples of translations of sentences expressing possibility and capability in the article "Model of surfaces roughness in turning of shafts of traction motors of electric cars".

English		Ukrainian
	Formation of the machined surface roughness of the traction motor shaft of electric vehicle **can be represented** by a simplified model as an expansion of the real profile on the deterministic and random components.	Formuvannia shorstkosti obroblenykh poverkhon vala tiahovoho elektrodvyhuna mozhe buty predstavleno sproshchenoiu modelliu u vyhliadi rozkladannia realnoho profiliu na determinovanu ta vypadkovu skladovi. (active constraction)
	In addition, it **can be assumed** that since the random component is a consequence of numerous factors that randomly	Krim toho, mozhna prypustyty, shcho oskilky vypadkova skladova ye naslidkom bahatokh chynnykiv, yaki riznoridno i pryblyzno odnakovo

	and approximately equally affect the process of roughness formation, the ordinate distribution of this component obeys the normal law.	vplyvaiut na protses formuvannia shorstkosti, to rozpodil tsiiei skladovoi po ordynatakh pidkoriuietsia normalnomu zakonovi. (active constraction)
	In terms of the vehicle flow distribution the optimal machine parts' life-time **can be calculated**.	Z ohliadu na rozpodil transportnoho potoku mozhe buty rozrakhovano optymalnyi termin sluzhby detalei mashyny. (active constraction)

Conclusion: translators neglect the Ukrainian syntax when translating international standards to convey the resultant meaning in sentences. Modal predicates in English sentences have different meanings, although they are formally conveyed in the same way. The Ukrainian language has all the means to express the active and resultant constructions separately.

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Section 05 Actual Problems of Economy and Sustainability of Economic Development, Globalization and Eurointegration of Industries

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Effect of trends on impulsive buying

The present study analyses impulsive buying as an unplanned purchasing of a product that does not seem necessary until the moment of buying and the effects of trends on impulsive buying.

Impulsive shopping can be considered self-therapy since such a surprise causes an outburst of positive emotions. By rewarding oneself this way, people help their brain produce dopamine. Even though customers may be aware of the negative results, the uncontrollable desire to satisfy their immediate needs pushes them to the irrational spending of money. Such a need also often occurs when there is an actual or false limitation of product availability.

Impulsive purchases are caused by multiple factors. They can be divided into four groups: external, internal, situational, demographic, and social [1]. Figure 1 shows the in-depth components of each factor.

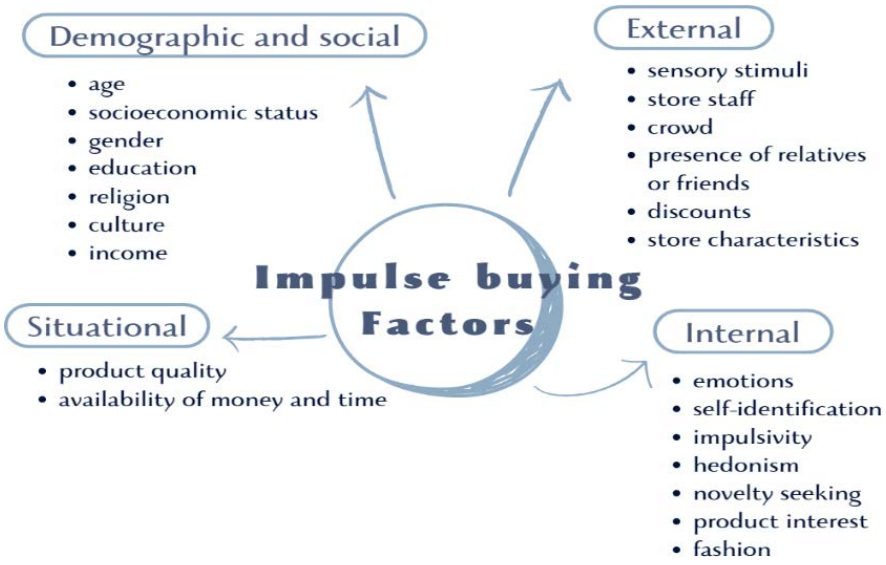

Fig.1 Factors affecting impulse purchasing

In this study, we present the results of the survey that were conducted among students of Dnipro University of Technology concerning impulsive buying. Ninety-one percent of respondents have the experience of spending their money instinctively. For this effect, the placement of goods such as different kinds of sweets, cigarettes etc. is closer to cash registers in stores. The results of the survey also show that during the planned shopping approximately 20% of purchases are impulsive.

The conducted survey demonstrates that customers most often impulsively buy food and beverages. The second place is held by the purchase of make-up and hygiene products, and the third is accessories.

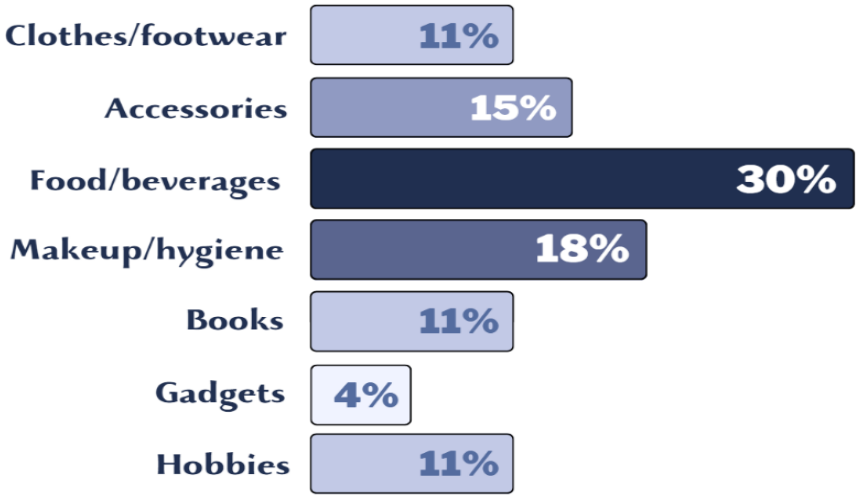

Fig.2 The most popular impulsive purchases

Trends are reflections of what is happening in the world at a given moment in time. They demonstrate moods, thoughts, and desires but also have their impact. Thus a codependent closed circle exists. Since the main driving force of trends is society, those who influence a large audience (stars, politicians, and social media figures) play almost a primary role in their formation.

Advertising does not always work in such a way that immediately motivates a person to buy a specific product. Sometimes it leaves its mark on the subconscious level and can work unpredictably. Trends master that task. How does it happen? In society, a need appears regularly. Everyday affairs always take the first place in people's thoughts, and desires fade into the background. At the same time, trends still exist, companies produce goods, advertisements are broadcast around, social networks are filled with particular topics, and even personal conversations can briefly mention popular themes. Consequently, a certain thought in the subconscious is formed. After that, under the influence of the factors that were described above (glum mood, discounts, income, crowd, etc.), when a person notices a product connected to a trend, a craving occurs.

The example of a trend is a consequence of the global pandemic that started in 2019 and turned life upside down. With everyone's anxiety about their well-being, their stress levels have risen significantly. Not only that COVID-19 was a health crisis, but it also impacted costumer’s behaviour. The internal need to purchase both essential and unnecessary products increased and the sanitation trend was created [2]. Slickdeal’s analysis conducted by OnePoll (an international market research agency) showed that this depressed state of mind and uncertainty about the future intensified the frequency of impulsive buying by approximately 18%. Three quarters of buyers confirmed that most purchases tended to be spontaneous. That was 14% more than the previous year [3]. Researchers also found that during the coronavirus pandemic

American customers were most prone to impulsively buy hygienic products with first place taken by cleaning supplies – 42% [4].

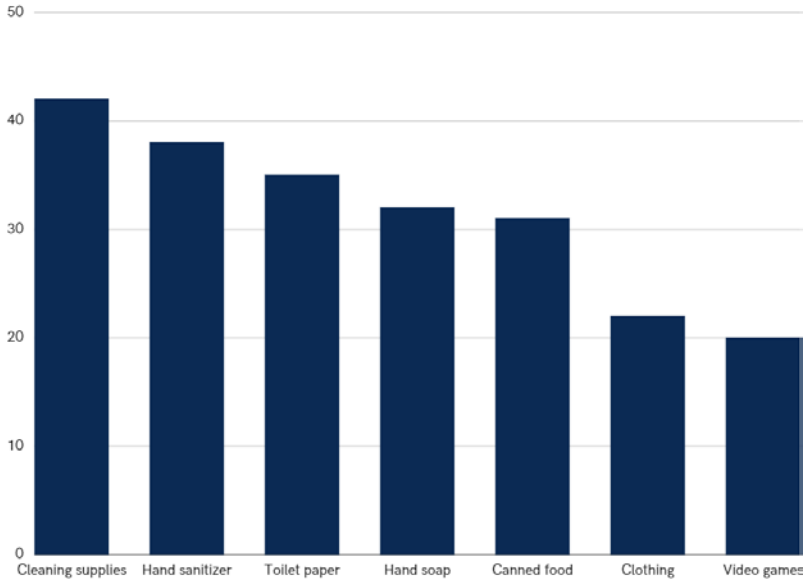

Fig.3 Top pandemic impulse buys

The COVID-19 pandemic is an example of the terrible circumstances leading to a health-care trend that changed not only the everyday life of everyone but their purchasing experiences.

As the survey shows, trends have a great influence on a frequency of impulsive buying as they form customer needs.

The results of this study can be useful for further exploration of the effect of impulsive purchasing, what impact it, and how it changes the buyer's behaviour.

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Liberalization of the Ukrainian railway transport

Ukrzaliznytsia (Ukrainian Railways) is indeed one of the largest cargo and passenger carriers in Ukraine. As a state-owned enterprise, it responsible for the management and operation of Ukraine's railway infrastructure, including tracks, locomotives, and freight and passenger cars, as well as providing related services such as maintenance, repairs, and logistics. The company plays a significant role in the country's economy providing vital transportation services for goods and passengers, maintaining crucial infrastructure, and employing a significant number of people. Despite all of this, the industry has been facing significant problems for a long time, which complicate its work and reduce the quality of services.

