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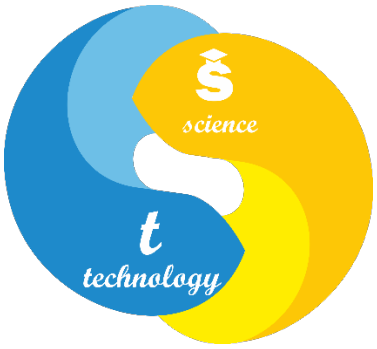

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«Modern Technologies: Improving the Presentand Impacting the Future»

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Збірка містить тези доповідей Міжнародної наукової мультидисциплінарної конференції студентів і молодих учених «Modern Technologies: Improving the Present and Impacting the Future», яка відбулася 23 листопада 2022 р. в Українському державному університеті науки і технологій. Тези представлені англійською, німецькою, польською та іспанською мовами.
Для студентів, аспірантів, викладачів.Друкується в авторській редакції.

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INDICATORS FOR SCIENCE, TECHNOLOGY AND INNOVATION IN ANGOLA

Indicators in Science, Technology and Innovation are of extreme importance as it is able to support the telling of the story of what happens when STI activities are undertaken".

Even though some African countries have drawn plans of action to provide a roadmap for the improvement of scientific and technological infrastructure through indicators, the majority of countries on the mainland do not release data about their activities, not only in the areas of Science and Technology, but in quite a few other areas as well. This is one of the challenges that I had to face during my field research.

Opposed to developing countries, developed countries have a tradition in releasing annual indicators of activities, such as R&D performance and funding, invention, innovation, diffusion of knowledge, technologies, business performance, and the development of human resources.

There is still a gap concerning the indicators for Science, Technology, and Innovation of Angola. This reality is in most African countries, given the historical issues and conflicts that have been a reality for some of these countries. I refer, first, to historical issues, in the case of the colonial period that lasted for five hundred years, in which goal was nothing more than to impose Western knowledge at the expense of knowledge of African peoples. This meant a true colonial practice of a colossal indigenous delay. In other words, colonialism, among other things, poured scorn on indigenous institutions and practices and directly and indirectly discouraged the development of indigenous knowledge, and even industries (BAFFOUR, 2012). In the same token, it was not only a political imposition, but also a cultural one which affected African values, beliefs, and indigenous systems of education, projecting Western values.

Moreover, armed conflicts and civil wars, which emerged after independence of former African colonies, augmented the great concern in developing local human capital in order to promote the quality of educational institutions, the productive sector, and strengthening African nations states.

As pointed out earlier, NEPAD (New Partnership for Africa's Development), is an agency created in 2001 with a common interest in increasing the pace and impact of Africa's development. It works in partnership with the African Union (AU) endeavour to put together all African countries to work in coordination, aiming at producing an overall system of indicators to help reporting the actual landscape of STI in Africa.

It is, reducing poverty, putting Africa on a sustainable development path, halting the marginalization of Africa, and empowering women.

Angola, according to official information from the Ministry of Science and Technology, is also conducting work on indicators for the system of Science, Technology and Innovation, whose statistics will be published in due course (MINCT, 2014).

However, as pointed out earlier, the concerns of all interviewees above are in agreement with the reports of the Forum on Higher Education, Research, and Knowledge (Scientific Committee for Africa) held in Dakar in 2002 in which they identified among others too many problems that hinder the development of R&D in country. The inadequate policies to support research in Angola are lack of funding, and lack of infrastructure for research. These are the biggest concerns, because it hinders the increase of training in research, and it also hinders a feasible catching up to foster innovation and technology development.

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UMWELTPROBLEME: URSACHEN, LÖSUNGEN UND FOLGEN

Was genau sind Umweltprobleme? Welche Umweltthemen beschäftigen die Welt gerade? Was hat es mit dem Klimawandel, dem Aussterben der Arten und der Stickstoff-Überlastung auf sich? Wie wirkt sich das konkret auf uns aus?

Die globale Bevölkerung wächst zunehmend. Im Jahr 2020 bewohnten rund 7,77 Milliarden Menschen die Erde, die Zahl soll allerdings weiter steigen: Bis zum Jahr 2050 rechnen die Vereinten Nationen mit etwa 9,7 Milliarden Menschen auf dem Globus. Hinzu kommt eine Verstädterung bzw. Urbanisierung in vielen Ländern: Das Verhältnis zwischen Land- und Stadtbevölkerung verschiebt sich. Während 1950 nur knapp ein Drittel der Weltbevölkerung in Städten gelebt hatte, ist es inzwischen seit 2007 mehr als die Hälfte. Die Vereinten Nationen prognostizieren bis 2050 einen Anstieg des Anteils auf zwei Drittel.

Der Technische Wandel und unser Umgang mit Rohstoffen und Produkten sind umweltbelastend. Viele Umweltprobleme stehen im Zusammenhang mit den wirtschaftlichen Aktivitäten von uns Menschen. So ist eine Hauptursache für die heutigen Umweltprobleme der Technische Wandel: Die industrielle Revolution sorgte für einen rasanten Anstieg von Kohlenstoffemissionen aufgrund der Verbrennung fossiler Rohstoffe. So wird seitdem immer mehr Kohlenstoff in die Atmosphäre freigesetzt, der vorher Millionen von Jahre in der Erde gebunden war. Doch nicht nur als Brennstoff wurden die neuen Rohstoffe eingesetzt. Technologie und Wissenschaft entwickelten sich immer schneller und brachten bahnbrechende Erfindungen wie z.B. künstliche Düngung in der Landwirtschaft, Automobile und die Chemie- und Pharmaindustrie hervor. Die Weltbevölkerung und die Schadstoffbelastung wurden infolgedessen immer größer. Auch unsere Art zu wirtschaften belastet die Umwelt.

Das aktuelles Wirtschaftsmodell folgt dem einer Durchflusswirtschaft: Zunächst werden Rohstoffe und Energie aufgewendet, um Produkte herzustellen. Bei der Produktion und dem Transport entstehen Schadstoffe.

Wenn das Produkt gekauft und genutzt wurde, wird es entsorgt – und das häufig nach nur einer Nutzung. Sinnvoll wäre es, die Rohstoffe im Kreis zu führen, möglichst viel zu verwerten und zu reparieren, statt das „alte“ Produkt wegzuwerfen und sich direkt ein neues Produkt anzuschaffen.

Die Umwelt kann von allen unbegrenzt genutzt werden – aber wer zahlt die Kosten der Nutzung? Die Umwelt wird als öffentliches Gut verstanden, also als ein Gut, das jeder unbegrenzt nutzen kann, so auch die Atmosphäre der Erde. Diesem Gut wird in der Regel kein konkreter Wert beigemessen, deswegen z.B. für Lärmschäden oder Luftverschmutzung kein Preis gezahlt werden muss. Darüber hinaus sind Umweltprobleme nicht immer klar auf ein verursachendes Subjekt zurückzuführen. Meistens will daher niemand die Kosten tragen, wenn etwa Schadstoffbeseitigung oder Umstrukturierungen notwendig wären.

Die meisten Umweltprobleme sind nicht klar voneinander zu trennen oder genau auf eine Ursache zurückzuführen – sie sind komplex. Ihre Folgen können sowohl zeitlich als auch räumlich verschoben auftreten.

Die Temperatur in der Atmosphäre steigt immer weiter, wodurch die Erde heißer wird und umgekehrt. Auslöser sind Treibhausgase aus Industrie, Verkehr, Land- und Viehwirtschaft. Das Klima erwärmt sich durch die Menschheit viel schneller und stärker als von Natur aus. Dadurch kommt es beispielsweise zu Dürreperioden, dem Schmelzen von Gletschern und dem Anstieg des Meeresspiegels. Der übermäßige Ausstoß an CO2 verursacht neben dem Klimawandel außerdem Luftverschmutzung, die unsere Gesundheit und die aller anderen Lebewesen des Planeten gefährdet.

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BRAZILIAN SCIENCE, TECHNOLOGY AND INNOVATION POLICY

Scientific education and development of sustainable practices are themes of great interest to UNESCO, taking into consideration the continuous support offered to Science and Technology policy in Brazil. The major challenge posed in the country in this field is to have Science Teaching disseminated to the population in an increasingly homogeneous way capable of effectively improving people’s quality of life. The scale of problems faced in this area is complex and consequences can hardly be solved in the short term.

In the field of Science, Technology and Innovation, the greatest challenge in Brazil has been in designing and implementing a long-term policy that enables scientific and technological development to

reach the population in order to improve life quality. This policy should have an effective impact on improving society's living conditions.

This is a process, which has been enhanced through time and has increasingly shown the great potential that public and private investment in Science, Technology and Innovation has for generating development and social integration. UNESCO acts as a catalyst for these themes and offers the country support to stabilize policies, as well as promoting technical cooperation at national and international levels in the field of natural sciences.

Electing Science, Technology and Innovation as a strategic choice for the country's development implies prioritizing investments in this sector, to recoup losses and swiftly advance in the production and dissemination of knowledge and innovation, particularly in relation to its incorporation in national production. This also means advocating on behalf of the importance of Science, Technology and Innovation as a factor that integrates other government development policies. In this context, it is necessary for citizens to closely follow advancements and to be prepared to participate in decisions that are important for society.

When it comes to Science, Technology and Innovation management, Brazil relies on a structured system composed of a central coordinating body and development agencies in charge of defining and implementing development policies on science, technology, and innovation. The State and local level Science, Technology and Innovation management systems follow the same model for development policies attuned to regional and local vocations.

Due to the country's dimensions, to difficulties encountered in its management structure, and, above all, to implementing national policies capable of simultaneously addressing varied regional needs, the scientific and technological knowledge produced is still slow to produce significant changes in the social inequities found in some regions. Therefore, the problems faced by Brazil in the fields of Science, Technology and Innovation are complex and can hardly be solved in the short term.

The country can count on installed material and intellectual capacity capable of promoting significant progress in national policies on Science, Technology and Innovation, as well as on the Environment. It also has a mobilized civil society and a powerful business sector. In this sense, UNESCO aims at sensitizing Brazilian society to the role played by science for peace and development. This includes public managers and opinion makers from the private sector.

Since STI does not evolve in a vacuum, its latest edition summarizes the evolution since 2010 against the backdrop of socio-economic, geopolitical and environmental trends that have helped to shape contemporary STI policy and governance.

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ALGUNAS CUESTIONES DE INTERACCION DE LA ECONOMIA Y LA SOCIEDAD

Todas las sociedades enfrentan el problema económico, que es el problema de cómo hacer el mejor uso de los recursos limitados o escasos. El problema económico existe porque las necesidades y deseos de la gente son infinitos, aunque los recursos disponibles para satisfacer necesidades y deseos son limitados.

Los recursos están limitados de dos maneras esenciales:

– en cantidad física, como en el caso de la tierra, que tiene una cantidad finita;

– en uso, como en el caso de la mano de obra y la maquinaria, que solo pueden usarse para un propósito en un momento dado.

La elección y los costos de oportunidad son dos conceptos fundamentales en economía. Como los recursos son limitados, los productores y consumidores tienen que elegir entre alternativas competidoras. Las personas deben elegir cómo usar sus habilidades y esfuerzos de la mejor manera, las empresas deben elegir cómo usar a sus trabajadores y maquinaria de la mejor manera, y los gobiernos deben elegir cómo usar el dinero de los contribuyentes de la mejor manera.

Por un lado, la competencia es un proceso social y económico complejo; por otro lado, es un

proceso de satisfacción de las crecientes necesidades de la sociedad y de los individuos a niveles técnicos, tecnológicos, ambientales y económicos más elevados, donde la lucha por la supervivencia y la preservación de segmentos de mercado es feroz.

A Paul Samuelson se le atribuye a menudo el mérito de proporcionar la primera explicación clara y sencilla del problema económico. Según sus afirmaciones, para resolver el problema económico las sociedades deben esforzarse por responder a tres preguntas básicas: ¿Qué producir? ¿Cómo producir? ¿Para quién producir?

¿Qué producir? Las sociedades tienen que determinar la mejor combinación de bienes y servicios para satisfacer sus variados deseos y necesidades. Las sociedades deben decidir qué cantidades de diferentes recursos deben asignarse a estos bienes y servicios.

¿Cómo producir? Las sociedades también tienen que decidir la mejor combinación de factores para crear la producción deseada de bienes y servicios. Por ejemplo, exactamente cuánta tierra, trabajo y capital se debe utilizar para producir bienes de consumo.

¿Para quién producir? Finalmente, todas las sociedades deben decidir quiénes se beneficiarán del resultado de su actividad económica y cuánto obtendrán. Esto a menudo se llama el problema de la distribución.

Diferentes sociedades pueden desarrollar diferentes formas de responder a estas preguntas.

Por infraestructura entendemos la parte de la economía que facilita la toma de decisiones efectivas y el movimiento recíproco de los factores y resultados de la producción entre propietarios, productores y consumidores en un desarrollo económico mutuamente beneficioso.

El estado necesita hacer (independiente o privadamente) inversiones en el desarrollo de infraestructura que estimulen aún más el desarrollo de la economía misma.

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EKOLOGICZNE ROZWIAZĄZANIA W MIASTACH EUROPEJSKICH

Dzisiaj ekologia przestaje już być niszowym tematem, który interesuje jedynie grupkę aktywistów. Coraz więcej osób uświadamia sobie, że w XXI wieku musimy zmierzyć się z kilkoma globalnymi problemami, zagrażającymi naszej planecie, które będą wymagały od nas wypracowania w społeczeństwie odpowiedzialnych postaw ekologicznych.

Eologiczne rozwiązania w miastach są konieczne. W miastach żyje ponad 52% mieszkańców naszej planety. To właśnie w największych skupiskach wykorzystywane jest prawie 70% energii elektrycznej, a także wiele innych zasobów. To w głównej mierze prowadzi do zanieczyszczenia środowiska na dużą skalę. Ekologiczne rozwiązania w miastach są konieczne ze względu na coraz gorszą jakość powietrza. Duża zawartość szkodliwych związków w spalinach niekorzystnie wpływa nie tylko na klimat, lecz także na zdrowie mieszkańców.

Zanieczyszczenie powietrza to największy problem, z jakim borykają się miasta. Szkodliwe związki pochodzą głównie z transportu i z ogrzewania. Miasto ekologiczne musi znaleźć sposób na to, jak wyeliminować spaliny, jednocześnie nie ograniczając komfortu mieszkańców.

Lepiej rozwinięte kraje europejskie już od dawna chcą dążyć do realizacji idei miasta ekologicznego. Jedną z metod walki ze smogiem jest inwestycja w infrastrukturę rowerową. Dobry przykład daje Kopenhaga, gdzie przez ścisłe centrum miasta prowadzą oddzielne, bezpieczne pasy rowerowe. Mieszkańcy mają do dyspozycji wiele ogólnodostępnych i darmowych parkingów dla jednośladów. Dzięki temu emisja spalin z transportu została ograniczona o ponad połowę.

Rowery to nie jedyny sposób walki ze smogiem. Największe europejskie i światowe metropolie stawiają sobie za cel całkowite odejście od pojazdów spalinowych w komunikacji miejskiej. Włodarze Barcelony chcą całkowicie wycofać wszystkie autobusy miejskie spalinowe do 2030 roku. Jednym z

ekologicznych rozwiązań w miastach jest wykorzystanie autobusów elektrycznych, które zasilane są stacjami czerpiącymi energię z fotowoltaiki.

Europejskie miasta, dla których ważne jest środowisko, sporo inwestują także w przywrócenie tam naturalnych ekosystemów. Sadzi się wiele drzew, pojawiają się także łąki kwietne dla pszczół. Bardzo powszechne staje się zakładanie ogrodów na dachach biurowców i obiektów publicznych.

W Polsce wciąż brakuje spójnej polityki dotyczącej wprowadzania ekologicznych rozwiązań w miastach. Pod względem ochrony środowiska naturalnego Polska jest jeszcze na początku drogi. Najważniejszym wyzwaniem jest walka z niską emisją spalin powstających przy ogrzewaniu budynków. W tym celu: realizowane są dopłaty do wymiany pieców; ułatwia się podłączenie do miejskich systemów grzewczych; są promowane dopłaty do OZE.

Każde polskie miasto ekologiczne stara się też na własną rękę rozbudować ekosystem. Powstają łąki kwietne, a w parkach sadzone są kilkuletnie drzewa. Często można zauważyć niezrozumienie dla nowych ekologicznych rozwiązań w miastach, ale podejście do ekologii w naszym kraju się zmienia na lepsze.

Jak szacują naukowcy, z każdym rokiem procent mieszkańców miast będzie się zwiększał. To oznacza, że wzrośnie zużycie energii i zasobów, więc może zwiększać się zanieczyszczenie. Włodarze największych ośrodków będą musieli więc stawić czoła wyzwaniu. Pozostaje mieć nadzieję, że ekologiczne rozwiązania w miastach, które wprowadzane są obecnie, zaczną szybko przynosić efekty i uda się uniknąć poważnych zmian klimatu.

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GRÜNE MOBILITÄT DANK WASSERSTOFF

Kürzlich kündigte die Deutsche Bahn an, ihre Dieselzüge klimafreundlich umbauen zu wollen: Dazu werde der Motor so verändert, dass er mit Ammoniak und Wasserstoff aus erneuerbaren Energien laufe statt mit fossilem Brennstoff: "Wir verabschieden uns vom Diesel und setzen dabei auf neueste Technologien", wird zitiert.

Die Elektrifizierung des deutschen Eisenbahnnetzes geht nur schleppend voran, auf Nebenstrecken fahren weiterhin häufig Dieselloks. Dabei will die Deutsche Bahn bis 2040 klimaneutral sein. Ein als grün geltendes Gemisch soll es nun also richten – und das mit vergleichsweise kleinen Umbauten an den Fahrzeugen. Zumindest in der Theorie. Praktisch haben die DB und das australische Energieunternehmen Fortescue Future Industries zunächst eine Absichtserklärung unterschrieben. Die sieht neben der Erprobung von Transportwegen für grüne Kraftstoffe die "Entwicklung von emissionsfreien Antriebstechnologien" vor. Heißt so viel wie: Fertig ist das Wundermittel längst nicht.

Die Deutsche Bahn erprobt Lösungen für den Einsatz von grünem Wasserstoff – unter anderem im Projekt H2goesRail. Gemeinsam mit Siemens Mobility geht sie dabei neue Wege und treiben die klimafreundliche Verkehrswende voran. So arbeitet die DB aktuell zusammen an einem innovativen Wasserstoff-Gesamtsystem aus Tankstelle, Zug und Instandhaltungsinfrastruktur.

Das Ziel ist es, Dieseltriebzüge im Regionalverkehr zu ersetzen und dadurch die CO2-Emissionen auf der Schiene weiter zu reduzieren. Dafür entwickeln wir bei H2goesRail eine innovative mobile Tankstelle, deren intelligente Steuerung eine Schnellbetankung von Wasserstoff-Zügen erlaubt.

DB Energie stellt im Projekt die Wasserstoffversorgung sicher – von der Herstellung durch Elektrolyse mit Ökostrom bis zur Speicherung und Bereitstellung.

Der grüne Wasserstoff wird direkt vor Ort hergestellt. Durch die sogenannte Elektrolyse wird Wasser mit Hilfe von Ökostrom in Wasserstoff und Sauerstoff zerlegt. Der so gewonnene Wasserstoff wird anschließend verdichtet, in einem mobilen Speicher gelagert und vor dem Tanken im daneben liegenden Tanktrailer aufbereitet und gekühlt.

Durch die Kommunikation zwischen Zug und Tankstelle und die druckgeregelte Betankungssteuerung werden Energieverbrauch und Tankzeit reduziert. So kann ein Zug in derselben

Zeit betankt werden wie ein Dieselzug.

Neben der neu konzipierten Wasserstoff-Tankstelle von DB Energie entwickelt Siemens Mobility in enger Abstimmung mit der DB den Wasserstoff-Zug Mireo Plus H. Er besitzt einen Antrieb bestehend aus Brennstoffzelle und Pufferbatterie und ist genauso leistungsfähig wie elektrische Triebzüge.

Deutsche Bahn begleitet die Entwicklung des Zuges – zum Beispiel durch Unterstützung beim Designprozess. Zudem bewertet sie die Auslegung des Gesamtzuges durch fahrdynamische Simulationen und begleitet notwendige Tests für Inbetriebnahme und Zulassung.

Um einen reibungslosen Betriebsablauf zu gewährleisten und den Zug regelmäßig warten zu können, wird das DB Regio-Werk in Ulm fit für Wasserstoff-Fahrzeuge gemacht. Gemeinsam mit ihren Partnern entwickelt und testet Deutsche Bahn fortlaufend neue umweltfreundliche Lösungen für den Verkehr von morgen.

Dabei setzt DB auf einen technologieoffenen Ansatz mit alternativen Antrieben wie Wasserstoff. H2goesRail nimmt somit eine wichtige Rolle auf dem Weg zur klimaneutralen DB und bei der Vergrünung der Flotte ein. Während Wasserstoff der Wirtschaft als Energieträger der Zukunft gilt, ist Ammoniak so etwas wie der Energieträger.

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EMPERATURRHYTHMUS DES GEHIRNS

Unser Gehirn hat quasi Dauerfieber. Und die Temperatur schwankt im Laufe des Tages auch noch. Beides ist völlig normal, sagen Forscher. Problematisch könne es aber werden, wenn die üblichen Schwankungen ausbleiben.

Die normale menschliche Hirntemperatur ist nicht nur viel höher als die Körpertemperatur. Sie schwankt auch im Laufe des Tages und das abhängig von der Hirnregion, vom Geschlecht und vom Alter. Das berichten britische Wissenschaftler und Wissenschaftlerinnen im Fachblatt "Brain". Ihre Ergebnisse könnten auch Hinweise auf die Überlebenschancen von Patienten geben, die ein Schädel-Hirn-Trauma erlitten haben.

Für die Untersuchung wurden 40 Freiwillige im Alter zwischen 20 und 40 Jahren rekrutiert. Das Team um Studienleiterin Nina Rzechorzek vom MRC Laboratory of Molecular Biology (Cambridge/Großbritannien) nutzte ein Verfahren namens Magnetresonanzspektroskopie, um die Temperatur verschiedener Hirnregionen der Probanden an mehreren Zeitpunkten im Laufe eines Tages zu erfassen. Gleichzeitig wurde ihre Körpertemperatur unter der Zunge gemessen.

Das Ergebnis: Die Körpertemperatur lag in der Regel unter 37 Grad Celsius, die mittels MRS ermittelte durchschnittliche Hirntemperatur hingegen bei 38,5 Grad Celsius. In tieferen Hirnregionen und hier insbesondere im Thalamus wurden gar über 40 Grad Celsius gemessen. Der höchste gemessene Wert lag bei 40,9 Grad Celsius. Über alle Teilnehmer hinweg schwankte die Hirntemperatur im Tagesverlauf um knapp ein Grad Celsius, wobei am Nachmittag die höchsten und in der Nacht die niedrigsten Temperaturen gemessen wurden.

Die Wissenschaftler stellten zudem fest, dass die Gehirne von Frauen im Durchschnitt knapp 0,4 Grad Celsius wärmer waren als die von Männern. Wie sie vermuten, sind diese Unterschiede auf den weiblichen Menstruationszyklus zurückzuführen, da die meisten Frauen in der Phase nach dem Eisprung untersucht wurden und ihre Hirntemperatur um etwa 0,4 Grad Celsius höher war als bei den Frauen, die sich in der Phase vor dem Eisprung befanden.

Darüber hinaus scheint die Hirntemperatur auch dem Schlafzyklus zu folgen. "Wir haben festgestellt, dass die Gehirntemperatur nachts vor dem Schlafengehen abfällt und tagsüber wieder ansteigt", erläutert O'Neill. Dabei zeigten sich die größten Schwankungen im Hypothalamus, der auch als "Schaltzentrale" des Körpers bezeichnet wird. Die Studie ergab außerdem, dass die Hirntemperatur mit dem Alter der Teilnehmer anstieg, vor allem in den tiefen Hirnregionen. Dort betrug der durchschnittliche Anstieg über die Spannbreite von 20 Jahren unter den Teilnehmern 0,6 Grad Celsius. Dies deute darauf hin, dass die Fähigkeit des Hirns zur Abkühlung mit dem Alter nachlasse und mit der Entwicklung altersbedingter Hirnleistungsstörungen in Zusammenhang stehen könnte, so die Autoren.

Im zweiten Teil der Studie analysierten die Wissenschaftler Temperaturdaten von 114 Patienten, die ein mittelschweres bis schweres Schädel-Hirn-Trauma erlitten hatten. Auch deren durchschnittliche Hirntemperatur lag bei 38,5 Grad Celsius, sie variierte allerdings stärker als bei den gesunden Probanden - von 32,6 bis 42,6 Grad Celsius.

Die Forscher berichten weiter, dass die Hirntemperatur nur bei einem Viertel der Patienten mit Schädel-Hirn-Trauma einem täglichen Rhythmus unterlag. Abweichungen im Muster der täglichen Temperaturschwankungen korrelierten demnach mit dem Sterberisiko der Patienten. So starben 4 Prozent der Patienten mit einem natürlichen Rhythmus im Vergleich zu 27 Prozent aus der Gruppe, deren Temperaturrhythmus gestört war. Die Wissenschaftler betonen, dass noch weitere größere Studien nötig seien, um den beobachteten Zusammenhang zu bestätigen.

L. Lesjuk
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STILRICHTUNGEN DER MODERNEN ARCHITEKTUR

Einfach, geometrisch und funktional: Das entspricht Ihrer Vorstellung von moderner Architektur? In vielen Fällen liegen Sie damit richtig. Allerdings sind die Stilrichtungen der Moderne weitaus komplexer und vielseitiger. Der Begriff „modern“ gilt als Synonym für zeitgemäß und angepasst an die aktuellen Entwicklungen. In der Architektur ist die Moderne jedoch nicht so klar einzuordnen und zu erkennen. Das liegt daran, dass die Klassische Moderne verschiedene Stilrichtungen umfasst, die mitunter Einfluss bis in die Gegenwart haben.

Geschichtlich beschreibt die Moderne eine Kunst- und Architekturepoche mit unterschiedlichen Strömungen, die zeitlich nicht genau voneinander abgrenzbar sind. Zugleich steht der Begriff Modernismus für eine weltweit verbreitete Formensprache, die einheitlichen Grundsätzen folgt. Die Prinzipien der Klassischen Moderne entwickelten sich Anfang des 20. Jahrhunderts als Gegenentwurf zum Historismus, der sich Stilrichtungen vergangener Jahrhunderte zum Vorbild nahm. Architekten der Klassischen Moderne wendeten sich zunehmend von der prunkvollen Ästhetik ab und fokussierten sich stärker auf die Funktionalität von Gebäuden.

Ansätze der modernen Architektur fanden sich bereits Mitte des 19. Jahrhunderts in der englischen Arts and Crafts-Bewegung und in Kunstströmungen wie dem Jugendstil zur Jahrhundertwende. Die Klassische Moderne lässt sich grob auf die Jahre zwischen 1910 und 1960 datieren, in denen sich verschiedene Unterströmungen entwickelten.

Während beim Expressionismus geschwungene und gezackte Formen vorherrschten, lag der gestalterische Fokus moderner Architekten ab den frühen 1920er Jahren stärker auf der Zweckbetonung von Gebäuden und dem Verzicht von dekorativen Elementen. Diese „Neue Sachlichkeit" (auch als Neues Bauen bekannt) folgte dem Anspruch, die Gestaltung nicht von ästhetischen Ideen abzuleiten. Dies führte unter anderem dazu, dass Stahlträger und andere Bauteile wie Versorgungsleitungen, Rohre und Betonwände nicht verdeckt oder verputzt wurden. Aus der Neuen Sachlichkeit entwickelte sich auch das Bauhaus, das auf klare Ordnung und eine gewisse Einfachheit durch geometrische Formen wie Kuben setzte. Der verwandte Funktionalismus gewann vor allem beim Wiederaufbau nach dem Zweiten Weltkrieg an Bedeutung. Eine weitere wichtige Strömung der Klassischen Moderne ist der sogenannten Internationale Stil, der sich in den 1920er Jahren zunächst in Europa und später in den Vereinigten Staaten durchsetzte. Bis heute entsprechen viele Bürogebäude und Wolkenkratzer in den USA den Prinzipien des modernen Stils.

Aufgrund der zahlreichen Strömungen unterscheiden sich moderne Bauwerke mitunter erheblich in ihrem Erscheinungsbild. Dennoch gibt es wiederkehrende Merkmale, die formalen und technischen Grundsätzen folgen. Typisch sind zum Beispiel Baumaterialien wie Stahl, Glas und Spannbeton. Die Architekturtheorie ist außerdem von den Leitsätzen zweier Vorreiter dieser Epoche geprägt:„Die Form folgt der Funktion" von Louis Sullivan Less is more „Weniger ist mehr" von Ludwig Mies van der Rohe. Die reduzierte, geradlinige Bauweise führt gelegentlich zu dem Missverständnis, die moderne Architektur ließe nur strikte geometrische Formen zu. Allerdings zeigen Strömungen wie der

Expressionismus oder auch der Brutalismus, dass moderne Architektur weitaus vielseitiger und experimenteller sein kann.

Der Entwurf für das Glaspaleis im niederländischen Heerlen galt 1934 als revolutionär und ist ein Paradebeispiel für das Neue Bauen. Für das einstige Warenhaus im Stadtzentrum entwarf der Architekt Frits Peutz eine Trägerkonstruktion aus 30 pilzförmigen Säulen, die mit jeder Etage schmaler werden.

Ivars Liepins
Latvia University of Agriculture

MEASURES OF THE DIGITAL TRANSITION

Digital challenges for Latvia include improving basic digital skills, increasing the uptake of digital solutions by businesses as well as alleviating the shortage of information and communication technology specialists, which currently impacts workforce availability, competitiveness, resilience, use of government e-services and innovation alike.

Latvia's recovery and resilience plan supports the digital transition thanks to investments in the digitalization of public administration and public services (€129 million) and by supporting the digital transformation of businesses and by creating a better environment for research and innovation with measures to improve the digitalization of small and medium sized enterprises (€125 million). The plan includes measures to deploy high-speed broadband that should help further improve digital infrastructure (€12.5 million) and reforms in favour of digital upskilling. The investment consists of purchasing information and communication technology equipment for general education institutions to close the digital divide for socially vulnerable learners and educational institutions. The project aims at providing better access to learning content and at enabling a smooth running of the remote learning process for pupils and teachers by creating "computer libraries" in schools. This allows pupils and teachers who need a computer to learn and teach to borrow it for the duration of their studies.

Limited innovation in business seems to be an important factor in slow productivity growth. Few Latvian firms have adopted new production technologies, launched new products or introduced new organisational methods. The share of innovating SMEs is among the lowest in the OECD, with Latvian firms lagging behind other OECD countries in their use of digital technologies, which is limited to basic tools.

Digital technologies have the potential to increase productivity in firms across all economic sectors. Big data and data analytics can help firms better understand their production processes, the needs of their clients and partners, and the overall business environment. Digital technologies can also improve the capability of firms to outsource key business functions and to access a range of financing instruments, which can help improve performance. Finally, online platforms can support the productivity of low-tech service firms, for example by providing them with booking facilities and efficient matching algorithms based on consumer review and rating systems. Promoting digital uptake by businesses, particularly SMEs, would go a long way towards fostering productivity growth in Latvia.

Economic growth and job creation are at the core of the strategy and inform the formulation of each of the seven action plans outlined in the guidelines: 1) ICT education and skills; 2) widely available access to the Internet; 3) advanced and effective public administration; 4) e-services and digital content for the public; 5) cross-border co-operation for the Digital Single Market; 6) ICT research and innovation; and 7) trust and security.

Digital innovation, in particular, has driven radical changes in the ways that people interact, create, produce and consume. Digital innovation not only gives rise to new and novel products and services, but also creates opportunities for new business models and markets, and can drive efficiencies in the public sector and beyond. In addition, digital technologies and data drive innovation in a wide range of sectors, including education, health, finance, insurance, transportation, energy, agriculture and fisheries, as well as the ICT sector itself.

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DERZEITIGE WIRTSCHAFTSWEISE UND UNSER WOHLSTAND

Die heutige Wirtschaftsweise zerstört die natürlichen Lebensgrundlagen und untergräbt dadurch den Wohlstand kommender Generationen. Die großflächige Abholzung von Wäldern, die Überfischung der Meere oder der Verlust fruchtbarer Ackerböden sind prägnante Beispiele für diese Entwicklung. Allein die Folgekosten durch den Klimawandel und den Verlust der biologischen Vielfalt könnten sich im Jahr 2050 auf rund ein Viertel des weltweiten Bruttosozialprodukts belaufen. Ein „Weiter so“, bei dem die Industrieländer ihre ressourcenintensive Wirtschaftsweise beibehalten und die Entwicklungs- und Schwellenländer diese Wirtschaftsweise übernehmen, stellt keinen gangbaren Weg dar. Daher ist der Übergang zu einer Green Economy erforderlich, die sich innerhalb der ökologischen Leitplanken bewegt und das Naturkapital erhält.

Green Economy ist ein neues Leitbild für wirtschaftliche Entwicklung. Es verbindet Ökologie und Ökonomie positiv miteinander und steigert dadurch die gesellschaftliche Wohlfahrt. Ziel ist eine Wirtschaftsweise, die im Einklang mit Natur und Umwelt steht. Der Übergang zu einer Green Economy erfordert eine umfassende ökologische Modernisierung der gesamten Wirtschaft. Insbesondere Ressourcenverbrauch, Emissionsreduktion, Produktgestaltung sowie Umstellung von Wertschöpfungsketten müssen geändert werden. Die Förderung von Umweltinnovationen hat dabei eine zentrale Bedeutung. Das UBA arbeitet an der Konkretisierung des Green-Economy-Leitbildes und entwickelt Vorschläge für die Gestaltung des Transformationsprozesses, bspw. im Rahmen des Projektes "Übergang in eine Green Economy".

Umweltschutz und wirtschaftliche Entwicklung sind keine Gegensätze, sondern bedingen einander. Die Steigerung der Energie- und Materialeffizienz wird im 21. Jahrhundert voraussichtlich zu einem entscheidenden Faktor für die internationale Wettbewerbsfähigkeit. Durch den Anstieg der Weltbevölkerung und die wirtschaftlichen Aufholprozesse in Entwicklungs- und Schwellenländern wird die Nachfrage nach Gütern und Dienstleistungen weiter wachsen. Diese Nachfrage lässt sich bei begrenzten natürlichen Ressourcen auf Dauer nur befriedigen, wenn es gelingt, „mehr“ mit „weniger“ herzustellen. Das heißt, Wirtschaftswachstum und die Inanspruchnahme natürlicher Ressourcen zu entkoppeln. Daher wächst der Druck, Umwelt- und Effizienztechniken einzusetzen und fortzuentwickeln.