One of the most serious problems is outdated equipment that has limited opportunities for modernization. Most of the rolling stock are aging, with some equipment over 30 years old. This leads to a deterioration in work efficiency, an increase in the time and costs of repairs and maintenance, and safety concerns. The decrease in the volume of freight transportation is also a problem that reduces revenue and leads to decreased competitiveness in the market. The lack of investment and sufficient funding complicates the process of modernization of railway infrastructure and vehicles.

Incomplete or imperfect legislation is also a hindrance to the effective work of the railway. Government intervention can create uncertainty for businesses and hinder development and modernization.

Eventually, a significant issue is the monopolistic position of the company in the field of railway transportation in Ukraine, which leads to a lack of incentives to improve the quality of services and reduce prices for them, since there is no competition that would drive the market.

The European experience can be beneficial for understanding how to overcome these problems. Since the 1970s, the railway market structure of European countries was similar to that of Ukraine. Eventually, all state monopolies began to decline. Without competition, companies became inefficient, tariffs increased, and debts accumulated. European experience has shown that having a vertically-integrated state monopoly is inefficient. As a result, railways started losing competition, especially to road and air transportation. To address the situation, European countries began implementing liberalization reforms.

The liberalization of Ukrainian railways means the implementation of competition in the railway transport market. Private companies that own locomotive fleets will become participants in the market together with Ukrzaliznytsia. This means that private companies will be able to operate their own locomotives and participate in the railway transportation market alongside the state-owned

Ukrzaliznytsia. This opens up new opportunities for competition and investment in the railway transport sector. Private companies may also bring in new technologies and innovations that can improve the efficiency and quality of railway transportation services. This will allow railway transport to become more attractive to investors as an open market creates more business opportunities. In addition, this can help railway transport reduce costs and improve the quality of services.

Furthermore, the liberalization of the railway system can increase the efficiency of cargo transportation and increase the volume of passenger transportation. Competition can lead to lower costs of transportation for both cargo and passengers, making rail transport more attractive for consumers.

The liberalization of the railway is associated with several challenges, including the need to reform Ukrainian Railways. One of the main tasks in reforming railway transport is the separation of functions, that is, the separation of infrastructure and transportation. This is a common model in the EU, where the state-owned company owns the tracks, and transport services are competitive. This will ensure neutrality of the infrastructure and equal conditions for all market participants, as well as provide transparency and efficiency in the management of railway infrastructure.

In order for the liberalized railway market to function effectively, it is necessary to create a regulatory body that will be responsible for monitoring and regulating the activities of different market players: issuing licenses and certificates, allocating lines for carriers, and addressing discriminatory complaints. This will ensure compliance with safety standards and competition rules, as well as facilitate effective interaction between different players in the market.

A change in approach to the funding of passenger transportation is necessary. In particular, it is important to ensure socially important interregional and suburban transportation. To achieve this, compensation for transportation services can be used, which should be included in the state and local budgets. This will ensure the availability and quality of passenger transportation, especially for those citizens who live in remote areas or in rural areas far from city centers. Providing stable funding for such transportation will help reduce social isolation and increase the level of mobility of the population.

The liberalization of railway transport can provide a new boost to the development of railway transport and the economy as a whole. Railways can become more competitive and efficient, providing fast and high-quality transportation for passengers and goods. Railway transport can become more accessible and convenient for passengers, as well as more advantageous for freight owners. To achieve these benefits, it is necessary to maintain competition in the railway transportation market, ensure quality service, and develop technologies and infrastructure.

In conclusion, the liberalization of railway transport will be an important step for the development of the Ukrainian economy and ensuring a more efficient and competitive railway transport. However, it is necessary to carry out reforms and take necessary measures to ensure a successful transition to the liberalized railway transport market.

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Applicant behaviour in the context of marketing interactions

The current stage of development of the educational services market in the context of market economy and globalization is characterized by significant transformations and instability of the external environment. Higher education institutions (HEIs) have created an environment of perfect competition. This «red ocean» has almost destroyed the distinction between public and private HEIs, which, in turn, leads to the need to intensify marketing activities.

An applicant is exposed to external and internal factors of influence when choosing a higher education institution. Under the influence of these factors, the applicant forms the perception of a particular alternative. The best way to interact with an applicant is to understand what affects them and to what extent. Therefore, a decision-making model for the applicant has been developed. In a broad sense, consumer behaviour in the educational services market can be divided into three stages that consumers go through as participants: applicant – student – graduate.

In the first stage (figure 1), an applicant realizes the need for higher education, guided by his or her motives, the importance of which differs from person to person. The next stage is the search for information, which in turn is divided into external (using external sources of information) and internal (learning experience, motivation, availability of necessary knowledge, intuition, prejudice, etc.). The evaluation of alternatives takes place in two directions: the speciality (based on the factors that determine its choice) and the university itself (the evaluation also depends on the importance and priority of the attributes of the university for the applicant).

Even though the figure shows generalized factors influencing an applicant's choice of a university, many years of experience indicate that each of them needs to be handled differently. Therefore, in 2022, marketing research was conducted to identify identical types of applicant behaviour as a consumer.

The research identified 5 types of applicants' behaviour (school and college graduates), which received their respective names – «Child with a vocation» (graduates of GSE institutions who have chosen a speciality but have not chosen a university), «Unrepentant souls» (graduates of GSE institutions who have not decided on either a speciality or a higher education institution to enter), «Ideal child» (applicants who have decided on both), «Two-stage education» (entering the same speciality as previously obtained in a PHEI), «Researcher» (choosing a speciality different from the one obtained in a PHEI). The sixth type of applicant behaviour is «Conscious». These applicants have received a bachelor's degree and work in their speciality, motivated to improve their skills and career growth.

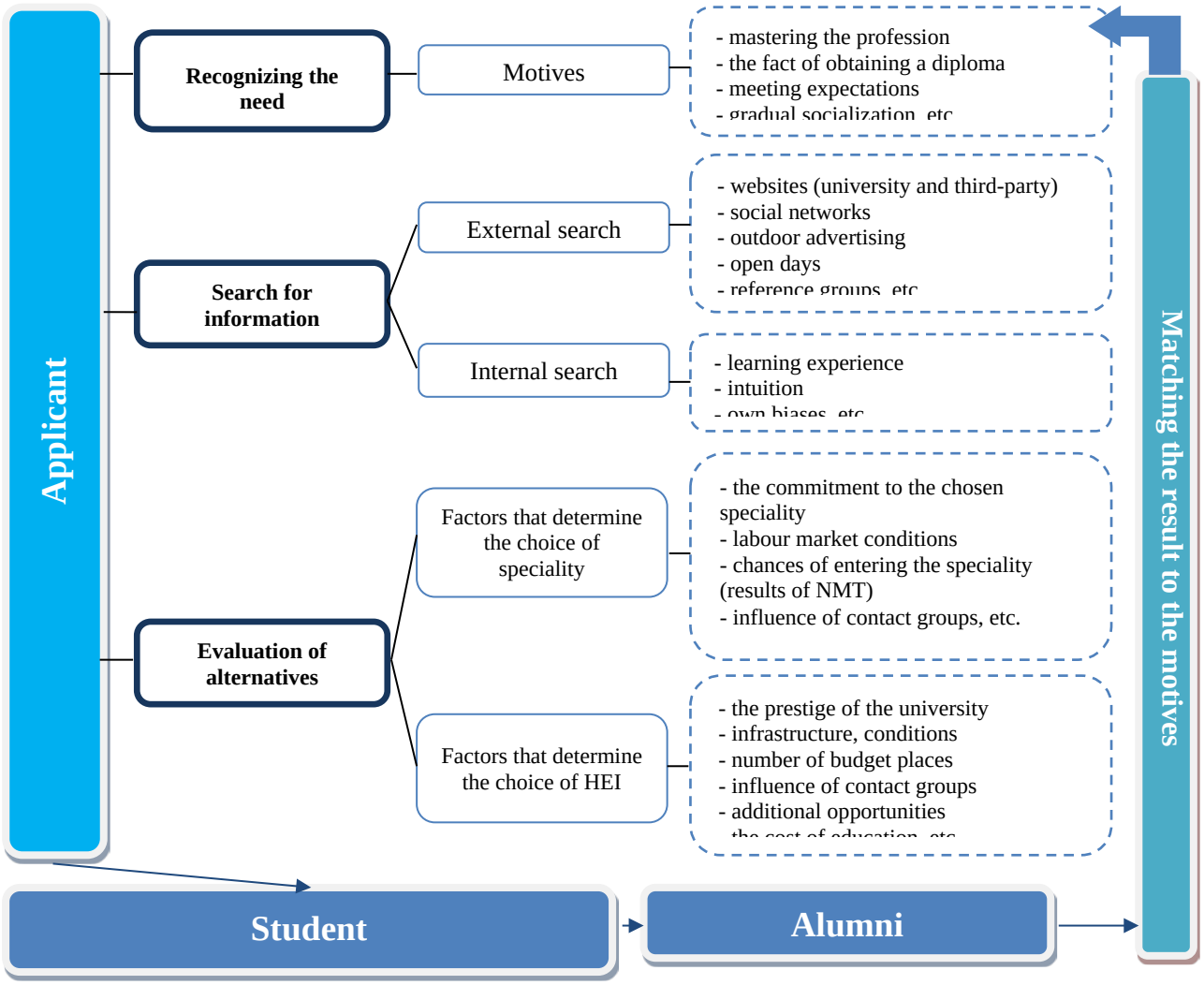

Fig.1 Decision-making model for the applicant

As for the applicants who chose the Dnipro University of Technology, the most common types of behaviour are «Child with a vocation» (34.85%) and «Unrepentant soul» (28.03%) – figure 2.

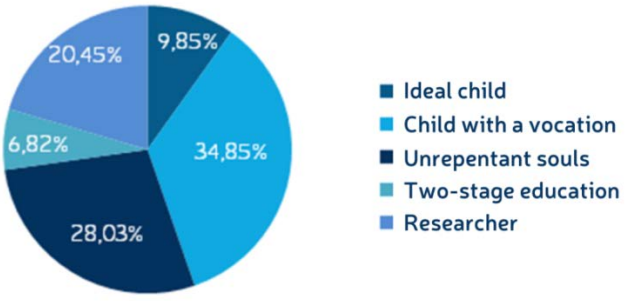

Fig. 2 Types of the behaviour of applicants who choose Dnipro University of Technology

But this does not mean that other types of applicant behaviour should not be taken into account, including «Conscious». This is why the power of marketing influence has been studied and influencing attributes have been identified (table 1).