Besonders deutlich zeigen sich die wirtschaftlichen Chancen eines fortschrittlichen Umweltschutzes am Beispiel der Leitmärkte der Umwelttechnik und Ressourceneffizienz. Zentral sind hierbei: Energieeffizienz, umweltfreundliche Energieerzeugung, nachhaltige Wasserwirtschaft und Mobilität, Materialeffizienz, Abfallmanagement und Recycling. Schätzungen zufolge wird sich das Weltmarktvolumen dieser zentralen grünen Zukunftsmärkte mehr als verdoppeln: von 4,6 Billionen Euro im Jahr 2020 auf 9,3 Billionen Euro im Jahr 2030. Deutschland gehört heute – auch wegen seiner ambitionierten Umweltpolitik – mit Weltmarktanteilen zwischen 7 und 17 Prozent mit zu den weltweit führenden Anbietern auf diesen Märkten.Allerdings verschärfte sich der globale Wettlauf um die grünen Zukunftsmärkte in den letzten Jahren deutlich. Viele Länder haben während der Finanzkrise Konjunkturpakete mit einem hohen Anteil von Umweltschutzmaßnahmen verabschiedet, zum Beispiel Südkorea mit einem „grünen" Anteil von 80 Prozent und China mit 38 Prozent. Diese Programme zielten auch darauf, im Wettbewerb um die grünen Zukunftsmärkte aufzuholen. Deutschland wird seine führende Rolle auf diesen Märkten deshalb nur verteidigen können, wenn es weiterhin eine Vorreiterrolle im Umweltschutz einnimmt und Umweltinnovationen systematisch fördert.

Mariia Odarenko
Constantine the Philosopher University in Nitra, Slovakia

ECOTOURISM DEVELOPMENT IN SPAIN

Tourism as an industry is a phenomenon that has a growing presence in the dynamics of the

international economy. For many nations and regions of the world, it is one of their main activities that generate income, employment and development.

In recent years, alternative tourism has been a “boom”, new and numerous forms of tourism have appeared, with various names, each of which tries to emphasize some important and differential factor that provides value.

Ecological tourism is an approach to tourist activities in which the preservation and appreciation of the natural environment that welcomes travellers is privileged. Due to its rapid growth it is also seen as a subsector of tourism activity. This movement appeared as such at the end of the eighties of the 20th century, although only in recent years has it managed to attract enough international interest for the United Nations Organization to dedicate the year 2002 to ecological tourism. In its most common sense, ecotourism implies an environmentally responsible trip to undisturbed regions, to enjoy the natural environment and the culture of the inhabitants of such environment, to promote both the appreciation of the natural and cultural riches of the places to visit, as to give conservation a tangible monetary value, which serves as an argument to convince both visitors and locals, of the importance of conserving its resources.

Although there are different interpretations, ecological tourism is generally promoted as "ethical" tourism, in which the well-being of local populations is also paramount, reflecting this fact in the structure and functioning of the companies or groups that dedicated to offering tourist services. Despite its relatively short existence, ecotourism is seen by various conservation groups, international institutions and governments as a viable alternative for sustainable development. On the other hand, there are also criticisms of this type of tourism, due to the lack of standards, criteria and regulations that allow services to be homogenized.

Global warming is one of the main problems to face for sustainable tourism, governments and companies need to work and concentrate their efforts on raising awareness and educating all tourists. Ecotourism will help increase the employment rate and promote local businesses. In the environmental aspect, ecotourism has a low impact because the organizations will have the responsibility to protect and preserve natural places.

In fact, Spain is the country in Europe with the largest number of accredited spaces according to the European Charter for Sustainable Tourism (CETS), with a total of 42 (29.2% of the total). It is followed by France, with 30, Italy, with 29, and the United Kingdom, with 13. Spain is also the country with the largest number of candidate spaces for CETS accreditation, with eight (25% of the total).

We see a growth towards sustainable tourism. Regarding the market share of this segment, in recent years it has increased considerably going from 7% to 25% in 2016. In addition, 30% of all natural and mixed World Heritage areas have a high level of territorial planning, in favor of sustainable tourism.

Now that the industry, citizens and tourists are aware of the real need that exists, the change in the model towards a more sustainable tourism committed to the environment and to local society is already happening. The continuous growth and trends in the sector point towards sustainable tourism as essential for the future.

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PROZESSMANAGEMENT FÜR AUTOMOTIVE

Die Automobilindustrie befindet sich im tiefgreifenden Wandel, der vor allem durch Elektrifizierung und autonomes Fahren angetrieben wird. Innovationen werden von Software und Interkonnektivität dominiert, die sich sogar auf das generelle Geschäftsmodell auswirken. Um mit der Dynamik dieses Übergangs unter anhaltendem Kostendruck fertig zu werden, ist die Optimierung und das Design aller relevanten Prozesse geschäftskritisch.

Um der wachsenden Komplexität bei der Entwicklung von Fahrzeugen und ihren Komponenten gerecht zu werden, verfolgt die Automobilindustrie drei Schlüsselansätze:
Agile Entwicklung bietet den Kunden einen schnelleren und genaueren Mehrwert und passt sich

besser an geänderte Anforderungen gerade in umfangreichen Projekten und Programmen an.

Im modellbasierten Systems Engineering werden systemtechnische Verfahren und Modelle über den gesamten Produktlebenszyklus hinweg verwendet, Simulationen und
virtuelle Prototypen bis hin zu Digital Twins erstellt, um den digitalen Thread eines Produkts zu verwalten.

Mithilfe von Produktlinien-Entwicklung können viele Produktvarianten auf effiziente Weise erstellt werden, indem ständige Neuentwicklungen durch Wiederverwendung bestehender, konfigurierbarer Komponenten ersetzt wird. All diese neuen Techniken verlangen grundlegende Veränderungen der Arbeitsweise und erfordern eine Neugestaltung der gesamten Engineering-Prozesslandschaft. Für die Innovationsfähigkeit jedes Unternehmens und die Wahrung seines Wettbewerbsvorteils ist es entscheidend, dass alle Entwicklungsteams diese neuen Prozesse und Techniken in ihrer täglichen Arbeit effizient anwenden können.

Jeder Automobilkunde erwartet von seinem Fahrzeug Zuverlässigkeit, Sicherheit und hohe Qualität. In dieser Hinsicht gelten für Unternehmen, die im Automobilgeschäft tätig sind, folgende Standards:

Automotive SPICE® 3.1 für Qualität im Systems und Software Engineering
ISO 26262:2018 für funktionale Sicherheit
ISO/SAE 21434 für Cyber Security
ISO PAS 21448 für Sicherheit der bestimmungsgemäßen Funktion (SOTIF)
IATF 16949 für generelle Produktqualität

Es ist wichtig, Prozesse gemäß dieser Standards zu implementieren und die Einhaltung in Audits und Assessments effizient nachweisen zu können. Das Risiko von Haftungsproblemen und Reputationsverlusten der Marke mit teilweise katastrophalen finanziellen Auswirkungen wird hierdurch erheblich reduziert.

Stages ist zur Prozessinnovation in der Automobilindustrie ideal geeignet. Durch die Features zur Modellierung, Pilotierung, Ausführung von Prozessen wird die Einführung agiler Praktiken, modellbasierten Engineerings oder Produktlinien-Entwicklung maßgeblich beschleunigt.

Stages enthält einzigartige Mechanismen, um die Einhaltung von Standards wie Automotive SPICE® oder ISO 26262 sicherzustellen und damit den Aufwand zum Compliance-Nachweis um bis zu 50% zu reduzieren. Stages unterstützt den gesamten Prozess-Lebenszyklus von der Initialen Modellierung bis zur integrierten Ausführung innerhalb der gesamten Organisation. Compliance- und Feedback-Funktionen halten Ihre Prozesstransformation auf Kurs und sichern Ihren Erfolg.

Amir Smagulov
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DEVELOPMENT OF LOGISTICS IN REPUBLIC OF KAZAKHSTAN

The logistics industry is the circulatory system of the economy, ensuring the timely delivery of goods along the entire production chain from raw materials and equipment to the final customer.

The volume of cargo transportation in Kazakhstan is growing every year, according to the results of 2021, freight transportation by all modes of transport (excluding pipelines) amounted to 4.2 billion tons. The average growth rate over the past 5 years was 1.4% CAGR despite the pandemic supported by the development of e-commerce and the country's transit potential. Revenues from transportation by all modes of transport (excluding pipelines) in the Republic of Kazakhstan at the end of 2020 amounted to 1.4 trillion tenge of which 1.1 trillion (78%) was received through the transportation of goods.

In terms of the domestic transportation structure of goods by mode of transport, the lion's share (83%) is accounted for by road transport also due to the rapid development of online commerce and delivery services and the growing demand for 3PL services.

According to a study by Baker Tilly, the volume of e-commerce in Kazakhstan reached 760 billion tenge in 2020 and continues to grow. According to a survey of the largest players in the e-commerce market, the growth rate for the top 5 e-commerce categories over the past 5 years was 84% CAGR while market places grew at a faster pace – + 196% CAGR. From our point of view, it is the

trends of the continued growth of market places and grocery delivery services from supermarkets that will be the main drivers of growth in demand for logistics services in the domestic market.

Describing regions, there is a relatively even distribution of income in the transport and logistics sector. At the same time, when compared with the distribution of retail trade volumes and in particular e-commerce we see significant gaps between regions. The share of e-commerce turnover in the retail turnover in Almaty remains quite low (about 3%) while in other regions except for West Kazakhstan Region (5%) this share is even lower. This suggests that there is some room for growth through an increase in the share of e-commerce, especially in cities where this figure is below 2%. Thus, we consider it likely that the outstripping growth in demand for warehouse space and logistics services in these regions and in the market as a whole is likely.

In addition, logistics and transport is the sector of the economy thanks to which the "transit potential" of Kazakhstan is not just words but real numbers and opportunities for economic growth.

At the end of 2021 23.8 million tons of cargo were transported through the Republic of Kazakhstan by all modes of transport (an increase of 4.8% by 2020) of which 88% were carried out by rail transport.

The volume of container traffic reached 1,065.6 million TEUs last year, up 22% from the previous year. According to rail.kz, 732,000 TEUs were transported along the China-Europe-China route, or 32% more than in 2020. Analysts also note that more than 83% of transit in the direction of China – Europe – China falls on the share of Kazakhstan.

Eren Turanly
State Turkish- German University

THE TURKISH EONOMY AS A PART OF GLOBALIZATION PROCESSES IN THE WORLD

We live in a global world today and have to find our place in it. Bill Gates once said that globalization is not only something that will concern and threaten us in the future, but something that is taking place in the present and to which we must first open our eyes. Globalization means the speedup of movements and exchanges (of human beings, goods, and services, capital, technologies or cultural practices) all over the planet. This term is known all over the world and has a lot of definitions. According to the Committee for Development Policy (a subsidiary body of the United Nations), from an economic point of view, globalization can be defined as: "… the increasing interdependence of world economies as a result of the growing scale of cross-border trade of commodities and services, the flow of international capital and the wide and rapid spread of technologies. It reflects the continuing expansion and mutual integration of market frontiers (…) and the rapid growing significance of information in all types of productive activities and marketization are the two major driving forces for economic globalization." So, the main idea of Globalization is to simplify finance regulations, eliminate mediators and break down the barriers among the world's financial centers. And the goal is to make it easier to exchange capital among the world's financial players. The deep analysis of the world`s economy today indicates that financial globalization has contributed to the rise of a global financial market in which contracts and capital exchanges have multiplied. The advantages of globalization are actually much like the advantages of technological improvement. They have very similar effects: they raise output in countries, raise productivity, create more jobs, raise wages, and lower prices of products in the world economy. On one hand, globalization has created new jobs and economic growth through the cross-border flow of goods, capital, and labor. On the other hand, this growth and job creation are not distributed evenly across industries or countries. Specific industries in certain countries, such as textile manufacturing in the U.S. or corn farming in Mexico, have suffered severe disruption or outright collapse as a result of increased international competition.

Globalization has huge influence on workers, cultures, and businesses around the globe and Turkey is no exception. It is the 19th-largest economy in the world. It is a member of the OECD and the G20, and an increasingly important donor of Official Development Assistance.

Turkey pursued ambitious reforms and enjoyed high growth rates between 2002 and 2017 that propelled the country to the higher reaches of upper-middle-income status and reduced poverty. The share of people below the US$5.50 per day poverty line fell by three quarters to 8.5 percent between 2002 and 2019. The Government's economic policy response to COVID-19 was swift but focused on loose monetary policy and rapid credit expansion. This supported economic activity and made it one of the few in the G20 and OECD to experience growth in 2020 - but also fueled inflation, which is expected to be close to 20 percent in 2022-2023. In conclusion we can say that Turkey plays important role in the modern world and will continue to cooperate with its partners.

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MENSCHENÄHNLICHE INTELLIGENZLEISTUNGEN

Künstliche Intelligenz ist der Überbegriff für Anwendungen, bei denen Maschinen menschenähnliche Intelligenzleistungen erbringen. Darunter fallen das maschinelle Lernen oder Machine Learning, das Verarbeiten natürlicher Sprache und Deep Learning. Die Grundidee besteht darin, durch Maschinen eine Annäherung an wichtige Funktionen des menschlichen Gehirns zu schaffen – Lernen, Urteilen und Problemlösen.

Diese Art des Lernens ermöglicht unter anderem das sogenannte Natural Language Processing. Dabei geht es um die Verarbeitung von Texten und natürlicher menschlicher Sprache, die unter anderem bei dem Sprachdienst Alexa von Amazon zur Anwendung kommt. Als vielversprechendste Methode des Machine Learning wird aktuell Deep Learning gesehen, das sehr tiefe neuronale Netze mit mehreren Ebenen und einem großen Datenvolumen nutzt.

Im Gegensatz zu NLP geht der Algorithmus beim DL tiefer: Die Maschine erkennt Strukturen, kann diese evaluieren und sich in mehreren vorwärts wie rückwärts gerichteten Durchläufen selbständig verbessern. Dabei verwendet der Algorithmus mehrere Knotenebenen - Neuronen parallel, um fundierte Entscheidungen zu treffen. Beispielsweise findet die Medizin mit Deep Learning Unterstützung bei der Früherkennung von Krebs oder Herzkrankheiten und kann DNA-Profile von Kindern nach Genmarkern untersuchen, die auf Typ 1 Diabetes hinweisen. In der Forschung wird Deep Learning unter anderem eingesetzt, um tausende Zellprofile und deren aktive Gene auszuwerten oder Teilchenschauer, die entstehen, wenn in einem Teilchenbeschleuniger Protonenstrahlen aufeinanderprallen. Da diese Art des Lernens komplexe, nicht lineare Probleme löst, kommt sie etwa auch bei selbstfahrenden Fahrzeugen zum Einsatz, um unübersichtliche Verkehrsszenen richtig zu interpretieren: Fußgänger, Radfahrer, Wetter, Verkehrszeichen oder Bäume – das Verhalten der Verkehrsteilnehmer muss unter Berücksichtigung aller möglichen Einflussfaktoren richtig erkannt und vorhergesagt werden.

KI ist für alle Branchen interessant, in denen großen Datenmengen anfallen. Beispielsweise für die produzierenden Unternehmen, bei denen Lieferanten, Sensoren in den Maschinen und das ERP-System viele Daten liefern können. Selbstlernende Algorithmen unterstützen hier die Qualitätskontrolle und liefern Prognosen für die vorausschauende Wartung der Maschinen. So vermeiden Unternehmen Produktionsausfälle und minimieren die Lagerhaltungskosten, um nur einige Beispiele zu nennen. Auch im Gesundheitswesen bieten sich durch medizinische Bildanalysen oder roboterassistierte Chirurgie nahezu unbegrenzte Möglichkeiten für den Einsatz der KI.

In jeder Branche entstehen derzeit Ideen, die oft zu deutlichen Effizienzgewinnen führen, da wiederholbare Aufgaben in Prozessen automatisch ablaufen. Die Menschen erhalten dadurch mehr Zeit für strategisch wichtige und kreative Aufgaben. Aber KI führt auch zu neuen Geschäftsmodellen – zum Beispiel, wenn ein Unternehmen keine Maschinen mehr verkauft, sondern stattdessen deren Leistung.

Künstliche Intelligenz vereinfacht Arbeitsabläufe, ermöglicht genauere Prognosen und schafft neue datenbasierte Geschäftsmodelle. Sie erlaubt schnellere Entscheidungen auf einer besseren Datenbasis, erhöht die Anpassungsfähigkeit von Unternehmen auf Marktveränderungen durch Echtzeitinformationen sowie Vorhersagen jenseits menschlicher Fähigkeiten. KI schafft für Unternehmen also weit mehr als Effizienz – sie ist ein Schlüssel zu erhöhter Wettbewerbsfähigkeit. KI ist für alle Branchen von Interesse, in denen mit großen Datenmengen gearbeitet wird. Selbstlernende

Algorithmen unterstützen hier die Qualitätskontrolle und liefern Prognosen für die vorausschauende Wartung der Maschinen.

Samrawit Yemane
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SCIENCE POLICY CREATED TO BUILLD THE ECONOMY AND INNOVATIVE SOCIETY

Ethiopia has, over time, been seeking mechanisms to harness the power of science and technology for its development. Various policy directives that promote science have been implemented in the country at different times.

Ethiopia's first Science, Technology and Innovation policy was formulated in 1993 after a lengthy drafting and ratification process that took about 10 years (from 1984 to 1993).