Table 1. Factors that influence applicants by the type of their behaviour

	Reference groups	Cooperation between GSE institutions and HEIs	Additional opportunities	Infrastructure	Study conditions	The prestige of the university	Preliminary department	Feedback from third parties online	Competitive assessment for entry	Communication with HEIs	Cost of education	The degree of marketing influence
Ideal child	+	+	+	+								Weak
Child with a vocation	+		+		+	+	+				+	Strong
Unrepentant soul	+			+	+			+	+	+	+	Strong
Two-stage education			+		+						+	Medium
Researcher	+			+	+			+	+		+	Strong
Conscious	+		+	+		+						Medium

It is worth noting that representatives of the «Two-stage education» group in 77.7% of cases choose the HEI to which their IPD belonged as a structural unit, while the «Researcher» group does the opposite (in 81.5% of cases choose a HEI to which their IPD did not belong as a structural unit). The most demanding type of behaviour is «Conscious». Applicants of this type have specific requirements for a HEI based on their previous study and work experience.

Unfortunately, the marketing department cannot influence all the factors mentioned above. Therefore, the following measures were proposed and implemented during the admission campaign:

- open day in the online format;
- offline university tours (conducted by students);
- express courses to prepare for the NMT;
- creating an applicant's guide;
- launch of targeted advertising in social networks;
- involving students in publishing reviews, including in video format;
- appointing a person responsible for relations with third-party sites;
- creating a section in social networks «Your opportunities»;
- FAQ chatbot for applicants in Telegram with answers to the most frequently asked questions about admission and the educational process;
- an anonymous chatbot to improve the quality of student feedback.

It is almost impossible to measure the effectiveness of a single activity. Because, as mentioned earlier, all factors work in combination and there is variation within the applicant group. If we measure the enrolment statistics, in 2022 the Dnipro University of Technology had a record number of 2,656 applicants (for Bachelor's degrees), previously this number did not exceed 2,100.

In conclusion, it can be said that the effectiveness of the activities proposed was high. That is why it is important to include market research in the activities of universities.

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Management 4.0 or management in the world of artificial intelligence

Management 4.0 can be called the fourth industrial revolution, characterised by the rapid development of artificial intelligence, robotics and other innovations. The first industrial revolution was characterised by mechanisation, the second by electrification, and the third by informatisation.

As of 2023, the following types of artificial intelligence already exist: face recognition for unlocking phones, social media, messaging, voice assistants, and search engines. According to GlobalData [1], the AI market will be worth $52 billion in 2024, while in 2019 it was $28 billion. Therefore, in the future, we can expect a concept similar to Moore's Law [2], based on AI. Such rapid changes in production process organisations are a factor in the growth of staff anxiety, which contributes to increased staff turnover, poor performance and reduced job satisfaction.

The 3 previous industrial revolutions were based on authoritarianism, hierarchy and centralisation in the 1st, scientific systematicity and rationality in the 2nd, and humanity, democracy and decentralisation in the 3rd. The 4th industrial revolution will be based on technological process with the least human intervention. It is time to start embracing the new world of artificial intelligence and see new opportunities.

Oracle and Future Workplace [3] conducted a study of 8,370 employees, managers and HR executives in 10 countries and found that almost 75% of employees are optimistic about working with artificial intelligence and robots. It was also found that most employees trust orders and seek advice from a robot rather than their managers. In such circumstances, the role of managers is evolving and focusing on softer rather than harder skills. The survey also showed that robots are better than managers at providing unbiased information, keeping to work schedules, solving problems, and managing budgets, while managers are better at empathising, training, and creating a work culture.

In Ukraine, in December 2020, the Cabinet of Ministers approved the concept of artificial intelligence development until 2030 [4]. This is a fairly new area for Ukraine, and the Ministry of Digital Transformation hopes to attract billions of dollars in investments and integrate innovative technologies into economically important sectors of the country. The concept covers 9 areas of artificial intelligence application. It is planned to actively introduce artificial intelligence to automate most of the work and improve the results obtained, and it is also planned to conduct massive training to acquire new qualifications through personnel in each sector of the state. This proves Ukraine's readiness to automate and robotise some of its work processes.

Therefore, the replacement of managers with artificial intelligence is becoming ambiguous. On the one hand, the Fourth Industrial Revolution may replace managers in some functions, such as routine administrative tasks, quality control, data analysis, and algorithmic decision-making, while on the other hand, it will help create new roles and requirements.

It is worth highlighting the following opportunities for managers and executives to use and collaborate with artificial intelligence:

- Using new technologies to improve the productivity, quality, innovation and competitiveness of their organisations.
- Developing new business models and strategies that leverage the potential of the Internet of Things, big data analytics, artificial intelligence, augmented reality, etc.
- Developing new forms of organisation and management based on network structures, group innovation, flexibility and adaptation.
- Developing new skills and competencies that enable effective management of smart machines, cyber-physical systems and digital ecosystems.
- Ensure the security and confidentiality of data exchanged between different devices, systems and stakeholders.
- Addressing social issues and challenges arising from the Fourth Industrial Revolution, such as job loss, disqualification, stress, inequality and social instability.
- Gaining access to global markets and resources through digital platforms and networks.
- Gaining access to global markets and resources through digital platforms and networks.
- Establishing partnerships and cooperation with other organisations, public institutions and civil society to solve complex problems and create public good.
- Attracting and retaining talented employees through flexible working arrangements, training and development, motivation and recognition.
- Focusing on building strong relationships with employees and establishing their roles

AI is not a threat to managers - it is an opportunity for them to grow and develop professionally. To adapt to these changes and opportunities, managers need to develop their skills and competencies in areas where AI is still not superior to humans. These areas include creativity, emotional intelligence, critical thinking, communication and leadership.

One example of a company that puts artificial intelligence on a par with managers is AIsthetic Apparel [5]. It is a startup that sells eco-friendly T-shirts with neural network-generated prints. In his article, Danylo Yevzhenko [6] says that this startup was invented and developed by the chatbot GPT-4, which was the CEO of the project, on the initiative of João Ferrao dos Santos. GPT-4 handled all business-related issues, such as choosing a name, creating a business plan, searching for

investors, setting up an online store, and more. Within a week of working on the startup, GPT-4 became profitable and received its first orders. This demonstrates that artificial intelligence can be a creative and savvy startup manager without requiring any human assistance.

Artificial intelligence, robotics and other innovative technologies are a new step for management. The managerial profession will have a different meaning and will require only a fraction of the skills and characteristics that exist in 2023. And achieving the best results will be conditioned by the cooperation of employees, including managers, with artificial intelligence. You also need to be aware of job cuts and constantly improve and develop yourself, increasing your chances of keeping your job. But even as anxiety and worries increase, it is worth remembering that artificial intelligence brings global changes and new opportunities.

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Problems of the rehabilitation system development in Ukraine during the War

The development of the rehabilitation system (RS) in Ukraine has been put on the back burner for decades. Now that the country has been in a full-scale war for more than a year, the development of the RS has become a promising and crucial area of work for the relevant ministries. It is worth noting that persons liable for military service aged 18 to 60 are subject to general mobilisation, and these individuals make up the bulk of the working-age population. Accordingly, if this age group does not receive quality rehabilitation services and cannot return to pre-martial law life and work after the end of martial law, it will be of great economic importance and will cause damage to the country's economy.

The issue of rehabilitation development arose in 2014 with the start of the Anti-Terrorist Operation (ATO) in Eastern Ukraine. Accordingly, the number of patients in need of rehabilitation began to grow in 2014. About 9,000 servicemen have been injured since the beginning of the ATO in 2014. More than 121 thousand soldiers were granted the status of combatants [7]. Thus, according to the Cabinet of Ministers of Ukraine, in 2015 and 2016, more than 10,400 participants of the ATO received psychological rehabilitation at the expense of the state budget [5]. Since February 2022, the need for rehabilitation services has increased dramatically, and medical facilities have not been physically prepared to provide a large number of services. Unfortunately, accurate data on the number of servicemen and women in need of rehabilitation services, including prosthetics, is currently classified by the Ministry of Defence of Ukraine. According to the Office of the United Nations High Commissioner for Human Rights, between 24 February 2022 and 13 March 2023, 13,734 people among the civilian population alone were injured [12]. There are more than ten thousand people who have undergone certain amputations. They will need prosthetic and orthopaedic products [9]. Obviously, in order to provide assistance to such a large number of patients, there needs to be a sufficient number of rehabilitation centres and specialists. In 2016, less than 30 institutions provided rehabilitation services to ATO veterans in Ukraine [3, p. 6-12]. According to the National Health Service of Ukraine (NHSU), as of March 2023, they contracted 244 medical institutions with inpatient rehabilitation services for rehabilitation packages [11]. This is the largest number of medical institutions in the history of Ukraine that will provide rehabilitation services. The reason for such a large volume of contracting is the flagship project of the Ministry of Health of Ukraine "Development of the Rehabilitation Care System" and the funding of the relevant NHSU rehabilitation packages [8]. It remains to be seen how many patients these medical facilities will be

able to accommodate and whether their capacity will be sufficient. It is important that rehabilitation services in Ukraine should be provided to all patients free of charge.

It is worth noting the existing shortage of rehabilitation specialists. According to statistics, in December 2020, there were 68 doctors of physical and rehabilitation medicine (FRM doctors), 395 doctors of physical therapy and sports medicine, and 831 physiotherapists in the country [1, p. 59]. For comparison, in Canada, there are 25,000 physical therapists and 9,000 occupational therapists per 35 million people [10]. As of March 2023, 1691 rehabilitation medicine doctors and almost 7,000 rehabilitation specialists were registered in the Electronic Healthcare System in Ukraine [11]. The NHSU notes that the number of users in the Electronic Healthcare System will continue to grow, as the registration of all healthcare professionals continues until all 100% of healthcare facilities and, accordingly, 100% of healthcare professionals working in them are registered [6]. In any case, the increase in the number of specialists should be made up of graduates. It takes 8 years to train an FRM doctor, and 5 years to train a physical therapist or occupational therapist. If we take into account the number of applicants for these specialties, we can note an increase in the period from 2018 to 2020, but already in 2021 there is a sharp decline in the supply of specialty 227 "Physical therapy, occupational therapy" at the first (bachelor's) level of education by 39.5% and at the second (master's) level of education by 23.7% [1, p.63]. In the period 2018-2022, less than 100 graduates obtained the specialty 227 "Physical Therapy, Occupational Therapy" at the second (master's) level of education [1, p.63]. If the trend continues, the demand for specialists in this speciality will not be met, and medical institutions will not be able to cover the existing number of patients with their services.

Another option to increase the number of FRM doctors could be the secondary specialisation of doctors of other specialties. In this case, specialisation lasts four months [2]. The limitation of this option is that the application for specialisation can usually be submitted only once a year, a limited number of educational institutions provide specialisation, and the number of graduates does not exceed several dozen. This option of increasing the number of specialists could meet the needs, provided that specialisation courses are held 2-3 times a year. Another problem with this method is the need for a specialist to first work for three years in the major speciality before being legally entitled to a secondary specialisation.

The quality of training of specialists and the quality of rehabilitation services they provide require special attention. In 2016, members of the World Health Organization (WHO) advisory mission noted that "immediate organisation of education and training courses for rehabilitation professionals with international support is needed" [4, p. 23]. The report also stated that "rehabilitation professionals are not trained by international standards" [4, p. 22]. Thus, it can be understood that the quality of professionals and, accordingly, the services they provided were low and did not meet the required international standards. Patients were the first to suffer from such services. It is currently difficult to assess the quality of rehabilitation services, but given that the reform of this area is still ongoing, it is unlikely that much progress

has been made in RS since 2016. It is the quality of RS that could be the subject of further research.

It can be concluded that RS in Ukraine is developing rapidly, as well as the number of patients in need. A considerable step for the development of RS could be to increase the number of specialists, which would create competition in the service market and, as a result, encourage specialists to develop under the international standards. An equally important factor in the development of RS could be the state order for rehabilitation specialities, as well as relevant changes in the system of secondary specialisation of doctors.

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Trends of river logistics in Ukraine

River logistics is one of the most relevant topics of Ukrainian logistics in recent years. Ukraine has such big rivers as the Dnieper, the Dniester and the Southern Bug that flow into the Black Sea. These rivers are quite powerful and pass through Ukraine's largest cities and across the country. So, Ukraine has various ways to develop river logistics, both passenger and cargo transportation. At present, not all modes of transport have the same transportation volumes, and not all modes of transport have been able to adapt to market conditions, the transition to which was accompanied by a series of political, economic and other crises. As a result, waterborne transport (river and sea) has practically lost its market share, which is currently less than 1% [1].

Currently, the situation with river transport is stable, mainly in cities where it serves as urban transport or is used for tourist and entertainment purposes; in addition to the seasonality inherent in this type of transport, it also operates only under favourable weather conditions.

Currently, the river ports and terminals are isolated complexes that have little or no interaction with the economy of the city or region where they are located. City ports need to be updated and developed in terms of both passenger and cargo transportation. The vast majority of them are not multimodal; they do not have a water-rail logistics connection: multimodal connections are usually available at river ports, but are not used due to the isolation of the organization or system of their mode of transport.

Value-added logistics in ports is limited. River ports/terminals are focused on bulk cargo not containerized cargo. In response to this, there are proposals to change the role of ports, in particular through the development of logistics zones. Typically, a logistics zone consists of [2]:

- public infrastructure such as roads, waterways, berths, railways, and electricity supply;
- superstructure of private or public interaction, such as a terminal, cargo handling complex, and public warehouses;
- private superstructures such as warehouses, private real estate, service complexes, small industrial facilities.

The logistics zone may also include individual facilities such as distribution and consolidation centres, open warehouse areas, transhipment complexes, vehicle maintenance and repair garages, end-to-end warehousing, or transit connections.

A typical logistics area of 40 hectares in a river port [2]:

- generates between 300-500'000 tons of cargo on waterways;
- creates 3'600 direct jobs and 7,200 additional indirect jobs;
- generates revenue for the state through land lease and income tax.

During martial law, a significant volume of grain has been transported by river transport as an alternative to sea transport. Potentially, this is the cheapest method of cargo logistics, which is more profitable, compared to rail. The potential of river transportation of grain in Ukraine exceeds the indicator of more than 15 million tons, but in fact, it is much smaller. The reason for the incomplete realization of the potential of this logistics direction is the need to carry out large-scale dredging of rivers, first of all, the Dnieper, the lack of cargo ships and the need to develop the river port infrastructure as a whole [3].

In the current conditions, market participants together with the Ukrainian authorities continue to search for opportunities to redirect export supplies to the European Union by alternative routes – by river transport along the Danube River to Romania.

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The impact of sustainable practices on firm performance

Nowadays, the negative impact of companies on environment is huge. People's awareness of the damage to nature is growing. This awareness initiates political debate and influences consumer choices worldwide. Political leaders from different countries are focused on low emissions, deforestation and other ecological problems solutions [1]. Consumers are more engaged in the impact they have on the environment with their consumption [2]. They are willing to pay extra for sustainable products (Fig. 1) [3]. These factors influence the way big firms produce and deliver their products. Companies are applying sustainable practices to increase their sales. Additionally, the government is supporting such practices with subsidies. On the other hand, new trends lead to the increased taxation of unsustainable materials used during the production cycle [4]. Consequently, some firms have a great competitive advantage over “unsustainable” competitors. However, the question is whether the high costs of switching to more sustainable practices are of concern for some firms.

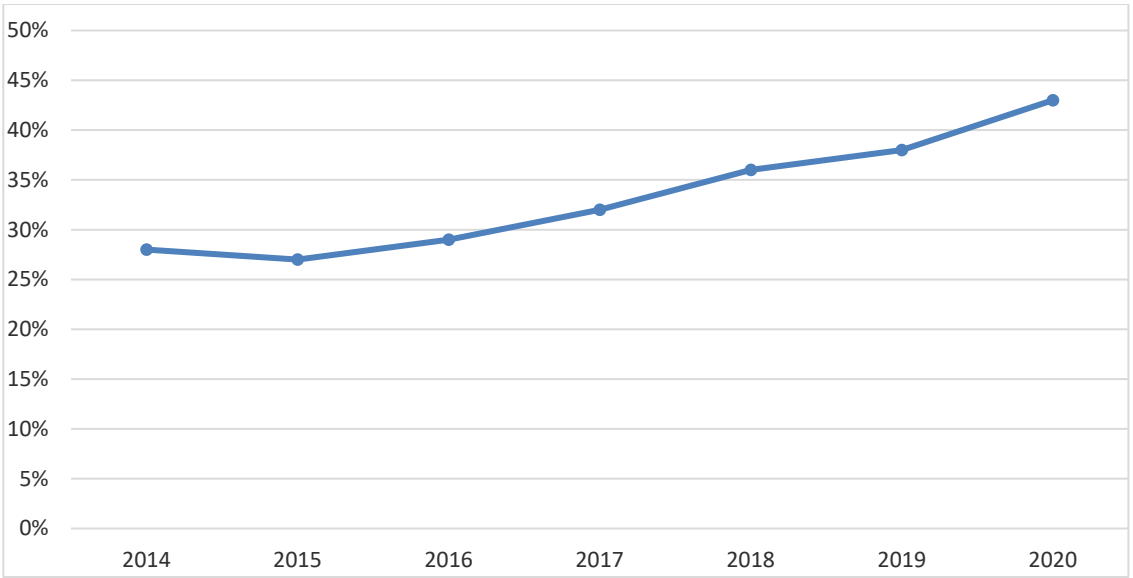

Fig.1 Percentage of consumers that are paying more for sustainable products in the Netherlands

In this thesis, sustainability will be discussed in the context of whether it can increase the firm’s performance considering shareholders’ interests. Sustainability is viewed as reasonable consumption at present, without a negative impact on the ability to consume in the future. In an economic context, sustainability can be applied to achieve higher markups and increase revenues. The reason for that is new trends for

sustainable consumption. Furthermore, in a legal context, the right to sue and impose tax burdens on unsustainable businesses has been recently granted by current legislation in countries around the world [5].

The firm performance can be assessed in different ways, such as shareholders' revenue, stakeholders' benefit, and environmental impact. Shareholders play an important role in the firm, as they are the fuel of the company. According to shareholder theory, the role of the firm is to maximize shareholder return [6]. The opposite of shareholder theory, stakeholder theory asserts that shareholders, suppliers, employees, consumers, and others affected by the production of the firm should benefit from it [7]. Societal standards regarding arising environmental issues, put a limit on the benefits of shareholders, in favor of the stakeholders, even though shareholders expect reasonable returns on their share investments.

Corporate social responsibility practices guide firms on how to take responsibility for the impacts they are making during the production and delivery of goods. Following those guidelines can help companies balance between responsibility to stakeholders and their benefit and shareholders' returns (Fig. 2) [8]. CSR reports are disclosed voluntarily and provide information about environmental impact, social impact, corporate governance, and ethical practices.

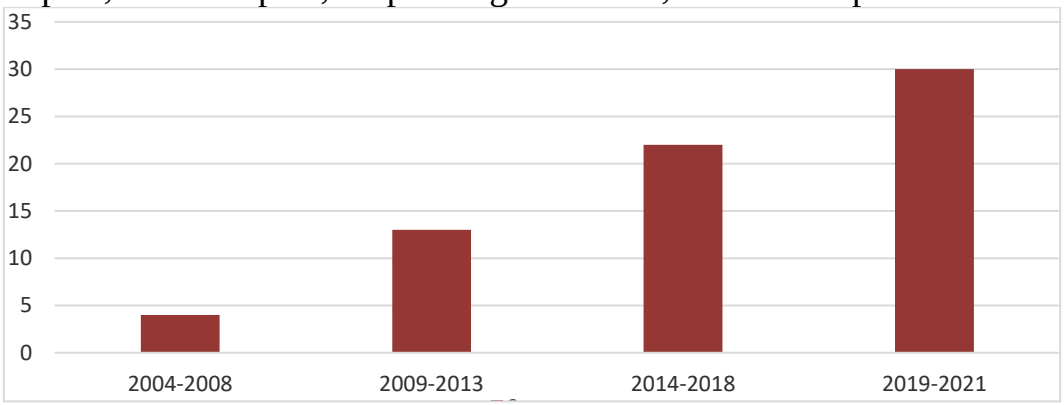

Figure 2. Corporate social responsibility communication growth over the years

Firms with positive CSR reports are viewed as better firms and, therefore, have a higher fundamental value [9]. This can lead to higher shareholder value and increased investor preference. Companies that perform well in CSR are likely to report on CSR performance along with their financial statements [10]. The lack of CSR reports would indicate the opposite and can cause strikes, further investigations, and negatively affect the firm. Therefore, it can stimulate the share price to drop, which will unfavorably affect shareholders.