The policy included major goals of building "national capability to generate, select, import, develop, disseminate and apply appropriate technologies for the realisation of the country's socio-economic objectives".

The policy identified four management bodies that were considered to be critical for implementing the policy: the National Science and Technology Council, the Technical Advisory Committee, an Ethiopian Science and Technology Commission (ESTC) and science and technology institutes and centres.

The plan also envisaged the establishment of research institutes, technology centres, design enterprises, and various science and technology support services under the ESTC or as autonomous entities.

After the successive restructuring of the Ethiopian Science and Technology Agency, the Ministry of Science and Technology was established in 2008. But, after two years, the ministry was again restructured in October 2010 and became the top government agency for coordinating, supporting and encouraging science and technology activities in the country.

The ministry was entrusted with setting science and technology and research priorities in addition to developing guidelines, frameworks, policies, regulations and strategies which facilitated the application of science, technology and innovation to accelerate the socio-economic development of Ethiopia.

Furthermore, the ministry facilitated collaboration among the government, universities and the private sector and oversaw human resource development plans in the field of science, technology and innovation.

It was responsible for developing mechanisms for incentivising and rewarding individuals and institutions that contributed to science and technology and for organising and supporting research councils that facilitated research activities.

The establishment of the Ministry of Science and Higher Education in 2018 has necessitated changes in the manner in which science development has been led and coordinated at a national level.

This has led to the restructuring of the governance and hence the development of a new policy framework.

In line with past policy directions, the new policy has been crafted to address the building of a knowledge-based, technology-driven economy and society; enhancing national growth and development through an emphasis on human resource development; as well as sound regulatory frameworks, partnership and funding mechanisms.

The new policy also deals with providing strategic leadership for the efficient implementation of policy, ensuring the availability of adequate funding and necessary support for the advancement of science research and science education as a discipline within university communities, research institutions, professional societies and private companies.

Flowing from the policy, seven core focus areas have been identified: human capital development; enterprise development; scientific research and innovation; infrastructure development and management; governance, leadership and management; knowledge management; and financing and

incentive schemes.

In addition to setting out the regulatory and partnership schemes, which are key to implementing the policy, emphasis has been placed on the need for aligning the core areas with the strategic demands of the country's medium- and long-term development plans.

SECTION 1.
TRANSPORT TECHNOLOGIES AND EQUIPMENT

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LiDAR AS A TECHNOLOGY FOR THE FUTURE OF TRANSPORT ENGINEERING

In recent years, we have been hearing more and more about testing and developing unmanned vehicles, testing the first taxis without drivers, introducing autopilot systems into modern cars that can take a person from point A to point B, without his participation in management at all, the invention and presentation in the general sale of the first robots capable of performing simple tasks. All this leads to the inevitable question of the implementation of systems and technologies that can ensure the safety of people when interacting with new participants in our lives, because you can't just draw a route on the map and tell the car to drive it, because it will not even take into account the rules of the road, not to mention about other aspects of the complexities of interaction with transport.

To solve these problems, there are various devices and technologies, but, in my opinion, the most common and progressive is LiDAR. LiDAR can be either a single sensor or a system of them, which is designed to ensure the correct operation of modern unmanned systems. When we talk about how to integrate an unmanned vehicle or any other vehicle into real-life conditions of use with weather variability, various emergency situations, the human factor of other road users and a huge number of other nuances, we must understand how and why a person reacts to them. After analyzing the driving model of an ordinary driver, machinist or pilot, we can understand that, first of all, the most important thing is that a person sees with his eyes what is happening around him, can draw up a picture of what is happening for himself and, when analyzing it, find solutions to get out of, for example, a dangerous situation, if one occurs. This is exactly what LiDAR allows to implement for unmanned systems.

The essence of LiDAR is that it, like a sensor, is able, like the human eye, to analyze space by emitting light streams and measuring the return time of reflected light streams to the receiver. This approach allows, first of all, to analyze the area around a car or other vehicle in real time and enables the unmanned system to automatically make decisions to exit an emergency without waiting for a command. In addition, LiDAR understands the size and volume of objects that it sees on its way, as a result of which the sensor can recognize specific obstacles in its path and react by analyzing whether a person, an animal, or maybe an inanimate obstacle is in front of it. This, in turn, makes it possible to compile three-dimensional maps that will take into account the complexity of the terrain, the size of objects on the road, the width of lanes, etc. constantly analyze what is happening on the road and respond to emergency situations not linearly, but each time in a different way, learning and finding the best ways to solve the problem, just like a novice driver, learning and practicing becomes a more experienced driver.

Of course, LiDAR, like any technology, is imperfect and continues to develop and modernize. The main problem of LiDAR at the moment is that it is not completely autonomous and most often works in conjunction with pre-compiled terrain maps. In addition, for high-quality LiDAR operation with a minimum number of errors and deviations, at this stage of this technology, if we are talking about cars, almost ideal conditions are needed with high-quality road surfaces and distinguishable road markings, which makes it not very effective at this stage for working in actively changing weather conditions, which can affect both the deterioration of the visibility of the sensors and the change in the interaction of the vehicle's wheels with the road surface, which can create instability during the operation of the system. Also, to all this, we can add that testing and operation of unmanned vehicles with LiDAR

analyzing sensors in the current implementation is not autonomous and takes place on separate dedicated servers that require a considerable amount of computing power and memory, which slightly complicates the process of developing this technology in modern reality semiconductor shortage.

Despite this, I can confidently state that LiDAR technology, including its features, is one of the most advanced environmental analysis technologies on the market today and, in my opinion, it will greatly affect the creation, type and functionality of the modes of transport of the future, which will become more autonomous, more comfortable and safer thanks to this technology, which can already be confirmed by the active successful testing of this technology by such companies as: General Motors, Uber, Baidu and many others.

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THE BENEFITS OF ADVANCED DAS SYSTEM TECHNOLOGY FOF RAILWAY

International experience proves that at the time of emergence of the Industry and Logistics, the rail transport sector becomes a driving force of the economy, with its potential sources of generating revenues and expanding economic space of the service sector. The world of mobility is constantly evolving when the industry invest in developing technology, it pays off by improving safety, enhancing productivity and supporting environmental sustainability.

A relevant experience to be adopted in Ukraine is advanced DAS system. Rail fractures are one of the leading causes of derailments on North American railroads, so the industry is focusing on technologies that can prevent and quickly detect such track defects. Research into DAS (also referred to in North American railroads as Fiber Optic Acoustic Detection, FOAD, which is the acronym used) was not limited to its rail-fracture detection capabilities, but covered other applications as well. DAS-type systems consist of a storage device (such as a hard disk) connected to a computer by a bus controller adapter. There is no network device (hub, switch or router) between them, and this is the main feature of DAS. At the same time, the drives can be internal or external. Other servers can only be accessed through the owner's server. The simplest case of a DAS system is a single drive inside a server or PC. An external RAID array connects to one or more servers via SCSI or FC (Fibre Channel), with each of these ports available to only one server.

The developers underline the following advantages of the system: low cost (compared to other storage solutions), easy deployment and administration, high speed of data exchange between the storage system and the server, high speed of data exchange between the storage system and the server, DAS-systems are well suited for multimedia streaming storage because of the high speed of exchange with disk drives, as well as the ability to build high-capacity systems. Besides, having accurate information about the location and speed of trains, dispatchers can manage train traffic much more efficiently, it also makes possible to identify in near real time the current location of the head and tail of the train with an accuracy of 2 to 20 m. Rail circuits cannot provide such accuracy of train location [1]. Applications based on FOAD technology can replace, or at least complement, a number of systems already in operation. One of the tasks of the FOAD working group was to identify potential applications for this technology and prioritize the applications whose development and development would have the greatest impact on the industry. The working group identified the following applications that are most important to the industry: rail fracture detection, train tracking, rolling stock and track condition monitoring, security functions and environmental threat detection [1].

However, FOAD technology has certain limitations. A stopped train does not generate acoustic signals, but with the chronology of its movements, this limitation can be removed. The identification of the first and the last axle of a train wheelset poses some difficulties. But the most significant limitation of this technology is its inability to reliably determine the track the train is on on a multi-track section. That is why FOAD technology itself cannot be classified as a safe means of controlling track vacancy. Perhaps with the development of fiber-optic acoustic sensing technology, this limitation will be removed.

To conclude, the rail transport main function is to meet, at a high-quality level, the needs in passenger and freight transportation services, including security of transportation. Competition in global markets as regards not only various modes of transport but also among foreign manufacturers of rail products, i.e. in the area of rail supply, requires development of key competencies on the basis of innovations

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ENERGY STORAGE DEVICES IN THE TRANSPORT SYSTEM

In the modern world, energy resources are actively used, which have a variety of types, types and areas of application, including electric transport. In parallel with the development of the energy industry, the question of where to store the energy for its further use has also evolved. The solution was the invention and creation of energy storage devices. The first energy storage devices were invented and introduced in the 20th century. Since that time, the industry has moved forward at a rapid pace, different types and kinds of energy storage devices have been created, such as lithium-ion batteries. They can often be found in electric cars, as well as in such forms of transport as the electromagnetic suspension train (maglev).

Such type of transport as electromagnetic has high speed indicators. To lift it into the air, it is necessary to apply a considerable amount of force, but thanks to strong magnets, as well as metal coils, it rises into the air due to electromagnetic forces. The same technology drives a train. In other words, magnetized coils on both sides of the track repel the magnets on the suspension, thereby lifting a train off the ground and keeping it moving along the route. There is also a similar system mentioned above, but in addition to onboard coils and electromagnets, there are coils that are located on both sides of the track structure along the entire length of the track.

The system needs a powerful source of energy, such as power plants, or the use of energy storage devices as a power source. In both cases, a large number of storage batteries supplying the necessary power is needed. That is why lithium-ion batteries are used. They consist of electrodes (cathode and anode) separated by a porous separator, which in turn is impregnated with electrolyte. The whole system, consisting of a group of electrodes, is placed in a sealed case, their cathodes and anodes are connected to the so-called current collector terminals. The sequence of such storage device operation is as follows:

1) at the moment of applying voltage to the electrodes, lithium ions break away from the cathode, pass through the separator to the graphite anode, penetrating into its molecular structure, thereby causing an oxidation reaction, which makes the battery charged;
2) if loads are applied to lithium ions, they will be directed back to the cathode.

This type of storage has a number of advantages over others:

1) sufficiently high energy density;
2) low self-discharge setting;
3) ability to create drives of any shape and size;
4) has a wide operating temperature range;
5) convenience and simplicity of application.

Such kinds as lithium-ion storage systems are effective not only as the main energy source for the track coils, onboard coils and electromagnets, but also for the power supply to the vehicle board systems as well as control systems. In this case the storages built-in on both sides of the track structure are supplied the power not by the power but the sun positively influencing the environment.

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RATIONAL ROUTES OF CARGO TRANSPORTATION AS A KEY TO THE EFFICIENT DEVELOPMENT OF THE TRANSPORT COMPANY

The state's economy is completely dependent on the development of transport systems. These systems play an important role in the effective interaction of various sectors of the economy with each other and act as a platform between the supplier, manufacturer and consumers. Unfortunately, today the process of transporting goods, in particular by road transport, faces a number of problems related to the loss of control over certain territories of important industrial areas as a result of military aggression by the Russian Federation. This significantly affects the reduction of cargo transportation volumes. Accordingly, there are also problems with the demand for cargo transportation, as a certain number of farms have suspended their activities. As a result, the planning of rational cargo transportation routes becomes a difficult task. Irrational cargo transportation routes lead to an increase in the cost of this process, which affects the level of service quality and competitiveness.

In addition to armed aggression, a negative factor is the spread of the COVID-19 pandemic, which leads to a decrease in the business activity of business entities. Motor carriers are trying to reduce the costs of product delivery in any way, and this is especially felt in the conditions of intensifying competition between them. Therefore, the planning of rational cargo transportation routes is a way out of the crisis for motor transport companies against the background of unstable order volumes.

Planning rational routes allows you to reduce transportation costs and increase the efficiency of logistics operations. That is, optimal use of vehicles and human resources is ensured. The rational model of freight transportation is the result of creating optimal transportation routes, realistic plans for unloading and loading operations, which generally increase the efficiency of the transportation network.

A special role in ensuring the optimization process is occupied by the issue of finding solutions for the efficiency of cargo transportation in complex transport systems, taking into account the influence of many factors of the external and internal environment. Building optimization models of transportation allows to find effective ways to reduce the cost of the transportation process. It will be possible to optimize the model taking into account the features of the network of customers (resource suppliers, main and auxiliary manufacturers, primary and secondary customers) and the technical condition of cars [1]. It will also be possible to ensure the most complete use of the carrying capacity of vehicles with proper loading; the use of modern approaches in organizing the placement of goods and stocks in warehouses and terminals. Taking such features into account will improve the efficiency of the transportation process and determine the direction of the search for economically justified routes for the delivery of goods to customers. Also, an important aspect in this matter is the choice of a method of modeling and determination of optimal routes, taking into account the most complete list of influencing factors. One of the ways to achieve these goals is to solve mixed vector-matrix optimization problems with limited resources.

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DEVELOPMENT PROSPECTS OF RAILWAY POSTAL TRANSPORTATION IN UKRAINE

The railroad is a universal mode of transport. It has a number of advantages, such as reliability, uninterrupted and regular traffic flow regardless of the season of the year and day/ night operation, a sufficiently large carrying capacity, relatively low cost of transportation, etc. There is an extensive railway network in Ukraine, that's why the transportation of mail is one of the potential uses of the railway infrastructure.

Generally postal cars are hitched to the passenger trains. However, sometimes post-baggage, baggage cars and even compartments of the passenger cars can be used if traffic volume is small and when it is not economically feasible to hitch a mail car to a train. The railroad used to be the main mode of mail transportation. However, in 2001, postal operators completely « switched» to road transport. Increased speed of transportation, door-to-door system of delivery, flexible schedules have caused the reduction of rail post transportation. As the result, Ukrzaliznytsia completely lost this segment of the transportation market. The fleet of post wagons has been running out for many years, and no new wagons have been purchased. As a result, in 2020 there were no mail cars in the inventory fleet at all. There were only 6 postal-baggage cars, but none of them were in operation. Rail mail transportation resumed only in 2022, when road transport faced the problem of rising prices and lack of fuel, a large number of roadblocks and traffic jams. 15 wagons are being used to transport mail currently, but some of them are not actually postal baggage cars. Freight and refrigerator cars, originally designed to transport perishable goods, were adapted for these purposes. It should be noted that Ukraine is able to renew the fleet of mail cars manufacturing them at Kryukiv Railway Car Building Works. In the recent years, the technology of mail transportation in containers and modernized fitting platforms is actively being developed in the world. Several years ago, Ukrzaliznytsia intended to introduce such model for the transportation of post to the areas where there are problems with roads, but this initiative was not implemented.

It is also worth adding that mail transportation by rail with sorting points located near railway stations in all regional centers can be also beneficial, as shipments can be transferred to the mail handling warehouses almost immediately after unloading. In addition, it is important for postal operators that post is transported during the night time, and in the early morning the shipments are already at their destinations. The schedule of the night passenger trains largely complies with this requirement, because it is developed according to a similar principle. However, the tariff setting approach remains an actual issue regulated by the state.

Thus, there are favorable conditions for the development of the postal transportation by rail in Ukraine. The interaction of railway and postal carriers would allow Ukrzaliznytsia to attract additional income, as well as improve transportation technology and reduce the cost of delivery to postal operators.

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PROSPECTS OF THE DEVELOPMENT OF THE MAGLEV TRANSPORT IN UKRAINE

High-speed transport is a type of land transport that can develop the highest speed of movement compared to other types of land transport. In modern transport systems, there are two classes of high-speed transport: rail transport and magnetic levitation transport. If the first type is a typical railway

transport with special speed characteristics, then the second type is a fundamentally a new approach to transport systems. There is no standard "wheel-rail" system in magnetic levitation transport, and due to the absence of mechanical losses, it is possible to develop the rate of movement from 300 to 800 km/h.

According to its principle of movement, magnetic levitation transport can only conditionally be attributed to railway transport, because there are no railway tracks in the maglev system, but there is only a road structure that serves as a way or direction of movement.

The movement of such transport occurs according to the laws of electromagnetic induction. Due to the phenomenon of magnetic levitation, the rolling stock "rises into the air" to the height of 10 cm, and due to switching the phases of the coils laid in the track structure, it begins to gain speed and move forward.

In Japan, China and Korea there are commercial lines of magnetic levitation transport put into operation. Taking into account the experience of these countries, it is possible to propose long-term projects for the development of the field of magnetic levitation transport in Ukraine. The advantages of this type of transport are the high speed of transportation and the low level of environmental pollution in the area where road structures of the rolling stock can be located. However, high-speed transport must strictly comply with safety regulations taking into account all possible risks and requirements.

The main requirements for magnetic levitation transport are the following:

- high speed of transportation;
- acceptable level of electricity consumption;
- comfortable transportation conditions;
- high level of reliability and maintainability of the rolling stock.

The Institute of Transport Systems and Technologies of the National Academy of Sciences of Ukraine, located in the city of Dnipro, is engaged in the research and development of this field of transport in Ukraine. On the simulated track structure the institute has already developed, manufactured and tested one of the first samples of a working model of the rolling stock with an electrodynamic suspension on superconducting magnets.