Consequently, potential shareholders would favor firms that are publicly showing their CSR reports. In addition, CSR activities improve the firm's reputation and provide a positive image.

Despite that, there is evidence that mandatory CSR spending can decrease the share value [11]. The explanation behind this is that firms that have CSR spending above the mandatory are not influenced by this law. Yet, companies with CSR spending lower than mandatory, increase their expenditures on the cost of revenues. However, before the new legislation, most companies allocated their CSR costs

according to the negative impact they had on the environment. Although mandatory spending shows a negative side of CSR practices, many countries oppose the introduction of a single mandatory CSR contribution for all companies.

To conclude, CSR and sustainable practices show the firm's positive performance. Firms are gaining a competitive advantage and reputational gains by being engaged in CSR activities. This leads to the increased shareholder value due to an increase in share prices and increased stakeholder benefit as society is benefiting from the accountability of the company's actions.

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Possibilities of implementing the ideology and components of the "Marshall Plan" in the post-war reconstruction of Ukraine's economy

The destruction of Ukraine's economy by Russian aggression objectively shapes the desire in the country and our Western partners for post-war reconstruction on the basis of implementing powerful programmes that combine innovation and successful international experience in solving such global anti-crisis projects.

The phrase "Marshall Plan" is used in the world to mean «a global anti-crisis recovery project, a large-scale programme of socio-economic reconstruction». Therefore, Ukraine's post-war economic reconstruction should be guided by the ideology and applying the positive experience of implementing the components of the «Marshall Plan» adapted to national conditions.

"The Marshall Plan" was put forward by US Secretary of State George Marshall in June 1947 and was a programme of economic support for European countries after the Second World War. It was based on the idea that with the help of America, the countries would restore industry, trade, production, reduce the share of imports, sources of foreign currency, and reduce inflation in European countries by investing in industries where it was extremely necessary. The programme lasted from the summer of 1947 to December 31, 1951, and brought significant economic success to those countries (GDP growth, production, trade) that received US support. In addition to the economic sphere, the general standard of living in these countries increased significantly.

Ukraine did not receive financial support at that time because of Stalin's policy of rejecting it. As an independent state, the first discussions on the implementation of the "Marshall Plan" began in 2007 in connection with the global financial and economic crisis and continued in 2014 and 2022 due to Russian aggression, which led to significant destruction and economic decline.

To date, the President of Ukraine has already established a National Council for the Recovery of Ukraine from the War, which is analogous to the Economic Cooperation Administration. One of the tasks of the National Council is to structurally modernize and restart the economy, as well as restore all types of infrastructure, energy, communications, social protection and cultural heritage. This advisory public authority should coordinate and accumulate money for Ukraine's reconstruction, coordinate schedules for international assistance, and moderate the development of a reconstruction programme and the implementation of practical reconstruction measures. This institution should be independent and not coordinate its actions with political forces [1, 2].

At the beginning of the implementation of the components of the national "Marshall Plan" and reconstruction in general, it is necessary to reduce the degree of

influence of factors on the part of the state that may be obstacles in this matter. These factors include uncertainty in losses due to the impossibility of predicting the timing of the end of the war, demographic problems of the country, corruption, imperfect financial legislation, lack of resources and political instability [3]. In addition, the state needs to deregulate the economy and minimize interference in the business activities of business entities.

The next component of the “Marshall Plan” that Ukraine can borrow is the identification of those spheres and industries that need investment the most. Of course, all industries and spheres suffered from the war and should also be addressed by the National Council for the Recovery of Ukraine from the War, but there are those that are critically important for the economy. First and foremost, these are traditional strategic industries such as metallurgy, machine building, and oil refining. It is not just about investing in these industries, but also about their technical and technological modernization based on the principles of innovation. Then these industries will be able to produce more competitive products. It is also worth reducing the supply of raw materials through the introduction of new technologies and exporting finished products that have increased added value and are therefore economically beneficial. In addition, it is necessary to increase attention to the IT sector, which is actively working during the war and will be able to work in the post-war period and become a new opportunity for economic development [3].

Ukraine needs to reconstruct the energy infrastructure that was damaged by missile strikes. The defence sector and aerospace industry need significant technical and technological upgrades. Ukraine suffered many losses due to the destruction of all types of infrastructure. The building of new housing, hospitals, educational institutions, enterprises, and other facilities requires the most funds [4].

In addition to upgrading enterprises in technical and technological terms, significant attention should be paid to their management. Recruiting highly qualified personnel should be a priority for them. Education plays an important role in this, and it also needs money. Also, the development of certain industries and spheres helps to create jobs. After identifying the main spheres and industries where investment is most needed, it is time to start looking for their sources. It should be noted that the projected losses as of the end of December 2022 amounted to $700 billion. To date, Ukraine’s recovery funds have already been created in various areas: a fund to support small and medium-sized businesses, a humanitarian fund, a fund to support the army, a fund for servicing and repaying public debt, a fund for economic reconstruction and transformation, a fund for restoring the property and destroyed infrastructure, and a separate fund for the recovery of Ukraine is planned [5].

The main sources of these funds could be the World Bank, the International Monetary Fund, the European Bank for Reconstruction and Development, the European Investment Bank, international companies, charitable foundations, as well as Ukraine's own budget and gold and foreign exchange reserves. Theoretically, Russian frozen assets and reparations are possible sources, but they should not be counted on due to the legal complexity of transferring them to Ukrainian accounts. Moreover, today there is a financial services platform called “UNITED 24”, created

at the initiative of the President of Ukraine. It receives funds to the accounts of the National Bank of Ukraine, which are directed by the relevant ministries to the most important needs in three areas: defence and demining, medical care, and the reconstruction of Ukraine [6].

Thus, the post-war reconstruction of the destroyed infrastructure and the creation of new economic clusters for economic development, as well as the reconstruction of social infrastructure, should be based on the priority, the dominant use of modern scientific approaches in planning, organizing, managing such activities, implementing innovative technologies of production and management, and mutually beneficial cooperation with democratic countries and other stakeholders. No doubt, it is possible to implement the components of the "Marshall Plan" adapted to national realities in the post war reconstruction of Ukraine's economy. To do this, a clear mechanism for such a transformation needs to be developed, which will begin with the creation of institutions to identify the financing needs of industries and spheres, and end with the creation of funds and the search for sources of financing. An important feature is the transparency of this scheme to show partners that the funds they allocate are used for their intended purpose. However, it is impossible to narrowly consider the "Marshall Plan for Ukraine" only from the point of view of financial support for reconstruction. The ideology of such a plan should be based on the modernization of not only the economy but also all other components of civil society: patriotism, democratic governance, the rule of law, education and science.

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Fintech innovations: new challenges and opportunities for the development of financial services in Ukraine

One of the modern trends in the development of financial services is the increasing level of digitization and the growing spread of FinTech innovations. More than half of financial services users prefer digital channels to obtain them, and modern challenges that are changing the global paradigm of world development only increase the role of FinTech innovations as a determinant of national economic development.

FinTech is a relatively new industry not only in Ukraine but around the world, which opens up enormous opportunities for all participants in the financial sector. Thanks to their innovative technologies and approaches, FinTech companies can quickly respond to the needs of their clients and offer individual solutions for each one. In addition, they allow the use of data and analysis of customer behavior to improve services and increase their efficiency. Furthermore, their implementation can contribute to increasing competition in the market, reducing the monopolization of financial services, and expanding access to financing for individuals, small and medium-sized enterprises, and those underserved by financial services.

For a long time, the alternative online finance sector did not receive significant attention, as it was considered less significant compared to traditional forms of lending. However, crisis events in the banking system, significant development of information technology, and a shift in the direction of innovation activity from large enterprises to startups have made alternative financing models much more attractive for development. The innovation of such models lies not only in new sources and methods of attracting financial resources but also in the use of special technical means and online platforms, which makes them not only financial but also technological innovations. The high potential for the development of these models, together with the advantages of speed, simplicity, and accessibility of attracting financial resources compared to traditional sources, ensures their attractiveness for providers and recipients of financial resources. All this became possible thanks to the high level of development of information systems [1].

Crowdfunding with non-financial rewards is the most common model of online financing today, which can be successfully used for fundraising for any project and for the interests of any subject. Ukrainian crowdfunding platforms began to appear in 2012, but there are obstacles to their development. Firstly, the lack of information about Ukrainian crowdfunding platforms and the low level of trust among the population in such financing create barriers to the implementation of many interesting

business ideas and projects. Secondly, the low level of income of the majority of the population leads to small donations, which results in a long fundraising period for project implementation. However, in the context of the development of the Internet environment and information technologies, the active development of digitization and digitalization of the economy of Ukraine, crowdfunding, like other types of alternative online business financing, will occupy leading positions in the Ukrainian market in the future.

There are different levels of development of online financing in the world, with African and Middle Eastern countries such as Israel and the UAE showing significant volumes of alternative online financing. However, in some developed countries with high levels of economic development and a developed financial system, such as Norway, Iceland, and Luxembourg, online financing has not gained widespread popularity. The most developed mechanism of online financing in Europe is in the United Kingdom, France, Germany, and the Netherlands, in the Americas – the United States and Canada, and in the Asian-Pacific region – China, Japan, Australia, and New Zealand.

It should be noted that the dynamics of the development of global and regional alternative online finance markets are determined by the trends in the markets of three countries – China, the United States, and the United Kingdom, which are the leaders in the three studied regions. These countries account for 99% of the global alternative online finance market. The remaining 1% of the market belongs to about 20-30 countries around the world, including Japan, Australia, France, Germany, New Zealand, Canada, and others (Figure 1).

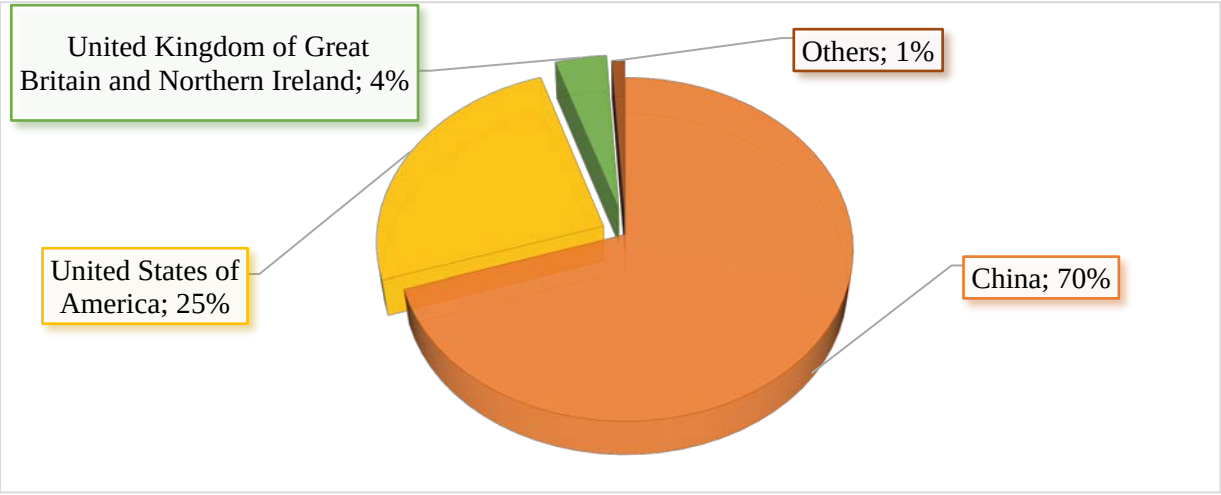

Fig. 1. Structure of alternative online financing worldwide, %. Source: [2].

Low levels of online financing volumes in other countries around the world, except for the three leading countries, indicate an insufficient level of development of online financing models in these countries. However, this does not always mean that residents of these countries do not have access to alternative online financing, as most online platforms allow residents of other countries to invest in projects.

Online financing is becoming increasingly popular in Ukraine. Microcredit is the most common type of microfinance in Ukraine. There are special online platforms

that allow individuals to borrow money. Online loans, mortgages, credit cards, and loans are popular financial services in Ukraine.

Ukrainian startups are also gaining popularity and successfully making money. For example, the Kwambio project has gained wide popularity and $650,000 for development. Petcube is one of the most well-known Ukrainian startups specializing in devices for pet owners. QROK has partnered with Google to develop indoor navigation where GPS signals cannot be received [3].

The main aspect is the approval of the “Development Strategy of FinTech in Ukraine until 2025” by the National Bank of Ukraine to ensure further reform and development of the financial sector of Ukraine in accordance with leading international practices and the implementation of measures provided for in the Association Agreement between Ukraine and the EU. The strategy sets priorities and goals for the development of the financial sector until 2025, including the creation of a full-fledged FinTech ecosystem with innovative technologies [4].

Active development of the FinTech industry in Ukraine is confirmed by the first UK-Ukraine FinTech Summit held in London in 2021. The summit discussed issues related to increasing the digital and financial literacy of the population, preparing professional personnel for the financial market, creating a Regulatory Sandbox, implementing Open banking, and openness to the implementation of innovative technologies.

Therefore, the FinTech market in Ukraine is developing more slowly than in other countries. The main obstacles to the implementation and active use of new forms of financing in our country are the lack of legal regulation of the provision of such services, complex document circulation, and a lengthy bureaucratic procedure for concluding agreements. These factors, taken together, significantly increase transaction costs for resource mobilization, increase their cost, and ultimately reduce the attractiveness of lending, which becomes the main restraining factor for the development and dissemination of new forms of financing in Ukraine.

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Your majesty uniqueness

Brand name and its design are very important aspects in marketing. The challenge for a brand is to be special, to present its product or service in a way that is impossible or almost impossible to repeat. How can a brand get such a result? A unique selling proposition can help.

A unique selling proposition is a brand or product characteristic that distinguishes it from its competitors, making the product special. These characteristics must be valuable to the target audience so that consumers will want to buy the product. Finding the unique selling proposition (USP) is not easy, but it is clearly worth the effort.

What benefits does USP bring? It makes the brand more noticeable and memorable, and makes advertising more effective. Besides, it helps to attract customers, build long-term relationships with them, and increases customer loyalty.

A unique selling proposition must make sense, so it is worth paying attention to what the proposition should be (Fig. 1).

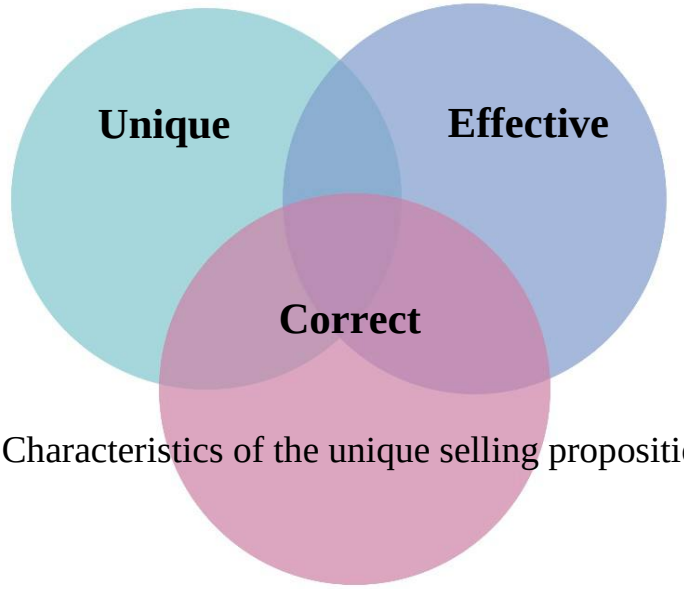

Fig. 1 Characteristics of the unique selling proposition

What should marketers pay attention to when looking for uniqueness?

First, they should analyze the target audience. This will help them understand what would hook the client.

Next, they consider what the customer's problems might be and think about how a product or service could help customers deal with them. This will help point customers in the right direction in the search for uniqueness that makes sense and is effective.

The next step is to consider uniqueness for the brand. To start analyzing the benefits for consumers, the marketers need to answer a few questions that will help them find the uniqueness of the brand:

1. How are we different from our competitors?
2. What can we offer that our competitors cannot?
3. What can consumers get from working with us?

The components of a unique selling proposition include slogan, design, and story. Everything starts with the text. It is very important for the text to be perfect. It is where a unique selling proposition begins.

Advertising slogans remain in our memory, and at some point, this short text fragment will come to mind. This is where associations come to the rescue. Big brands start their work on the philosophy and image of their product from the very beginning, thinking about how it will look in the eyes of the consumer and the hearts of others.

The next important element is the design. Often, it is the design that determines whether the product will be noticed or not. The aesthetics of being able to present a product beautifully is very valuable. Often, the eyes are the first to notice a product and make a choice. Therefore, it is very important that the design of the product attracts interest. If a product is seen at the point of sale, there is a good chance that it will be purchased; if it remains unnoticed on the shelf, the chances of buying it are reduced to zero.

Another very important point is the history of creation. It is truly different for everyone, unique and inimitable. This tool is very valuable and needs to be presented correctly. If the story is rather banal, then it is not expected to become a highlight.

Some brands highlight one aspect for themselves and work hard on it, while some prefer to pay attention to each of them. Pitaya, the Ukrainian swimwear and clothing brand that cares about the health of people and the planet as a whole demonstrates all of the above. Its slogan is "Perfect for all situations". Pitaya’s clothes are ideal for the beach, yoga, sports and outdoor activities, some styles can be worn every day, and the consumers have a wide range of products to suit every taste.

Pitaya has a unique history. They wanted to create clothes that could protect from the sun, so that the sun would not cause harm, and there would be no burns or redness on the skin. They dreamed that their clothes could be worn in the summer and allow people to get a safe suntan, and they succeeded.

The fabric with unique properties protects the skin from the sun like a sun cream with SPF 35. The special fabric allows for a light, even tan that does not leave white marks on the swimsuit/clothes. These swimsuits and clothes are quick-drying. This brand also cares about preserving the ecological balance of the environment. Thanks to the unique properties of the fabric used to create clothes and innovative swimwear, it reduces the use of sunscreens that pollute the environment. In this way, manufacturers care about preserving the ecological balance of the environment, which makes the brand conscious and socially responsible. Pitaya clothes and

swimwear are beautiful, comfortable, have bright colors, interesting patterns that will make customers stand out.

The story of Pitaya is an inspiration and a key to success. Brand identity is highlighted through many interesting tools.

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Graphic design mistakes that can ruin marketing materials

Graphic design is important for building marketing campaign. People process images and visuals 60,000 times faster than texts. When it comes to transmitting information to the brain, humans are wired to process visual information. Ninety per cent of the information that gets transmitted to the brain is visual in nature. Considering that fact, it is essential to make a competent design.

The first mistake of the graphic designers is using a poor logo of the company. If a logo is blurry, outdated or hard to read, the marketing piece will look unprofessional. Paying not enough attention to details will lead to a bad first impression. To avoid such a problem, the logo should be simple, easily recognizable and relevant to the business.

The second mistake is using illegible text. The text that is used in advertising should never be hard to read. It should be well-written and well-placed. Moreover, there should never be a big paragraph, because potential customers will not read it. Easy-to-read and small articles no longer than ten lines will catch customers' attention.

The third mistake when designing promotion materials is using the wrong saving format. There are a lot of formats for saving files, such as JPEG, PNG, SVG, GIF and WebP.