Within the framework of the work of the institute, technical solutions for the design of the high-speed land transport are developed, electromagnetic field parameters are calculated, the aerodynamic study of the rolling stock elements is developed, the energy and electromechanical characteristics of a linear synchronous motor in various driving modes are determined, the basic provisions of the theory of dynamics and the theory of heating of the hydraulic brakes are developed. systems, new schemes of electrodynamic suspension were proposed, which have improved levitation characteristics and high stability of movement.

The scientists of the institute determined that within the transport routes of Ukraine, the construction of a ring road of high-speed land transport connecting most of the regional centers of Ukraine, could be economically profitable.

The project would make it possible to upgrade the land transportation industry of Ukraine, put it to a new level, thanks to the speed, time saving and modernity of this type of transport.

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MULTIMODE PASSENGER TRANSPORTATION AS THE DIRECTION OF TRANSPORT MARKET DEVELOPMENT

It is quite obvious that modern transportation demands of the passengers have changed drastically on the contemporary market. The passengers require to be provided not only with comfortable and inexpensive journey but also with the safe transportation of the highest quality services and extra range of facilities to meet their demands and individual needs of the customers and to make their travelling pleasant.

Therefore, to ensure passenger transportation with all range of such requirements they should be mixed that is to be provided by various means of transport. Only during such kind of transportation every

kind of transport can demonstrate its competitive advantages so journey will meet the criteria of quality and speed. As one of the demands of the Association Agreement between the European Union and Ukraine is multimodal transportation and its dissemination throughout the whole country [1].

Under the conditions of globalization and passenger traffic it is essential to ensure transformation of the service system of passengers. To achieve the target it is necessary to develop multimodal passenger complexes, hubs, transport interchange junctions, which provide interconnection among all means of transport and among all passenger players involved.

Transportation hub is a big railway interchange centre for comfortable passengers journey and their luggage, for those who travel by several means of transport and whose trips are connected with overall timetable for the Single ticket, which includes all kinds of servises and provides the passengers with all the comforts while waiting for the next trip and reduces the time of the passengers travelling [2, p. 125].

To conclude it should be pointed out that multimodal transportation with the main mode of railway as strategically important object must be introduced in Ukraine. Undoubtly, it will promote both the development of the whole transportation system and the railway transport. Such kind of transportation should consider the needs of the passengers and determine the individual routes. Multimodal passenger transportation will advance passenger traffic and make it more competitive and attractive, more comfortable and suitable. Besides it will reduce the time of journey, and what is more it provides the government and Ukrainian Railways with the opportunity to get extra profit from various centres, shops and cinemas.

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NEW BUSHING BEARINGS AS A SIGNIFICANT STEP TOWARDS IMPROVING OF THE RUNNING GEAR OF THE FREIGHT CARS

Running gears are one of the most important parts of the wagon structure, as the safety of movement and operational tasks of freight transportation greatly depend on them. The axlebox unit is one of the key elements of the undercarriage parts of the wagons, which is designed to transfer the load from a bogie or the car frame to the axle neck, as well as to reduce the longitudinal and transverse movements of the wheel sets when a wagon is moving. The axle box consists of a frame, bearings and sealing parts of the frame.

Today the world's leading companies of the bearing production are SKF (Sweden), FAG (Germany), Timken (USA). In CND, 25 specialized factories produce bearings, three of which are located in Ukraine (Kharkiv, Vinnytsia, Lutsk). According to the type of use of the bearings, all axle boxes are divided into two types:

1. Rolling bearings (roller bearings)
2. Sliding bearings [1, p.121]

Kharkiv Bearing Plant (HARP) developed, tested and manufactured double-row bearing with tapered rollers of the cassette type TBU 1520 HARP:
Main Advantages of TBU 1520 HARP compared to traditional cylindrical bearings (CRB) are:

- The main result of the design optimization and technology is an increased maintenance intervals by more than 2,5 times (over 800 000 km).

- CRU Duplex design with flanged rings has also eliminated one of the major axle box drawback - low reliability of the edge fastening caused by the thrust ring in the classic design. Dynamic axial force transmitted to the edge fastening is reduced in 4 times.
- Unique Klüberplex HARP grease, developed together with German company Klüber Lubrication (Freudenberg Group), is the only one which alongside with a record high resistance to wear and contact fatigue surface damage, low resistance moment during starting and moving, has a low-temperature resistance of key characteristics to -60°C.
- As a result, the operating costs for the axle box, the costs for maintenance and repair of bearing units during freight car service lifetime are reduced.
- Significant reduction of the labor intensiveness and mounting costs when forming the wheel sets: the bearing is delivered fully assembled, filled with grease and assembled in the radial clearances and diameters of the inner rings bores, and does not require additional operations before mounting on the axle. As a result, mounting time, production facilities and the staff, energy consumption is reduced.
- Possibility of mounting/dismounting on existing equipment: application of double bearings does not require purchase and installation of the new special equipment.

The results of controlled operation in the wagons equipped with CRU Duplex bearings have demonstrated an increase in the operational reliability of the axle units - the number of compartments due to the failure of the axle unit per year is 4 times less compared to wagons equipped with traditional cylindrical bearings [2].

Although the price of TBU 1520 HARP type bearings is higher than the ordinary ones it is quite obvious that taking into account all the advantages, listed above, to switch to this type of bearings in order to increase the mileage between repairs and save money for the simple carriages in repair is preferable.

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MAGNETIC LEVITATION AND RAILWAY

Levitation is a stable balance of an object in a gravitational field without direct contact with other bodies. The necessary conditions for levitation are the presence of a vertical force that compensates for gravity, and the presence of horizontal forces arising from the displacement of the body to the side and ensuring its stable balance.

There are several types of levitation: electrostatic, aerodynamic, optical, acoustic and diamagnetic.

The type we are talking about is a diamagnetic levitation, the complete displacement of the magnetic field from a material, object or object. As a result of this effect, the material, object or object, including a living organism, begins to levitate above the source of the magnetic field. According to Irnshaw's theorem, any equilibrium configuration of static point electric charges is unstable unless they are subjected to forces other than Coulomb forces - this proves that using only ferromagnets, it is impossible to stably hold an object in a gravitational field. Despite this, with the help of servo mechanisms (auxiliary motor for remote automatic control or regulation of machines, devices, closing and opening of valves, valves, etc.), diamagnets, superconductors and systems with eddy currents, levitation is quite real.

In science, the experiment with a hovering frog is known and quite widespread: the animal was carefully placed over a magnet that creates an induction of more than 16 Tesla. The frog actually hangs in the air at a short distance from the magnet. For this British physicists A. Heim and M. Berry in 2000 received the Ignobel (Schnobel) Prize.

This phenomenon was reproduced not only in an interesting experiment, but also in technological

progress. Thus, in 1902, Alfred Zane patented the idea of a linear motor - an electric motor in which one of the elements of the magnetic system is open and has an open winding, creates a magnetic field, and the other interacts with it and is made in the form of a guide that provides linear movement of the moving part of the motor. After that, scientific research was aimed at creating prototypes of such an engine and its design in full size to implement the project of a monorail railway, the principle of which is the movement of a train on a magnetic cushion.

This technology uses a T-shaped metal track. The side surfaces of the train "envelop" the track, and magnets attract the train to the bottom of the bar and balance it on the sides. This technology is simpler to implement and allows even stationary trains to levitate, but it has a significant drawback: less stability at high speeds, which requires more complex control systems to maintain a constant distance between the train and the web. TransRapid trains are based on this technology.

There is another technology that uses superconductors - they levitate in the magnetic field of permanent magnets. Because of this, such trains are much more stable at high speeds. Among the disadvantages of this approach is the high price due to the fact that all known superconductors can exist only at ultra-low temperatures, as well as problems with movement at low speeds - the train can be maintained in the air only after reaching a certain critical speed, otherwise the currents generated in the canvas are insufficient to support its mass. Because of this, such trains must be equipped with wheels or other means of movement at low speeds.

In 1982, a monorail track was laid in Germany, less than a kilometer long, which "lifted" the train by 15 mm from the rail, and the rolling stock that moved on it received a patent for the carriage of passengers. In just three months, this train managed to carry 50,000 passengers, although it reached a speed of only 75 km/h.

In the late 90s, several branches of monorail railways were constructed in Japan, and in 2015, the Shinkansen monorail rolling stock set a record speed of 603 km/h. According to scientists, Maglev trains, i.e. trains on magnetic cushions, can be accelerated to 1000 km/h in the near future, because they are driven by magnetic levitation, and only air resistance is needed for braking, which can be reduced due to the aerodynamic shape of the rolling stock. In addition, their wear is extremely small due to the fact that they do not touch the rails, and therefore the wear of such trains is very slow, and it is economically beneficial. And despite the fact that the monorail railway is still a rather underdeveloped technology, it is the future of railway transport.

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ARTIFICIAL INTELLIGENCE IN ROAD TRANSPORT

Artificial intelligence (AI) is in the spotlight as one of the emerging fields transforming the transport sector. It is not a new term. Academics talked about artificial intelligence as early as the 1950s. Since then, AI has undergone a number of ups and downs, where optimistic expectations were followed by bitter disillusion. In recent years, AI has made a lot of progress, as machine learning techniques have been combined with technologies used for searching and analyzing the large quantities of data (otherwise known as big data and data mining) produced by the development of the digital world. Other reasons for its successful growth include the development of communications networks and the internet of things, as well as progress in transport devices. The future progress of AI in transport is expected to be even more spectacular, although there is no agreement on the timing and exact nature of these developments.

AI is helping to make all transport modes safer, cleaner, smarter and more comfortable. AI can be applied in vehicles, infrastructure, for drivers or transport users, and to the way in which these interact to deliver a transport service. AI helps to detect market trends; identify risks; ease traffic congestion; reduce greenhouse gas and air pollutant emissions; design and manage transport; and analyze travel demand and pedestrian behavior.

Road transport is one of the sectors where AI has most successfully been applied, opening up entirely new levels of cooperation between various road users. Worldwide, automotive manufacturers,

technology firms and research groups are exploring AI technologies to develop automated vehicles for use in commercial as well as personal transportation. Such vehicles are based on a variety of sensors (such as GPS, cameras, radar), in combination with actuators (devices which transform an input signal into motion), control units and software. Some of these technologies only take over certain driving functions (like parking), others are intended to completely replace the human driver. AI technologies that take over certain driving functions are already widely available on the market, while fully automated vehicles are being tested (including to deliver parcels) in a limited number of driving situations and areas. In general, it is more complex to test automated vehicles in urban areas, as there are lot of different actors, complicated road systems and infrastructure (intersections, road signs etc.), where the vehicle needs to predict much more (often unpredictable) signs of movement.

AI also makes truck platooning possible – the coupling of several heavy goods vehicles (HGV) within minimal distance of each other, allowing them to automatically and simultaneously accelerate or brake. While the lead HGV is driven by a human driver, drivers in those following may only be present in case complex traffic situations (such as roundabouts) or unexpected incidents arise, rather than actively driving. In the future, it is expected that the responsibilities of the drivers of following HGVs will reduce progressively, until ultimately they are no longer necessary. Although HGV manufacturers are already testing truck platooning in several countries, further tests are still needed on multi-brand truck platooning in more complex traffic situations, to verify safety requirements are met.

In addition, AI algorithms are used extensively in sharing economy platforms that offer road transport services. For example short-distance ridesharing platform Uber uses AI techniques in all aspects of its services, from matching riders and drivers to route optimization.

AI technologies are also applied in road traffic management, helping to analyze the traffic pattern, volume and other factors. These can in turn provide drivers with information on the fastest route, to relieve any traffic congestion that may have formed. AI technologies also help to keep the traffic flowing via traffic signals and traffic lights that rotate in real time to meet on-the-ground traffic flow demands.

AI brings great benefits to road transport but also poses serious challenges, especially in mixed use environments. AI has the potential to make traffic more efficient, ease traffic congestion, free driver's time, make parking easier, and encourage car- and ridesharing. As AI helps to keep road traffic flowing, it can also reduce fuel consumption caused by vehicles idling when stationary and improve air quality and urban planning. However, lower transport costs and freeing the driver from driving tasks could also lead to more people choosing a car as a transport mode (instead of public transport), and subsequently increase congestion and air pollution.

In addition, cybersecurity and data privacy are also of particular importance in the development of AI in automated vehicles. Namely, AI-based automated vehicles require access to a lot of data that is often sensitive or protected. If third parties manage to access automated vehicle data without control, the safety of the vehicle, its occupants and other road users is endangered.

Systems based on AI used in autonomous transportation could significantly improve road safety, since human error (such as speeding, distraction and drink-driving) is involved in more than 90 % of accidents on roads. However, AI also creates new risky situations, as accidents with automated vehicles have demonstrated. In an interim period, when vehicles are increasingly automated but not yet completely autonomous, drivers might be distracted and pay less attention to the road. When a situation arises where the human needs to intervene, a distracted driver can be slow to react. It is simply difficult for humans to maintain effective visual attention during a longer period of automated driving. At present, therefore, more progress is needed to ensure that fully automated vehicles can safely interact with other road users, perform well under all weather and road conditions, correctly recognize obstacles and understand the environment.

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THE LATEST TRANSPORT TECHNOLOGIES AND EQUIPMENT FROM FOREIGN COMPANIES

Equipment

Railinc unveiled the TransmetriQ Rail Management System, which enables shippers to better manage their freight rail operations. Providing shipment tracking and estimated time of arrival services, the product combines customized, near-real-time data with functionality such as electronic billing.

The new Palletizer Highrunner HR9 from Qimarox automates the unloading process. Designed for logistics operations handling many different products in short batches, it offers a pattern generator to optimize the processing of boxes. When equipped with a 3D product scanner, the system can operate autonomously.

The new P3 pallet from ORBIS is a reusable plastic pallet with a low-profile 5.1-inch height; it can be double-stacked in racking systems and maximizes truckload space. Designed for primary packaging, food and beverage, and CPG applications, the 40-inch-by-48-inch P3 pallet integrates with manual and automatic materials handling equipment.

Teleroute, a European freight exchange community for road transport, released TelerouteRecommends, Europe's first freight AI recommendation engine. It provides a real-time and continuous feed of new routes and loads that are available and will be of most interest to its freight exchange members, from an efficiency and profit standpoint. The AI engine analyzes data from historical usage of the platform to discover patterns.

Technologies

Secop GmbH, a manufacturer of medical refrigeration compressors, unveiled the MP2UVULTM, a compressor designed for mobile refrigeration systems that require extreme low temperatures to transport biomaterials such as mRNA-based vaccines for COVID-19 and Ebola. Secop's new compressor supports temperatures ranging from -94 degrees to -122 degrees Fahrenheit, regardless of outside temperatures. The compressor operates on battery and solar power.

Cortec's EcoShield Heat Sealable Paper is a packaging product coated with a water-based adhesive coating, which forms seams when the paper is heated with coated sides together. Offering a non-hazardous and repulpable coating, the EcoShield Heat Sealable Paper can be disposed and reprocessed through standard recycling procedures.

Enterprises can improve the environmental and social impact performance of their global supply chains with a new suite of sustainability solutions from o9 Solutions, an AI software platform provider. Embedded in its integrated business planning platform, the solutions include product and enterprise environmental footprint measurement, traceability, ESG risk management, ESG-enabled business planning, sustainable sourcing, and supply chain circularity.

SECTION 2.
ADVANCEMENTS, PROBLEMS, AND PERSPECTIVES OF ENGINEERING

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USAGE OF ACCIDENT TOLERANT FUELS ON UKRAINIAN NUCLEAR POWER PLANTS

Current nuclear fuel has a number of disadvantages, for example, a rather low temperature of a

sudden change in thermophysical parameters of 1200 degrees. Tolerant fuel removes such shortcomings by raising the limit temperature to 1500 degrees and above and almost or completely removing the possibility of hydrogen formation on the nuclear fuel cladding [1][2].

The concepts of tolerant fuel can be divided into 3 parts:

- Design modifications
- Operation modifications
- Fundamental changes

Design modifications include such measures as coated cladding, cladding change to a different material, fuel pellets doping, or changing the fuel pellet design altogether. These changes allow the use of operational modifications: enrichment increase and burnup increase. Increasing the enrichment allows increasing of the energy release and to have more power with smaller sizes of the core [3]. Increasing fuel burnup allows you to increase the fuel cycle, and thus less fuel is needed, and less waste is produced. Fundamental changes are generally long-term and are of great interest from the point of view of safety. Extruded fuel technology allows the fission products to be completely contained [1]. Other type of fundamental change to the fuel is TRISO is generally the most promising because it cannot melt. TRISO type fuel is comprised of grain-like structure that can fully retain fission products [4].

Currently on Ukrainian Nuclear Power Plants reactors VVER-440 and VVER-1000 are used which are of pressurized water reactor type for which accident tolerant fuel is designed. Under Ukrainian regulations currently operated fuel should not breach the following maximum design limit boundaries: temperature of cladding must not exceed 1200°C, local fuel oxidation less 18% of fuel thickness or 1% reacted zirconium [5]. If those boundaries are broken it will constitute a severe accident for which significant radioactive release is possible.

When used in Ukrainian reactors, accident tolerant fuel will be able to reduce significantly the risk of breaking maximum design limit boundaries which will increase the safety of a nuclear reactor in emergency situations and allow for a longer fuel cycle without completely changing the design. However, they are not always appropriate and according to the principle of ALARA (As Low As Reasonably Achievable) their use is not required due to their cost and difficulty in conversion. Many technologies are still in early stages but have great potential to improve performance.

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IMPLEMENTATION DEFENCE IN DEPTH (DiD) IN SMR-160

The SMR-160 is a small pressurized water reactor (PWR) that generates 160 MW of electrical power. This small modular reactor (SMR) was developed by Holtec International. One of the most important criteria for a nuclear power plant is its safety, so I would like to consider one of the fundamental principles of safety – the implementation of Defence in Depth (DiD) strategy.