Companies all over the world use every kind of saving formats, but some of them are used more often than other. File storage trends in different formats on the Figure 1.

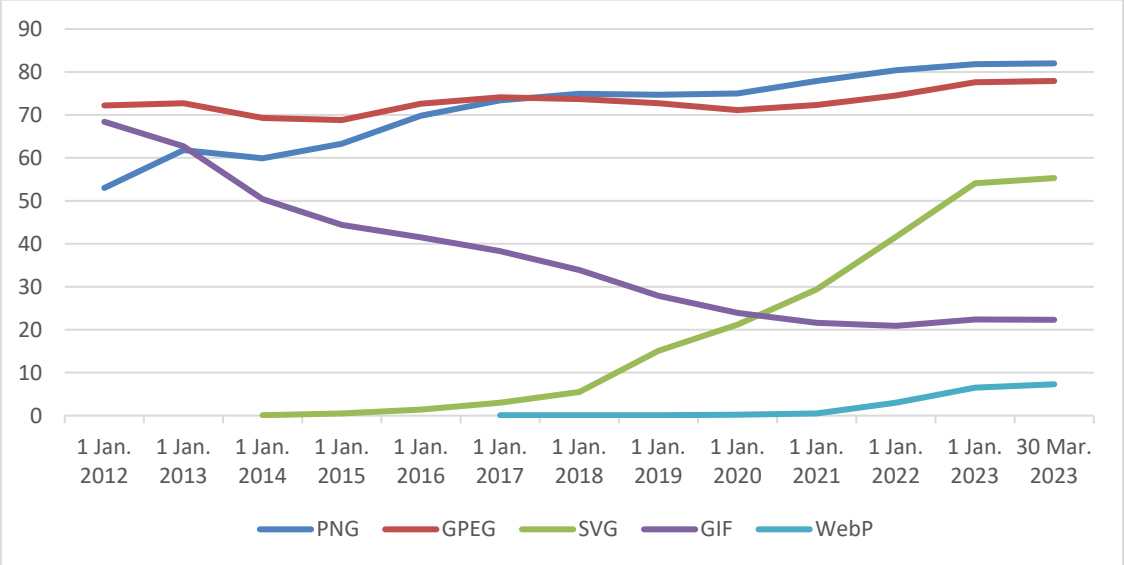

Fig. 1 File storage trends in different formats

Over the last ten years PNG and JPEG saving formats didn`t lose their popularity and now they have quite the same percent of usage, namely 82% and 77,9%. This trend can be explained by the option of almost every file be saved in PNG and JPEG. In addition, files will not occupy a lot of a disk space. Popularity of GIF have declined over the last decade from 68,4% to 22,3%. This format has fallen out of trends and only one fifth of companies uses GIF for presenting their product. SVG had a rapid go up from the year 2018 from 5,5% to 55,3%. More than a half of the companies uses it because of its high resolution, so the firm`s logo does not lose its quality at all. WebP takes the lowest place (7.3%) because it`s not supported by all browsers.

The fourth mistake is choosing the wrong font combinations. Font combinations is chosen depending on the purpose of the graphic. In any case, fonts are combined the way they do well together. There cannot be a gothic font with a one for the comics. Combination of fonts that match in style and effect is the best choice.

The fifth mistake is ignoring hierarchy rules. Visual hierarchy is about the importance of each element to be in a definite place. For example, the viewer usually pays attention to the larger text, so the title bigger than other information will be noticed by a potential customer. In addition, the flow of the design will navigate the viewers' eyes through the marketing material. Considering the fact, the most important message is in a definite place.

A good marketing piece should have an easily recognizable and good-quality logo, legible and well-placed text, right font combination, follow hierarchy rules and be saved in an appropriate format to immediately catch customers' attention.

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Modern digital innovations in audit activity

The rapid development of innovations, new technologies, and scientific discoveries change and improve auditing activities through digitization and automation of individual processes, information exchange, and the emergence of new control methods and tools.

The algorithm of digital transformation of audit activity should ensure the transition from a general strategy to specific steps for subjects of audit activity with the simultaneous modernization of professional competencies. Digital competencies should include knowledge of core functions and use of various devices, proficiency in audit, accounting, and taxation software, the ability to create digital and media content, and the ability to protect information and personal data to ensure cyber security.

Strategic directions for increasing the effectiveness of audit activities must comply with International Auditing Standards [1] and correct the shortcomings that exist at the current stage in accordance with the Report on Monitoring the Quality of the Ukrainian Audit Services Market [2]. At the same time, relevant scientific and methodological [3] and practical [4] features of accounting, analysis, auditing, taxation, and financial monitoring in today's conditions should be considered.

Deficiencies in quality control audits of audit services [2] indicate the existence of a risk that audit firms will not fully achieve the goal defined by the International Standard on Quality Control 1, "Quality Control for Firms That Perform Audits and Reviews of Financial Statements, and Other Assurance and Related Services Engagements," which consists in establishing and maintaining such a system of quality control that would provide sufficient assurance that the firm's personnel act and the firm itself in accordance with professional standards, legal and regulatory requirements, and the reports provided by the firm or partners from the task, meet the circumstances. Therefore, more than 89% of audit entities audited in 2019–2020 experienced difficulties in obtaining acceptable audit evidence in sufficient volume, drawing up appropriate audit documentation, checking accounts, adequately assessing audit risks, and showing due professional care, thoroughness, and skepticism, which is imperative to ensure a high-quality audit [2].

The sufficiently high percentage of systematic involvement of IT specialists in performing financial statement audit tasks (39.2% according to the Report [2]) is indicative, in contrast to the low percentage of modern automation of auditing activities. In particular, the share of audit entities that use robotic process automation

to perform audit procedures is only 7.8%, for software for intelligent analysis of business processes – 3.9% and software for extracting data analysis – 41.2%.

Instead, 70.6% of audited entities gave a positive answer to whether the audited entity plans to implement software to automate the provision of audit services in the next two years. Thus, the demand for digital modernization of processes in the audit field undoubtedly exists and, in the coming years, should be implemented on the basis of normative and methodological professional development [1,2], taking into account practical experience [4], using today's innovative technologies.

Positive consequences of digital modernization of audit processes are possible if new concepts of information processing and transmission are used:

control of economic operations in real-time (RTA);

electronic data exchange – from working documents to the auditor's report (EDI);

extended language of financial, management, and tax reporting of various business areas (XBRL);

"cloud technologies" computing, control, and accounting operations based on clouds;

artificial intelligence (AI) – modernization of mathematical modeling with modern technological innovations (assessment of potential risks);

BigData – utilization in financial supervision of business processes to increase efficiency, accuracy, and speed;

blockchain – systematization and effective control;

soft digital infrastructures (identity and trust infrastructure, open data infrastructure, interoperability infrastructure, electronic settlement, and transaction infrastructure).

It should be noted that the computerized audit techniques usage allows for more extensive testing of electronic transactions and billing files, which may be helpful when the auditor decides to change the scope of testing, for example, in response to risks of material misstatement due to fraud. Such methods can be used to select typical transactions from the electronic master files, to sort transactions with specific characteristics, or to test the entire population instead of a sample.

Based on the results of quality control, the analysis of widespread violations during audits of audit entities, taking into account the revision of standards related to the assessment of risks of material distortion and the implementation of actions in response to the assessed risks, modern ways of digital modernization of audit processes should be:

– development, improvement, and implementation of audit procedures related to the identification and assessment of risks of material misstatement at the level of financial statements and the level of assertions (transformation into an assessment in percentage values based on the use of modern IT technologies);

– development, improvement, and implementation of audit procedures related to the testing of internal control measures, including in the IT environment (use of new templates and digital processes of creating auditor's working documents);

– improvement of the existing algorithm for calculating the level of materiality and introduction of a new algorithm for calculating the volume of sample testing (expanding the possible list of primary indicators and factors influencing their selection due to the involvement of IT tools; differentiation of indicator levels depending on the selected indicator and enterprise category; use formulas, modern models for calculations)

– establishing a justified relationship between the assessment of audit risk, the materiality indicator, and the sample size.

Thus, the implementation of digital innovations in auditing is the modernization of control processes with electronic and digital devices, means, and systems; the establishment of electronic communication exchange of information between participants of audit activity; building an integrated interaction of the virtual and real audit environment. Information and communication and digital technologies provide additional opportunities to intensify audit processes.

But in order for these improvements to work effectively, further research should align all digital technological aspects with the introduction of the necessary IT and administrative infrastructure directly at the subjects of audit activity. The implementation stage involves obtaining a comprehensive effect from digital modernization of audit processes and document flow, rationalization of interactions in the control and accounting system with detailing of audit protocols and methods. The advantages of digital modernization of audit processes are related to their acceleration, cost reduction, and formalization.

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How much does the corporate culture affect the company's success?

Corporate culture is now becoming a fashionable trend. Why is corporate culture such a complex concept and why do most companies live with it more formally than honestly?

The main problem is that corporate culture is not about people, but about faith. Many companies have the right and sensible things in their corporate culture, but for some reason, they don't "strike a chord". The question is whether people believe in it or not, whether they live it or not.

About 86% of companies in the world call corporate culture the number one priority in their HR policy. In Ukraine, the figure is slightly lower, but still quite significant. Why do you think top management is so focused on this topic? Many executives believe that if they formalise all the aspects related to corporate culture, happiness will come. They usually hire expensive consultants who come and sell a standard set of solutions that we all know. Corporate culture includes both a formal part, such as mission, vision, strategy, competence model, etc., and an informal part. When you start comparing the formal part of different companies, it turns out that there are few differences between them.

The corporate values of each company are about the good and the eternal. But when we touch on the informal part (faith, ideology, role models), this is where companies start to have problems.

Go to any company and you will find its mission, vision, and values. Ask all employees: "Do you love the company?". "Well, of course, we do," they will answer. Then ask questions: "Dear friend, are you willing to work without money?". This is where the miracles begin.

You can copy a competitor's technology, and you can attract a lot of the best specialists from the market, but how well can these people work together effectively and do what they cannot do in another company? In other words, to what extent are they united by a common corporate culture?

The key question to ask when implementing a corporate culture is how to measure its effectiveness. All companies conduct social climate surveys to see how loyal, engaged and satisfied their employees are. But these figures alone do not give anything. Why?