In accordance with [1], DiD is a set of successive physical barriers on the way of the spread of radioactive substances and ionizing radiation in combination with technical means and organizational measures aimed to prevent abnormal operation and accidents and limit their consequences. As for the physical barriers, there are such barriers as: fuel matrix, fuel cladding, reactor coolant system boundary,

containment and biological shield. All these physical barriers are implemented in SMR-160.

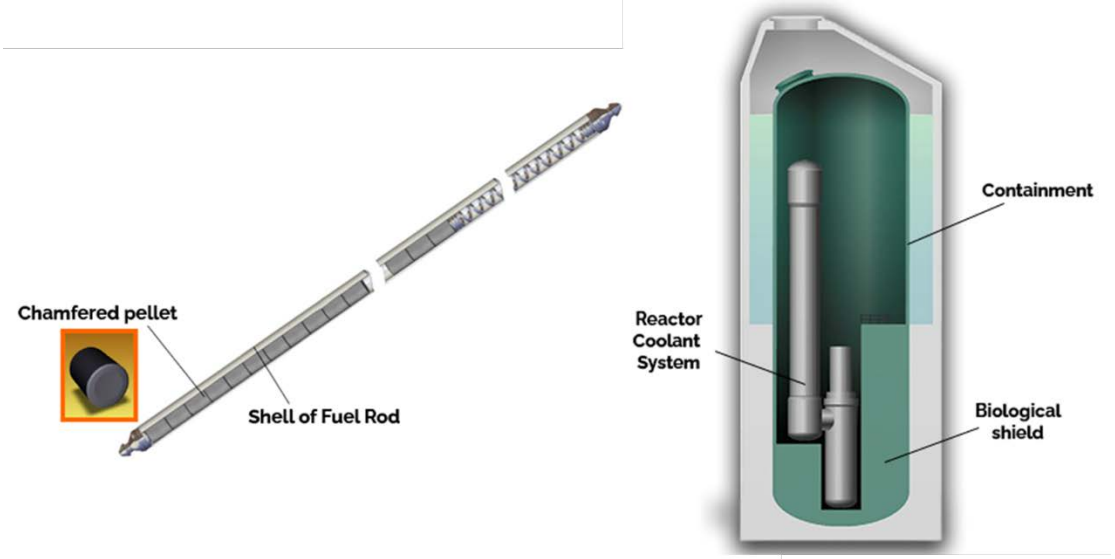

Figure 1 – Physical barriers of SMR-160

Besides, DiD consists of five levels. The objective of level 1 is to prevent abnormal operation and failures. Measures at Level 1 include a broad range of conservative provisions in design, from siting through to the end of plant life, aimed at confining radioactive material and minimizing deviations from normal operating conditions (including transient conditions and plant shutdown states). In SMR-160 Reactor Pressure Vessel and spent fuel storage are underground, this provides more protection against external hazards. Also, ensuring the required quality of systems and elements is very important. Fortunately, Holtec has good experience in state-of-the-art manufacturing.

As for the level 2, the objective of this level is to bring the plant back to normal operating conditions as soon as possible. Diagnostic tools and equipment such as automatic control systems can be provided to actuate corrective actions before reactor protection limits are reached. For example, it can be power operated relief valves, automatic limitation systems on reactor power and on coolant pressure, temperature or level. Moreover, in SMR-160 there is Instrumentation and Control System (I&C System) which provides detection the occurrence of an abnormal state or malfunction of an equipment of the plant and sends signals to the reactor scram system which then actuates the alarm.

In spite of provisions for prevention, accident conditions may occur. Engineered safety features are provided to prevent evolution towards severe accidents and also to confine radioactive materials within the containment system. The measures taken at this level are aimed at preventing core damage in particular.

Engineered safety features in SMR-160 consist of three categories: Plant Safety Systems (PSS), Passive Core Cooling System (PCCS) and Passive Containment Heat Removal (PCHR) System. [3]

In accordance with [2], the most important objective for mitigation of the consequences of an accident in Level 4 is the protection of the confinement. Main role will play Passive Containment Heat Removal System, which passively cools the containment volume, without any required actuations. The large inventory of water in the annular reservoir (gap between steel containment structure and reinforced concrete containment enclosure structure) is sufficient to extract energy from the containment for over 3 months without replenishment.

The objective of Level 5 is mitigation of radiological consequences of significant releases of radioactive materials. The following passive features of SMR-160 make a contribution to this defense in depth level such as: relatively small fuel inventory, compared with larger NPPs; increased retention of fission products (facilitated by such features as reduced power density, increased thermal inertia, etc.). The SMR-160 concept provides for extended accident prevention and mitigation by relying on the principles of simplicity, reliability, redundancy, and passivity. SMR-160 has less power, so SMR-160 may have a smaller emergency planning zone than larger nuclear power plants.

So, SMR-160 has passive safety systems, property of internal self-protection, less power and load, and also simplified operation. All these features of the reactor reinforce the main purpose of

defense-in-depth to prevent accidents. The reliability of the design contributes to a significant reduction in the conditional probability of accidents of internal or external origin, and passive safety systems provide the ability to restore the reactor in a stable condition in any emergency conditions that are postulated.

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THE CONCEPT OF CONSTRUCTION OF A METRO PYLON STATION IN SOLID ROCK

The metro pylon station is most often used in weak soils. However, the concept of building this type of metro station in solid rock is very promising future. The construction of the station consists of three tunnels vertically divided by the walls of soil and where exit passages to the side platform are constructed. For the construction of such stations cast-iron tubings restricted the load are used.

Pylon-type metro stations are considered not favourable for development. However, over the years new ideas have emerged and they are leading to rethinking the feasibility of the construction of such stations.

The reason for this is the construction of a metro in the city of Dnipro and a proposal for the construction of a pylon-type station in rock soils. The Turkish company Limak offering its own developments is engaged in the construction of the metro, so the approach to the metro construction has been changed.

The main technique of the LİMAK company in the field of underground construction is creation of the complex multi-layer structures applying shotcrete and monolithic concrete, that is, the application of the strategy of NATM (New Austrian tunneling method). The extensive experience of LİMAK company specialists allowed us to solve a number of problems of underground construction, in particular the construction of excavations in rock. For the case of a pylon-type metro station built in bedrock, the application of NATM is very problematic because of the absence of corresponding scientific justification in Ukraine.

The LIMAK company used the experience of the European Union, which led to a rethinking of the Soviet strategy of underground construction. Such a review of the construction strategy and the development of a new approach to underground construction are objective. The arguments for this are that the production of the prefabricated elements has been practically stopped, and the development of shotcrete and monolithic concrete skills promotes creating high-quality multi-layer structures.

At the same time, the potential of the old design scheme of the pylon station has not been exhausted. A new concept needs to compare two concepts and identify the advantages and disadvantages of each of them. The new construction concept can also change the design of a station, which requires research and scientific substantiation of the pylon metro station built in bedrock

The reasoned substantiation of the construction of the pylon type metro station will allow to reasonably implement the new construction concept of the pylon-type metro stations in rock.

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MY PROFESSION AS THE BEST ONE IN THE WORLD

In the life of every person there comes a moment when he has to determine exactly what profession to choose. This is a rather difficult choice, but it has to be done.

The profession of a chemical technologist is quite complicated, but at the same time very exciting, It requires perseverance, accuracy and patience, it also requires to have a good memory for numbers, symbols and signs. This profession requires the practical application of the knowledge and skills, responsibility for the actions, both in case of success and in case of failure. Most chemists work in laboratories. In order to avoid accidents, you need to observe safety precautions, and for this, of course, you need to know them.

This area both now and in the future is in demand. After all, chemistry is one of the most important sciences, along with mathematics and physics, which helps people to improve the production of various goods. Since the chemist-technologist controls all production processes and personally checks the quality of products.

Perhaps it will undergo some changes, but this will not affect the very essence of the activity.

It is the profession's requirements for workers that make it so difficult to learn. To work as a chemical technologist, it is not enough to have a baggage of knowledge, it is also important to apply them skillfully and correctly. It is also very likely that you will have to work in hazardous working conditions. Despite all this, many are not frightened by this.

Is this profession in demand enough? The answer is obvious- yes.

Representatives of the profession of Chemist are quite in demand in the labor market. Despite the fact that universities produce a large number of specialists in this field, many companies and many enterprises require qualified chemists.

The main activity of a chemist is to conduct a chemical analysis and study the composition of substances, a product or intermediate, raw materials, etc. Also, a specialist of this profile is engaged in chemical synthesis, manages the chemical process, conducts chemical research.

Representatives of the profession of Chemistry are really rare in our time. Not everyone will decide to become a Chemist. There is a high demand for specialists in this field among employers, so the profession of a chemist has the right to be called a rare profession.

Pros and cons

Pros

1. An interesting profession (if you have inclinations to chemistry), in which you can regularly discover for yourself, create something new.
2. The ability to work in almost any industry.
3. Opportunity to engage in research or management activities.
4. The prospects of the specialty, the ability to bring real benefits to people, the economy, the environment.
5. Decent wages (with successful employment).

Cons

1. The likelihood of working in unhealthy conditions.
2. The need to cope with a large volume of work tasks and different types of labor activity.

I believe that professions in the field of chemistry are the best ones. They are important for the world and interesting, despite the complexity. The benefits of chemical technology and the role of chemical technologists are numerous, essentially ensuring the safety of all living beings, the present generation, and the future. Obviously, it would be very difficult to live without them.

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LANDSLIDES, CAUSES OF OCCURRENCE AND METHODS OF CONTROLLING

A landslide is a shift down the slope of a loose rock mass under the impact of gravity, especially when the loose material is saturated with water.

Landslides occur on a section of a slope or a bluff due to an imbalance of rocks caused by an increase in the slope gradient as a result of underwashing with water, weakening the strength of rocks during weathering or waterlogging by precipitations and groundwater, the impact of seismic shocks, as well as construction and economic activities, without considering the geological conditions of the area.

Landslides are a common occurrence in areas where slope erosion processes are actively manifested. They occur when the masses of rock that build up the slopes of the mountains lose their support as a result of an imbalance in the rocks. Large landslides most often occur as a result of a combination of several of these factors: for example, on mountain slopes composed of alternating water-resistant (clayish) and water-bearing rocks (sand-gravel or fractured limestones), especially if these layers are inclined to one side or crossed by cracks directed along the slope. Almost the same risk of landslides is fraught with man-made rock dumps near mines and quarries. Destructive landslides moving in the form of a disorderly pile of debris are called rockfalls; if the block moves along some pre-existing surface as a single whole, then the landslide is considered a downfall; a landslide in loess rocks, the pores of which are filled with air, takes on the form of a stream (flow landslide).

With all else being equal, steep slopes with a convex or overhanging configuration are most susceptible to landslides, and the most typical landslide rocks are the clayey ones, the shear resistance of which is very sensitive to changes in humidity. Landslides are often formed in areas of inclined occurrence of layers with their dip towards the slope, as well as when there is squeezing clay out by overlying rocks.

The mechanism of impact while forming a landslide process manifests itself in three directions. The first is a change in the external shape and height of the slope, leading to a redistribution of shearing and holding forces on it. The second is a change in the structure and physical and mechanical properties of rocks. The third is the creation of additional pressure on the layers composing the slope.

In dangerous, landslide areas, the constant monitoring of the soil movement, the water level in wells, drainage structures, wastewater disposal systems, boreholes, rivers, reservoirs, atmospheric precipitation, and runoff is organized.

If the probability of landslides is high, then special measures are taken to protect against landslides. They include the strengthening of landslide slopes, coasts of seas, rivers, and lakes with retaining and storm walls, and quays. Sliding soils are reinforced with piles arranged in a checkerboard pattern, artificial freezing of soils is carried out, and vegetation is planted on the slopes. To stabilize landslides in wet clays, they are preliminarily dried by electroosmosis methods or by hot air injection into wells. Large landslides can be prevented by drainage structures blocking the way of surface water and groundwater to the landslide material. Surface water is diverted by ditches, and groundwater by adits, or horizontal wells. Despite the high cost of these measures, their implementation is cheaper than eliminating the consequences of the catastrophe that has already occurred.

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TREND OF PROCESS AUTOMATION

The modern level of technical development allows creating technological lines without human intervention. An entire complex of equipment works in the industrial network, which allows you to perform many technological processes in a wide algorithm of technological processes of production.

Complex automation highly technological production, separate technological processes are combined into a technological complex. A set of typical technological processes located in accordance with a defined technological process and interconnected by transport devices is called an automatic complex.

The main goals of automation are the creation of a multi-level complex that performs the full technological cycle of production.

The modern process of creating automated complexes consists of several stages. At the beginning of the design, a de scription of the signals and executive bodies for the technological process is performed. At the second stage, the selection of equipment is carried out, and at the last stage the development of the control system is completed.

Main problem of automation projects is the complexity of connecting individual mechanisms of the system into a single technological complex. Usually, the production line is modernized gradually; therefore, when designing each link of the technological complex, it is necessary to take into account the entire technological process, and in automatic lines, where there are hundreds of input signals, as well as thousands of intermediate changes, the development of the program turns into a complex and multi-level process.

In order to simplify the design of automatic complexes, it is proposed to create a single standard that takes into account all technological typical technological processes and create ready-made blocks for their introduction into the technological process.

Well-known companies such as ABB and Schneider join the DIN ISO standard. The main goal of this standard is to create a catalogue of typical technological processes (temperature furnaces, mixing rooms, working with gases and liquids). Also, the standard provides for the creation of a system of standardization of sensors and working mechanisms.

Accepting the standard for the maintenance of automated systems, it will be enough for the engineer to divide the technological process into several simple operations that are described by ready-made blocks. The blocks will be stacked into a system, which in turn will have additional control and management blocks.

As a result, the use of the block structure of automated complexes will lead to an increase in the distribution of ready-made solutions with the same structure and control system, which will lead to a decrease in the price of typical technological processes. This solution is included in the global paradigm of Industry 4.0 development.

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THE BEST SEMICONDUCTOR OF THEM ALL?

Silicon is a chemical element that is designated by the symbol SI. [2]. Silicon is widely used material in modern gadgets as semiconductor material. One of the reasons of this is considerable amount of this element on our planet. Unfortunately, silicon’s properties as semiconductor are not ideal. Silicon doesn’t let “holes” whizz through its structure as easily as it does to electrons. Also, silicon isn’t perfect in terms of conducting heat, this is the cause of overheating issues and using expensive cooling systems in computers.

A team of researchers at Massachusetts Institute of Technology, the University of Houston institutions were carrying out experiments with cubic boron arsenide, and results show that this material might overcome both of these limitations. It conducts heat and lets electrons and holes whizz through its structure significantly better than silicon. “Heat is now a major bottleneck for many electronics. Silicon

carbide is replacing silicon for power electronics in major EV Industries including Tesla, since it has three times better thermal conductivity than silicon despite its lower electrical mobilities. Imagine what boron arsenide can achieve, with 10 times higher thermal conductivity and much higher mobility than silicon. It can be a gamechanger" – one of the researchers said. [1]. Also, researchers said that this is the best semiconductor material ever found, and it might be even the best possible one. The earlier tests showed that boron arsenide conducts heat almost 10 times better that silicon. It is known that this material has good bandgap, a property that gives it a potential to be semiconductor material. At this moment, cubic boron arsenide has been made and experimented with in small batches. The researches were using specific methods that were developed by former Massachusetts Institute of Technology postdoc in order to test small regions within this material. There are a lot of tests ahead to determine whether cubic boron arsenide can be made in different forms, much less replace silicon. But the researchers told that if this material won't be used in semiconductors, it's possible to find another uses where its properties would make a very big difference.

Silicon took decades to win the crown of the most used semiconductor material, having purity of over 99,99999999%, and it will be a challenge to produce and purify cubic boron arsenide as effective as silicon for mass production. To sum up, cubic boron arsenide is very perspective material, but it will take a long time before we might be able to buy a gadget that uses it as semiconductor material.

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ENGINEERING ACHIEVEMENTS

Engineering is a profession in which scientific knowledge and mathematics is used and experimented with to develop ways that benefit mankind, making it extremely important to society for several reasons. Engineering encompasses a whole range of industries that could include on-site, practical construction work as well as evaluating safety systems from an office. They use the knowledge, they have within a specific industry, in order to make things work and solve problems, whether this be with transport, medicine, entertainment, space or the environment.

The world consists of wonderous engineering achievements. Throughout history, humans have built some of the most astonishing ancient engineering achievements. These ancient civil engineering achievements, such as the 7 Wonders of the World, have dominated the human imagination to this day. In fact, many of them have inspired modern engineers to surpass their own limits and expectations.