Do you remember Dr House's famous phrase "Everybody lies"? If the company's director is very strong, he will explain the employees how to fill out the next questionnaire correctly. So that the figures for this company are good. Because when the CEO of the group of companies compares the performance of the enterprises at the end of the fiscal year, it is desirable to be at the top of the sheet, not at the bottom. This happens all the time.

And this is a wrong approach because recent studies demonstrate that corporate culture has an impact on the financial result. For example, the quality of work itself increases by 41%, and profitability increases by 22%, if the company has an emotional engagement of its staff. People can create wonders.

Let us be honest with ourselves. Let us remember the main ideas proposed by Dr.House. Could he have coped with his task alone? What did he do with his team of young guys? He mocked them and behaved in a politically incorrect way. But in the end, he converted them to his expert faith, and by the end of the work, it was a well-coordinated team with common principles, values, and a coordinate system.

Corporate culture encompasses all of the company's activities and has a key impact on the bottom line, regardless of whether the company's management is consciously shaping it or not. If you have decided to influence changes in corporate culture, the key question is how much you are ready to change yourself, not just declaratively, but honestly. Building a corporate culture is not a project. It cannot be built in a month, a year or two. It should be an ongoing process, a constant systematic work, which should be led by communication between the CEO and other top managers with the company's ordinary employees.

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Marketing in Japan

Asian culture was always different from European culture, but it is not only about literature, music, or movies. It is also about advertising as Japan is the third-largest market in the world, representing about 10% of the world's economy. Japan has its own unique way of promoting goods and services, and marketers in Japan should create more and more innovative decisions and original methods.

Many companies in Japan still use old-fashioned marketing strategies, for instance publishing magazine ads, having a mascot stand outside shops, and handing out flyers on the street. In this case, Japanese and Ukrainian marketing have something in common. Japanese banners and flyers are always extremely bright and colorful compared to Ukrainian ones, but marketers use them everywhere and every day.

Japanese marketing is not only about active promotion. Small businesses are trying to make their products look American or European but in the Japanese way, so consumers can be interested in purchasing them even if they have seen only the shop's style. People are ready to pay more for the things that look expensive only because of English letters on them or American/European context. For example, there is a special area in Osaka named American City. All products there are much more expensive than the original Japanese ones because the impact of Western culture is enormous on the Japanese nation (Picture 1)

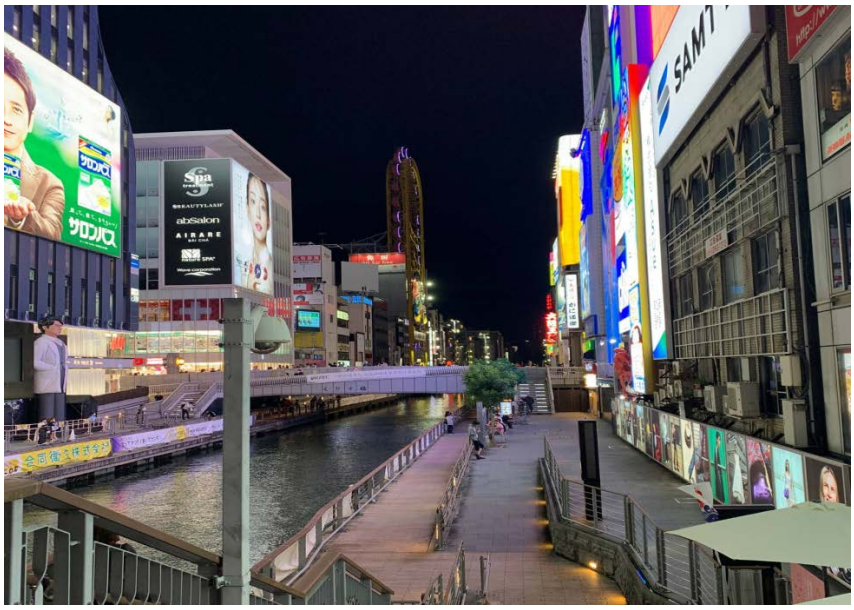

Figure 1 – Japanese advertising in the center of Osaka

A lot of Japanese people can trust only popular and famous brands and are not so risk averse as their counterparts in the West. Young companies should use as many

marketing promotion methods as possible to establish long-term relationships with their customers. In this case, marketing should be based on the consistent delivery of high standards for products and services. This is the most significant aspect for Japanese consumers because they expect high-quality products even if they are extremely cheap. Besides, Japanese markets always have a high level of responsibility, so they are always ready to provide high-quality products for their customers.

High standards are not the only marketing aspect in Japan. Marketers here are dependent on good ratings and customer reviews. However, it is difficult for Japanese customers to give a bad rate because Japanese culture has a big influence on service and marketing, and all Japanese workers are very polite and ready to help with any issue.

The Japanese nation is very group-orientated. Collective attitude can determine which products or services will be accepted by the market. When Ukrainians from Kansai University organized a festival about Ukraine, it took about 15 minutes to get the first consumers, and only after that people around started to be interested in the products from the Ukrainian booth (Picture 2). Thus, marketing in Japan is characterized by trust. If customers are highly selective in their purchasing choices, ways for promoting goods should also demonstrate effectiveness and high value.

Figure 2 – Ukrainian festival in Kansai University

In addition, there are a lot of differences in digital marketing too. For instance, Ukrainians prefer to buy some things online and offline, but in Japan, almost 82% of the users are searching for products online. Personal experience shows that Japanese girls buy something offline only in specific cases. It is easier for them to help international students search for goods online, and use Google Maps or Internet to find the right stores. In fact, the process of buying something online in Japan is more difficult because of a lot of paperwork. If you are a foreigner and you need to buy something online, you should be ready for a complicated process. Even buying products offline can be a problem for foreigners in Japan, so in this category, Ukraine is a winner.

There are some aspects that marketers should consider in creating marketing strategies and digital content. The first one is localization. The dominant language in Japan is Japanese, and all advertising is always in Japanese with some elements of English. The second one is safety. Japanese people are really dependent on the rates and thoughts of other people, so Japanese companies always take care of security. The third one is discovering new things. Japanese people are really good at creating new stuff. For example, there always are new local food and drinks in Starbucks that always reaches many customers (Picture 3). And last but not least is that products should be aesthetic. There are high beauty standards in Japan, so things should be visually beautiful.

Figure 3 – Japanese local drinks and food at Starbucks

To sum up, Japanese culture has a big impact on marketing styles, marketing strategies, and advertising in Japan. Marketing in Japan is unique. It is different from the Ukrainian way of promoting things, and it makes Asian marketing awesome and unforgettable.

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Reforming the railway industry as a prerequisite for European integration

The transportation industry is leading for any country, because it provides interaction of all other industries. In the context of the European integration and corporatization of rail transport, there is a clear need for critical analysis of the company's activities in areas targeting the market segments.

Rail transport is a leader within the boundaries of internal communication, and often also in international traffic when transporting products and raw materials of most industrial branches. It is this transport in Ukraine that provides transportation of mass industrial and agricultural cargoes (coal, metal products, grain, etc.) for long distances regardless of the season and weather conditions.

Military aggression causes significant damage to our country's economy, infrastructure, railroads, and highways. It is clear that in the post-war recovery of Ukraine's economy, railway transport as a leading industry will play an important role. We hope to join the EU, but there are a number of conditions that must be met, particularly in the railway sector. European integration processes in Ukraine have been ongoing since 2014. Ukraine undertook within eight years (until November 1, 2022) to ensure the implementation of twelve EU Directives and Regulations into national legislation and thus create an open and competitive railway logistics market. European directives provide for the provision of equal and non-discriminatory access to the resources of the strategic railway infrastructure to all users, regardless of the forms of ownership. Such a reform is mandatory for EU membership [1].

If we analyze what exactly happened during this period in the railway industry, then, first of all, the corporatization of the industry in the form of shareholding and structural changes is obvious.

Experience of developed countries shows that corporatization and functional separation of railways is the most promising way of railway transport reforming and solving the problems of financing its future transformations. In the process of corporatization of Ukrainian railway transport, the state restricts its functions as a business entity, but, on the other hand, it strengthens its role as a regulator of market relations. In addition, the state retains responsibility for the transport process safety, provision of transport services in those sectors and segments of the railway activity, where the market relations are virtually absent or not yet sufficiently developed [2, p. 69]. Worldwide practice shows that large integrated companies are the most influential in most sectors of the economy of developed countries. The incentive to approve such a structure is the market itself, in which the subjects of management operate.

A key direction for reforming the railway industry is the transition to a vertically integrated structure, which involves:

– Transition from the regional organizational structure, namely – vertical integration of the company's activities in the areas targeted for market segments;

– Principles of budgeting and economically justified mutual settlements between verticals;

– New system of tariff formation: separation between the infrastructure and the traction component of the tariff;

– New effective system of corporate governance: a clear division of functions between structural units and verticals with the definition of financial and economic objectives for each vertical and control over their implementation [3, p. 32].

But the path to European integration is not only structural changes. These are, first of all, changes in the regulatory framework, transportation technology, elimination of the state monopoly in the railway industry, subordination of logistics to the interests of the cargo owner, who orders and pays for transportation services.

In addition to the implementation of railway legislation, the railway industry of Ukraine faces a number of other tasks: separation of functional companies; modernization of rolling stock; ensuring interoperability of railway systems, etc.

It is also advisable to join the European Railway Agency, which sets standards for European railways in the regulation "Technical specifications of interaction". The Agency develops common approaches to safety, working closely with stakeholders from the rail sector as well as with national authorities, the EU institutions and other interested parties. Featuring a dedicated Safety Unit, ERA also monitors and reports on rail safety in the EU. The European Union Agency for Railways is carrying out technical work on railway safety and interoperability based on the requirements of European law. The main task of ERA is to create a competitive European railway industry, to increase the international compatibility of national systems, which guarantees the necessary level of safety.

European integration is the readiness to work according to European criteria and European prices. At the moment, "Ukrzaliznytsia" remains a state monopoly in the field of railway transportation, which does not comply with the norms of EU Directives and Regulations. There is no competitive market in railway logistics in Ukraine. And this can become a significant obstacle on the way to European integration.

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