The Danyang Kunshan Grand Bridge holds the Guinness World Record for the longest bridge in the world at 102.4 miles (164.7 km) long. As such, it is one of the greatest modern engineering achievements. It located in China's Jiangsu province along the Yangtze River Delta on the Nanjing and Shanghai rail line. Lowland rice paddies, rivers, lakes, and canals dominate this region of China. The Danyang Kunshan Grand Bridge runs parallel to the Yangtze River for about 49.7 miles (80 km). Additionally, it goes over the open water of Lake Suzhou for about 5.59 miles (9 km). [1]

The Great Pyramid of Giza is the most established and biggest between the 3 pyramids of Giza. It is the most established and the main as yet standing structure of the Seven Wonders of the Ancient World, and roused draftsmen and architects for a large number of years. The Great Pyramid was worked around 2560 – 2540 BC, with a stature of 146.5 meters (481 ft) and is recorded as a UNESCO social world legacy site. The monstrous structure was built completely utilizing physical work and for a long time has been a wellspring of extraordinary discussions over the accurate ways they were developed: how the gigantic squares were conveyed for long separations and to extraordinary statures without current hardware, how the mind-boggling exactness was accomplished. [2]

Still, in the field of late innovation accomplishments, the Large Hadron Collider (LHC) is the biggest molecule collider on the planet, worked in the years 1998-2008 by CERN (the European

Organization for Nuclear Research). It was worked by a huge number of researchers and designers from several colleges and from in excess of 100 nations. The LHC is a 27 km (17 mi) long passage, 175 meters (574 ft) somewhere down in the ground underneath the outskirts of France and Switzerland. The LHC is utilized by researchers to replicate the condition of the universe not long after the Big Bang, and test significant speculations. In 2013 an examination in the LHC demonstrated the presence of the Higgs boson molecule.

To sum up, since the beginning of time humans have made large strides through engineering to simplify living. The pulley, industrial machines, and tires were the engineering wonders of century's past that kick started humanity's drive to win against all odds.

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SERVICE OF MILITARY COMMUNICATIONS AND TRANSPORTATION

Management of military connections on the railway transport of Ukraine is a representative of the Armed Forces of Ukraine on the railway transport of Ukraine, which organizes to decide with military teams, management and structural units of the State Administration of Railway Transport of Ukraine, within its competence, all issues related to military transport world time and special period.

Management of military communications is subordinated to management of military communications on the railways of Ukraine. The military communications service in peacetime and in special periods performs the following main tasks:

establishment of effective cooperation between the Ministry of Defense and military administration bodies, formations, military units, institutions and organizations of the Armed Forces with the central executive body in the field of transport and management bodies, institutions, enterprises and organizations of public transport (hereinafter referred to as transport enterprises) with the aim of proper organization of military communications and military transportation;

organization and planning of the development of the system of military transportation by public transport;

organization of military communications and military transportation;

control of preparation of public transport for military transport;

organization of the construction and development of the military communications service;

implementation of planned activities to maintain the established level of combat and mobilization readiness (ability to perform functional tasks) of the military communications service;

planning and use of State Budget funds provided for military transport and other transport costs of the Ministry of Defense and the Armed Forces;

organization of financial support for military transport and other transport costs of the Ministry of Defense and the Armed Forces.

The general management of the military communications service is carried out by the main body of military communications. The head of the main body of military communications is the chief of military communications of the Armed Forces.The main tasks and powers of the military communications bodies, the responsibilities of their officials are regulated by the relevant provisions, which are developed on the basis of this Regulation and approved by subordination. Regulations on the service of military communications of the type, operational command (air command) of the Armed Forces, its organizational and staff structure (changes to it) are agreed by the main body of military communications and approved by subordination.

In recent years, the main efforts for special coordination, which will be focused on the implementation of all transport to ensure measures aimed at the development of the Armed Forces of Ukraine, rotating peacekeeping contingents, during the training of command and staff schools, transfer of special equipment and equipment of the Armed Forces of Ukraine and other states in the course of

international exercises within the framework of the international program "Partnership for Peace".

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PROBLEMS OF INTEGRATION OF ELECTRIC VEHICLES AND PLUG-IN HYBRID ELECTRIC VEHICLES

The modern world is full of familiar cars with Internal Combustion Engine (ICE), which pollute the environment. Road transport pollutes the atmosphere largely due to the emission of harmful substances from exhaust gases. This problem has led to a growing interest in hybrid electric vehicles (HEV) and electric vehicle. Today, two technologies make electric cars work: the battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEV). The main advantage of ICE is the long driving range. This led to the simultaneous development of HEV and EV.

The main task is to increase the travel distance for EV. In turn, PHEV have problems with energy loss. Features of the engine design require the conversion of energy from mechanical to electrical and vice versa. Therefore, the main goal is to reduce aforementioned losses (A. Benevieri, 2021, p.1).

There is currently only one way to fix this problem. To minimize the losses in the storage system, the power provided by the ICE should be instantaneously close to the power required at the vehicle wheels. It sounds very simple, but it is actually more complicated. Unfortunately, there are no vehicles in which this problem is eliminated. Therefore, this is the main goal of engineers specializing in PHEV (A. Benevieri, 2021, p.1).

Today, there are several cars with PHEV. Examples: Chevy Volt, Toyota Prius, Ford CMax Energi. These cars are presented with having an increased power reserve. Therefore, from year to year such cars are becoming more popular. There is also a wide range of electric vehicles. Examples: Tesla Model 3, Nissan Leaf, etc. (K. V. Vidyanandan, 2018, p. 5).

To sum up, research and production of electric vehicles and plug-in hybrid electric vehicles does not stand still. Every day, people try to get away from cars with Internal Combustion Engine as soon as possible. This leads to the fact that electric vehicles are becoming more and more popular for people who drive a car is not very long distance. PHEV is also gaining popularity, even with its disadvantages.

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SECTION 3. MODERN ECONOMIC PROBLEMS AND THE WAYS OF SOLVING THEM

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UNBUNDLING AS AN ELEMENT OF THE REORGANIZATION OF THE RAILWAY DEPARTMENT

Unbundling is quite often used in enterprises in order to carry out effective reorganization. According to last year's plans, which were announced by the management of Ukrzaliznytsia in 2021, they planned to reorganize the Company from a regional structure into business segments (that is,

unbundling) in the current year, 2022.

Reorganization involves changes in all areas of railway work. So, with regard to freight transportation, it is planned to separate the freight carrier, because this is required by the norms of EU Directives and Regulations, which in turn provide for the distribution of infrastructure and transportation services and the opening of the rail transportation market, since today such services are linked organizationally and financially and are provided together. Considering that Ukraine became a candidate for membership of the European Union in June 2022, there is hope that the planned reorganization of the railway department will take place as soon as possible. At present, appropriate preparations are being made for the creation of a branch of «Cargo Carrier of UZ "Cargo"». After creation, all the necessary assets of the Company will be transferred to the branch, which will ensure the reliable functioning of this cargo carrier. Regarding the organization of passenger transportation, this direction has long needed qualitative reformation in order to remove passenger transportation from the list of unprofitable ones. Thus, in 2020, the Board of the Company made a decision to reorganize the structure of the passenger transportation economy and updated the organizational structure of the "Passenger Company" branch. It was decided to include the following production divisions: Locomotive Depot, High-Speed Depot, Locomotive Depot West and Locomotive Depot South.

A decision was also made to transfer from the main balance sheet of the regional branches of Ukrzaliznytsia to the balance sheet of the already existing "Passenger Company" branch of two locomotives and one electric locomotive depot, as well as traction rolling stock used in the organization of passenger transportation.

The management of Ukrzaliznytsia notes that the allocation of the passenger transport vertical depends significantly on the directions of state policy, because currently passenger transport tariffs are unprofitable from year to year and are always covered by the profit from the organization of freight transport, which definitely contradicts the current EU Directives and Regulations in the field of railway transport.

It is also necessary to mention such areas of activity of railways as production and service. The main reorganization initiatives in this vertical are significant transformative transformations associated with the immediate transfer of the relevant assets of wagon and locomotive enterprises to freight and passenger carriers, as well as the formation of an effective business vertical that will specialize in capital types of repair and modernization of rolling stock. It must be said that the UZ has already completed the division of the repair and operational components of the wagon economy by the existing wagon depots.

The corporate center is one of the areas of reorganization of Ukrzaliznytsia. In 2020, Ukrzaliznytsia tried to carry out various measures regarding the centralization of corporate functions. For example, new unified organizational structures of the legal services of the Company's regional branches were implemented. Centralization of accounting at the level of branch services of regional branches also began, which was completed in 2021.

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CHALLENGES OF THE 21ST CENTURY

The three great challenges of the 21st century are the battle against poverty, the management of climate change plus previous year’s newcomer - Covid-19.

The current crisis in the financial markets and the economic downturn is new and immediate. All three challenges require urgent and decisive action, and all three can be overcome together through determined and concerted efforts across the world. It is important, however, to understand the depth and severity of the treelong-term challenges, and their intimate relationship, before we turn to the shorter term.

Our response to climate change and poverty reduction will define our generation. If we fail on either one of them, we will fail on the other. Unmanaged climate change will irretrievably damage prospects for development in many parts of the world, and action on climate change which hinders

development can never build the global coalition on which such actions depends.

We are also studying economics as the Covid-19 crisis develops in real time. As in previous years, inequality remains a particularly pressing. We have already seen that the most vulnerable in society have disproportionately suffered since the first lockdown in March.

This crisis is having a deeply damaging effect on the developing world. Demand for its exports of commodities and manufacturers have been strongly reduced and capital flows are dramatically lower including direct and portfolio investment and remittances. A world recovery is of vital importance to the developing world, and we must remember that this crisis originated in the rich world. And during the downturn and in the process of recovery we must do our outmost to ensure that the methods that are used do not do further damage. I am thinking in particular of the danger of protectionism. But we must also work hard to ensure that our efforts to reconstruct our financial sectors by overly focussing on domestic banks, risks and issues, do not discriminate against trade finance or assets held in and flows to emerging markets.

Where environmental concerns were secondary to inequality and unemployment just a few years ago, they are now prominent in the minds of people. For the generation who joined the 'strike for climate', global warming and environmental degradation pose existential threats that they argue should be addressed without delay.

We now recognize the problems and understand what needs to be done to combat climate change. For developed countries this means commitments to cut their emissions by at least 80% from 1990 levels by 2050, with credible plans to deliver interim targets consistent with this goal.

The developed world must face up to its responsibilities on both development and climate change. It will require radical change and real resources. But the prize is immense. We can not only manage the profound risks of climate change we can also find a much more attractive and stronger form of growth: a growth that can last and help us overcome world poverty. I believe that the developing world, if we in the rich world play our part, will accelerate its actions and we can together create an international collaboration which can transform the way the world works together.

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CARGO ELECTRIC BICYCLES: ECONOMICAL ASPECT

The issue of transporting people and goods is always important for economic functionality. Depending on techno-economic capabilities, the demands of society and its understanding of ecology, the perception of effectiveness and expediency of convenient transport are changing. Moreover, the Corona virus pandemic has profoundly and considerably affected the way people imagine the world we live in. Despite these transformations and many other challenges, sales of electric bicycles are seen to have increased significantly.

The objective of this research is to assess the influence of cargo electric bicycle spread on the world economy. In fact, assessment of the general influence made by all electric bicycles is a complicated task; therefore, the research for *cargo* vehicles has been done. This special type is intended for transportation of goods, although it may have other applications, e.g. cross-country and endure rides. A cargo bike is a good option for regular applications because of its great convenience, which allows carrying groceries, bags, sports equipment, other things, and even children. They can be used by businesses to deliver goods, by farmers to look after fields, and by police to be more mobile.

The main economic reason to use electric bicycles is the considerable difference in energy consumption compared to internal combustion engine vehicles.

The research of PRO-E-BIKE project was used and a few examples were given to see how cargo electric bicycles allow saving on delivery (Gonzalez et al., 2015, p. 9-17).

DHL is a famous post-delivery company in the USA, which also works in other countries. It has 15,000 cargo electric bicycles all over Europe. In the Netherlands, every courier bicycle DHL saves the

company nearly 13,000 euros per year by applying the policy of replacing one van with one cargo bicycle.

In Milan, GLS, which is the second-largest delivery company in Italy, has altered its entire business to use electric bicycles. They replaced 6 vans with 9 bicycles, hired staff for additional two-wheeled vehicles, and optimized the delivery system. Even though the company has engaged more people, it still saves money. Moreover, productivity and efficiency increased.

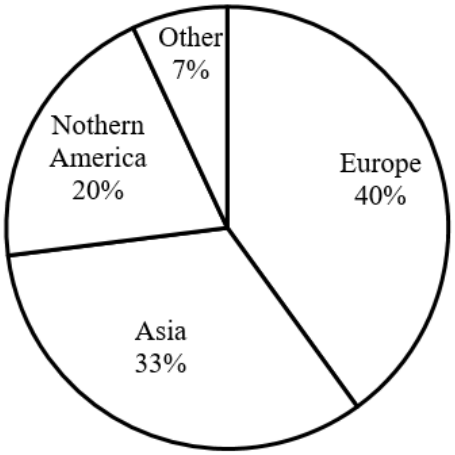

Figure 1. Part of cargo electric bicycles on the world market

Based on the research of Market Research Future, The Verge and COVID-19 Analyses the diagram was made (Fig. 1) to represent part of cargo electric bicycles on the world market. The annual turnover is expected to grow by nearly 29% each year in 2020-2025.

The research shows that electric bicycles can greatly affect the world economy in the near future. Using this vehicle widely will lead to a significant decrease in energy consumption. As it was seen with DHL and GLS, a business that switches to cargo electric bicycles will be able to hire more employees, favoring the economy.

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ENERGY SECURITY AS A COMPONENT OF ECONOMIC SECURITY

Economic security in the modern world is the most important element of a country's economic security.

The events, Ukraine encounted today, during the state of war, have caused the changes in the state, and especially affected its security. Security as the basis of a country should determine the essence a country, as the ability to ensure the vital activity of its society, the prospects of existence and its development. The current state of the security makes it practically impossible to solve the problems Ukrainian society faced. As in any country, the concept of security includes many areas of life and development of the country, its society and environment.

Economic security is one of the basic components of the country's security. It consists of such interconnected and interelated structural components as: financial security; foreign economic security; social security; investment security; macroeconomic security; industrial safety; scientific and technological security; food safety; demographic security; energy security.

The latter plays a key role, since in the modern world economic, energy and national security of a state are interelated.

According to the Decree of the Cabinet of Ministers of Ukraine "On the concept of the executive authorities activities in energy security insurance of Ukraine" energy security is "timely, complete and uninterrupted high-quality fuel and energy supply of material production, non-production sector, population and other consumers; prevention of harmful effects on the environment during the transportation; fuel and energy resources refining and consumption under conditions of modern market relations, trends and performance of the world energy market" [1].

To solve the issue of the energy security of Ukraine, domestic scientists propose diversification by the means of: a) reviving of interest in liquefied gas and the LNG terminal , b) establishing unified

pricing principles in the contracts with Gazprom, c) facilitating the projects of "common interest" of the Energy Community constructing interconnectors , d) development of alternative energy [2]

Energy Strategy of Ukraine for the Period until 2030 determines the energy security to be an integral part of the economic security of the state, which involves the achievement of a state of technically reliable, stable, economically efficient and ecologically safe supply of energy resources of the economy and social sphere of the state; the ability of the state to ensure the effective use of its own fuel and energy base, to carry out optimal diversification of sources and ways of supplying energy to Ukraine to ensure the livelihood of the population and the functioning of the national economy in the normal, emergency and martial law regimes, to prevent sharp price fluctuation of fuel and energy resources, or provide the conditions of painless adaptation of the national economy to new prices of these resources on the global market; to achieve technically reliable, stable, economically efficient and ecologically safe supply of energy resources for the economy and social sphere of the state [3].

Having determined the main goals of the energy strategy, it becomes possible to forecast the prospects of economic development. The ratio of economic security at the state level is strategically important in terms of energy-generating enterprises for the economy of Ukraine.

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MODERN LOGISTICS IN SUPPLY MANAGEMENT

Logistics is a major fundamental component of economic growth as it constitutes the critical bond between the supplier and the customer, comprising all aspects of transport management, safety and storage of goods. As such, it is influenced by the process of ongoing evolution related to all the changes taking place in the spheres of the contemporary scientific development affecting many areas of life. The telecommunication revolution of the recent decades has brought almost unimaginable opportunities to facilitate and control even the most complicated processes. Hence the latest novelty in the nomenclature of the subject, namely the notion of «smart logistics» which, in fact, is nothing new in the very essence, but it only indicates the fact that logistics has noticed the new solutions offered by information technologies as well as their practical applications in logistic processes. The foregoing is caused by the nature of logistics, which has always succumbed to such changes that enabled it to keep up with the evolution of the economic environment and the altering customers' expectations. It would lead to ongoing improvement of the efficiency of logistic processes so that one can ensure that sufficient quantity of appropriate goods is delivered to the right location on time and at appropriate price. However, this field of expertise is definitely more complex as it comprises such problems as service quality, customer service, supply chain management, transport and its safety, storage or customs. Consequently, there is a need for ongoing improvement of the state of knowledge and implementation of innovative solutions by means of appropriately trained workers and managers on each level of the logistic chain.

Nevertheless, the contemporary approach to logistics is not merely a consequence of the information technology progress; it also reflects the suppliers' and the carriers' understanding of the customers' needs as well as the fact that satisfying those needs may be decisive for the given logistics company's survival or fall. Hence IT only functions as an enabling technology to create appropriate

conditions for the given type of action, and therefore, it is a tool that needs to be integrated with the entire complex system of logistic processes in order to make them faster, more efficient and more integrated internally and externally with the surrounding. As a result of trends thus defined, every single component of the technological development taking place in logistics increases competitiveness to a considerable extent while acting in a more and more demanding environment. As a good illustration to the foregoing, it is worth mentioning logistic centres equipped with state-of-the-art technologies enabling them to automate numerous processes performed, hence exerting a positive influence on the costs, reliability, speed and punctuality of services. It may seem all the more important that their role and relevance increase as they are factors accelerating the economic growth on a regional, national and international level.

The dynamic changes to the modern logistics have affected the way in which the fact of being «smart» is stressed with regard to the process based on utilisation of advanced information and communication technologies in logistics, which in facts makes it smart. The «smartness» should be sought in highly advanced decision-making models and algorithms supporting the activities undertaken by men and aimed at increasing efficiency and safety of logistic processes on all levels.

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ON THE PROBLEM OF MARKETING STRATEGY

Marketing strategy is known as a process allowing an organization to concentrate its limited resources on the greatest opportunities to increase sales and achieve sustainable competitive advantages. It serves as the fundamental underpinning plans designed to fill market needs and reach marketing objectives. Plans and objectives are generally tested for measurable results. Commonly, marketing strategies are developed as long-term plans, with a tactical plan detailing specific actions to be accomplished currently. Marketing strategies are dynamic and interactive. They are partially planned and partially unplanned.

Marketing strategies may differ depending on the unique situation of the individual business. However, there are a number of ways of categorizing some generic strategies. A brief description of the most common categorizing schemes is presented below:

– Strategies based on market dominance – in this scheme, firms are classified as market share or dominance of an industry.

– Generic strategy is a strategic scope and strategic strength. Strategic scope refers to the market penetration while strategic strength refers to the firm's sustainable competitive advantages.

– Innovation strategies deals with production and sales activities as well as the development and business model innovation.

– Growth strategy – in this scheme the question is "How should the firm develop?"

It should be pointed out, that the strategic management process plays a crucial role in the marketing development. It begins with identifying the organization's mission and strategic goals. The process also includes analyzing the competitive situation, taking into consideration both the external environment and relevant organization factors. Once the situation has been carefully analyzed, managers can begin to develop, or formulate, various strategies that can be used to reach strategic goals. The part of the strategic management process that includes identifying the mission and strategic goals, conducting competitive analysis, and developing specific strategies is often referred to as strategy formulation. In contrast, the part of the strategic management process that focuses on carrying out strategic plans and maintaining control over how those plans are carried out is known as strategy implementation.

Moreover, another reason for the importance of strategic management is that it can help to highlight the need for innovation and provide an organized approach for encouraging new ideas related to strategies.

Finally, marketing strategy involves careful scanning of the internal and external environments.

Once a thorough environmental scan is complete, a strategic plan can be constructed to identify business alternatives, establish challenging goals, determine the optimal marketing mix to attain these goals, and detail implementation. A final step in developing a marketing strategy is to create a plan to monitor progress and a set of contingencies if problems arise in the plan.

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DO DIGITAL TOOLS MAKE US MORE OR LESS PRODUCTIVE AT WORK?

Technological tools have gotten into practically every industry in the world. Moreover, they have led to improved productivity and enhanced service delivery. But not in all cases has this been the scenario.

There are tons of new technological tools – both hardware and software. They have filled up our workplaces in what is seen as a way of improving productivity and service delivery.

There are almost endless benefits of using technology in the modern workplace. This can help to bring more success into the business by improving productivity.

Companies and businesses can hire personnel remotely without looking at the location they are in. In addition, Businesses are now able to attract remote work policies and hire the best talent regardless of where they live.

Your staff will benefit a lot from the use of technology in your business. And it can even make them more productive. It can also make them a lot happier when performing their duties. Hence, they will become more productive in the long run.

When your staff offer a better quantity and quality of work, you can definitely drive up sales and boost revenue margins. Profits will become the norm for your organization and this can even help you boost your staff's salary comfortably. You will also save on turnover costs when your employees are satisfied and happy working with you. They will not think of going to work for the competition.

While technology has had its fair share of success in the workplace, it has also led to some negative effects, which we need to look at carefully.

Data breaches and cybersecurity threats. Propagation of network communications has changed the nature of businesses, resulting in an unprecedented magnitude of threats and vulnerabilities to business information systems.

These threats frequently become viable because of a lack of involvement by some top managers in the development of organizational plans and efforts designed to mitigate cyber-attacks.

Crossing of privacy lines. New technologies bring lots of modern threats towards our personal privacy. Privacy is one of the most important civil rights in the computerised world. People must have the right to control what information about their lives stay inside their own home and what is spread to the outside. Privacy is primarily about the power of the individual and the personal privacy is unquestionably under attack.

In general, the impact of technology in the workplace is positive. And while there are some challenges brought about by it, experts are constantly looking for their solutions so that we can all have a near-perfect experience.

There is now specialized software or hardware that can help practically any part of business operations. And the future is even brighter in terms of the possibilities.

Digital tools make us more productive at work. And they do this by simplifying some of the mundane tasks we're used to. But all this depends on how you use it. As technology can be both positive and negative.

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THE NEED FOR DIGITALIZATION IN PASSENGER RAIL TRANSPORTATION

It is quite obvious that one of the most important tasks of modern times is the development of transport technologies. The main transport industries are actively using new technologies. High competition in the transport market of passenger transportation requires the introduction of innovative technologies, improvement of the quality of transportation and improvement of transportation services for higher attractiveness of passengers. Railway transport is one of the basic branches of the economy. Stable and effective operation of railway transport is a necessary condition not only for ensuring defense capability, national security and integrity of the state, but also for raising the standard of living of the population [1]. Today, the transport services market is developing very rapidly. One of these trends is the digitalization of the transport services market, namely the expansion of electronic services on the transport portal, electronic applications, electronic services and many other projects. This will not only enable the introduction of multimodal passenger transportation and ensure convenient receipt of basic or additional services for both passengers and businesses. Also, the implementation of the process of digital solutions in the transport of Ukraine will speed up the process of integration into the unified transport network of Europe and Asia.

In 2019, the Government of Ukraine developed and approved the Action Plan for the Reform of Railway Transport for 2020-2023 [2]. A number of tasks were set, including the direction of digital development:

- introduction of the Unified electronic travel document in railway transport;
- introduction of automatic fare payment on suburban connections;
- increase in the level of awareness of passengers regarding the running of passenger trains, including the opportunity to track train running.
- development and implementation of a geo-informational system to increase the railway infrastructure capacity.

Digitalization is a technology for improving the quality of services in railway transport.

The main directions of application of digital technologies are the following [3, 76-79]:

1. Creation of "virtual" offices: customer service without personal contact.
2. Document flow: introduction of the electronic tickets, issuing travel documents "online"
3. Payment: mobile payment, single travel documents, use of the mobile applications to obtain transport services.
4. Platforms for logistics services: services for searching for a carrier, booking tickets, identifying the optimal route.

Discussing the priorities of digitizing of railway transportation in Ukraine, a few more points can be added, which would be relevant in the field of passenger transportation, namely, the creation of a single mobile application, the creation of free Wi-Fi connection in the waiting rooms and in the suburban and long-distance trains.

Therefore, it is currently necessary to adopt and implement the experience of foreign transport companies in Ukraine. In particular, to create a single digital platform for the introduction of multimodal passenger transport, which will allow provide the advantages of all types of transport with priorities of railway transport.

The digital platform will allow a passenger to choose their individual route, exactly the type of transport that a passenger requires. Besides a traveller has the opportunity to choose the travel time and the price of the trip which is beneficial for them.

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SECTION 4. INFORMATION TECHNOLOGIES

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IMPACT OF GLOBALISATION PROCESS ON FORMATION OF MASS COMMUNICATION SYSTEMS

The central process of transformation of modern society is formation of a global system that levels the borders of national states connected by economic, political, cocial and informational ralations. Globalization factors actively influence the formation of mass communication systems.

According to the researches of I. Bochan, , globalization is a process of worldwide economic, political and cultural integration and unification, which leads to the standartization of legislation, economic and technical processes, as well as the convergernce of cultures of different countries (Bochan, 2007, p. 360).

Analyzing the term "globalization", scientists pay attention tothe concept of Canadian sociologist H. M. Mcluan, according to which the world is a "global village", where a global community and opinion are formed, which, thanks to the means of mass communication, increasingly begin to influence the actions of governments and international institutions (Habrusieva, Dovhan, 2016, p.41).

Today, researches on the impact of globalization processes on mass communication systems are highly relevant.

Mass communication is the transmission of informarion using technical means (the press, radio, television, film, sound and video recording) to a mass, assorted and anonymous, audience, located in different places, with the aim to establish spiritual values and to implimant ideological, political, economic and organizantional influence on human evaluations, thoughts and behaivior (Chukhno, 2003, p. 348).

The purpose of the study is to trace the influence of globalization processeson the formation of mass communication systems.

Scientific and technological progress contributes to the growth of globalization, interdependence of the world, creates the basis for the formation of a single global system of economic, political, socio-cultural ties. Recently, these processes have intensified due to the rapid development of information and communication technologies.

Globalization of mass media is the overcoming of geographical boundaries for the distribution of text, audio, and video information with the help of three technological innovations (Koval, 2015, p.41): satellite communication, computer networks, and digital coding of text, sound, and images.

The problem of the functioning of mass communication systems in the conditions of globalization of social development became the subject of research by foreign scientists, namely: M. Castells, D. Lall, N. Luman, E. Toffler. Among Ukrainian scientists, O. Zernetska, V. Rizun, I. Slisarenko, and O. Starish studied the problems of the influence of globalization on the formation of mass communication systems.

The influence of globalization processes on the formation of mass communication systems has its positive features and disadvantages.

Thanks to the globalization of mass communication systems, all peoples of the world are incorporated into a single global society: they can engage in activities that do not coincide with the boundaries of state borders, national communities, and religious systems (Bochan, 2007, p.284). Global

communication in the form of satellite television and the Internet radically changes the meaning of geographical concepts in the context of the administrative-territorial organization and interstate borders.

Radical changes in means of exchange of economic, financial, and other types of information create conditions for prompt and effective resolution of industrial, scientific-technical, and business issues both within the country and abroad. In fact, globalization forms a single world in the form of a metastate with a single world economy, culture, etc.

At the same time, the globalization processes of the mass communications system destroy the national cultural values of a specific country, level it's ethnic, political, and cultural features and subordinate it to the interests of the dominant nation in the global system. Accordingly, globalization leads to the loss of the diversity of the world.

Another huge disadvantage of the influence of globalization on the system of mass communications, in particular the Internet, is the free and unrestrained flow of unverified information (gossip, rumors) and anonymous comments, which create a certain effect of permissiveness. V. Rizun complains that the Internet communication system has great technical capabilities, but there are absolutely no means of restraining speakers and controlling information (Rizun, 1992, p.46).

Therefore, the current period in the history of mankind is determined by the complex processes of the impact of globalization on the development of mass communication systems. The world is turning into a "global village" in which a global community is being formed, a global public opinion that, thanks to mediation and reinforcement by means of mass communication, is increasingly beginning to influence the actions of governments and international institutions.

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PRODUCT LIFE CYCLE MANAGEMENT BASED ON PLM

With the help of PLM (Product Lifecycle Management), the company using the potential accumulated in the past is able to achieve success today and guarantee business development in the future. According to the analytical company «CIMdata» definition, PLM is a strategic business approach and an integrated solution for the collective development, management, distribution, and use of information within the enterprise and between partners from the moment of concept formation to the withdrawal of products from the market.

The PLM system is not a single super product, but a set of software products. The main components of the PLM system at the enterprise include PDM system for storing and managing product data, CAD system for designing products, CAE system for engineering calculations, CAPP system for developing technical processes, CAM system for the development of programs for CNC machines, and the MPM

system for modeling and product analysis.

At each stage of the life cycle, different software products are used to develop engineering data. There are many offers on the market for PLM systems. In March 2021, the independent analytical agency Forrester Research conducted a study and published a chart of PLM system market leaders [1], presented in Table 1.

<table>
<tr><th>Place</th><th>Strategy</th><th>Current offers</th><th>Market presence</th></tr>
<tr><td>1</td><td>Siemens</td><td>Siemens</td><td rowspan="2">Dassault Systèmes, Siemens</td></tr>
<tr><td>2</td><td>PTC</td><td rowspan="2">PTC, Dassault Systèmes</td></tr>
<tr><td>3</td><td>Dassault Systèmes</td><td>Autodesk</td></tr>
<tr><td>4</td><td rowspan="2">Aras, Autodesk</td><td>Aras</td><td rowspan="4">PTC, Aras, Autodesk, Arena Solutions</td></tr>
<tr><td>5</td><td>Oracle</td></tr>
<tr><td>6</td><td rowspan="2">Arena Solutions, Oracle</td><td>Autodesk</td></tr>
<tr><td>7</td><td>Arena Solutions</td></tr>
</table>

Table 1 – The results of the study of PLM systems by Forrester Research (adapted from Forrester Research, 2021)

The assessment was carried out in three categories: "Strategy", "Current offers", and "Market presence". In the "Strategy" category, the 1st and 2nd places are shared by Siemens and PTC, the bronze winner is Dassault Systèmes, and the 4th and 5th places are shared by Autodesk and Aras, Arena Solutions, and Oracle rounds out the top seven. In the "Current offers" category, Siemens is the sole leader, Dassault Systèmes and PTC share the 2nd and the 3rd places, followed by Aras, Oracle, Autodesk, and Arena Solutions. In the Market Presence category: Dassault Systèmes and Siemens are tied, followed by Autodesk in the third place, and then all others being are roughly equally ranked.

Therefore, taking into account the life cycle of the product the creation of strategic planning is necessary for the stable long-term growth of the company. Modern software based on PLM systems will help make decisions at each stage of the product life cycle contributing to the growth of business, allowing you to be guided by up-to-date information.

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VIDEO CARDS OF THE 21TH CENTURY

Nowadays we often use computers, but not all PC (personal computer) users are aware of what makes the picture on their monitor. This is thanks to a detail such as a graphics card.

Video card is a device which converts the graphics image stored as the contents of the computer memory (or the adapter itself) into a form suitable for further display on the monitor screen. Usually, the video card is made in the form of a printed circuit board (expansion card) and is inserted into the motherboard expansion slot, universal or specialized (AGP, PCI Express). Of course, you might think that a computer cannot display a picture without a discrete graphics card, but it's not so, many processors have built-in graphics cores in them. Naturally, these built-in cores will be inferior to the discrete, but because of this you can make a truly compact PC.

There are incredibly productive graphics cards, such as in GeForce RTX 3090 ti and 4090, such parts can be used by people who are engaged in a professional level: 3D graphics, neural networks and data processing.

Also, such graphics cards are used for playing games. They have a really interesting technical feature such as: DLSS 2.0 & DLSS 3.0. DLSS 2.0 is a smoothing technology using neural networks. The neural network stored on the driver compares the actual low-resolution image with the reference image and gives the full high-resolution result. The inputs used by the trained neural network are low-resolution

aliases transmitted by the game engine and low-resolution motion vectors from the same images, also generated by the game engine. The motion vectors tell the network in which direction the objects in the scene move from frame to frame to estimate what the next frame will look like. In due course, DLSS 3.0 improves performance by generating more frames using artificial intelligence. DLSS analyzes sequential frames and motion data from the new Optical Stream Accelerator in GeForce RTX 40 Series GPUs to create additional high-quality frames without compromising image quality or response speed.

RTX graphics cards are interesting not only for their DLSS technology. They also attract many players with ray tracing technology. Ray tracing is one of the methods of geometric optics - the study of optical systems by tracking the interaction of individual rays with surfaces. In a narrow sense, it is a technology of constructing images of 3D models in computer programs, in which the backward trajectory of the ray propagation (from the screen to the source) is traced. Now let's talk about advantages and disadvantages of this technology.

Advantages:

- the ability to render smooth objects without approximating them by polygonal surfaces (e.g. triangles);
- high algorithmic parallelizability of calculations - it is possible to trace two or more rays in parallel and independently, to separate areas (screen zones) for tracing on different nodes of the cluster, etc;
- cutting off invisible surfaces, perspective and correct change of field of view are the logical consequence of the algorithm;

Disadvantages:

- A serious drawback of the backtracking method is performance. The rasterization and line scanning method uses data coherence to distribute the computation between pixels. Whereas the ray tracing method starts the process of determining a pixel's color anew each time, looking at each observation ray separately. This separation, however, brings several other advantages, such as the ability to trace more rays than intended to eliminate contour irregularities in certain areas of the model. It also regulates ray reflection and refraction effects, and the overall degree of photorealism of the image.

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DATA PROTECTION ACCORDING TO THE DATA TRUSTS MODEL

Data trusts are a promising concept for enabling data use while maintaining data privacy.

Data trusts can pursue many goals, such as putting data protection into practice more effectively, increasing the participation of consumers or other data subjects, and strengthening data sharing along the value chain. They have the potential to become an alternative model to the current data practices of large platforms, which are accused of accumulating data power and using it primarily for their own purposes. To fulfil these hopes, data trusts must be trustworthy, allowing their users to understand and trust that data is being used in their interest.

We can think about data trusts as trustworthy data intermediaries – organizations that manage data on behalf of others while adhering to a legal framework (including competition, trade secrets, and privacy laws) in a trustworthy manner.

Data sharing can transform organizations and exponentially increase the impact of their work. A data trust is a fundamental component of any data sharing initiative and must be crafted to address the specific circumstances of the participating organizations.

By developing additional safeguards on IT security, privacy, and discrimination alongside more competencies to use medical data without having to rely on consent, data trusts could enable medical research. This approach could allow for a broad range of medical research while still ensuring that the interests of patients and society, in general, are taken into consideration.

Data sharing across agencies can help government leaders and policy makers enhance collaboration, measure program impact, answer business questions and better respond to the needs of

constituents. Unfortunately, data is often siloed, stored in a wide range of formats, and restricted in use. Without a central data repository, government leaders don't have the full picture needed to best support their communities.

A well-crafted data trust eliminates the most common obstacles to scalable data collaboration, namely: data inconsistency – most agencies have distinct data formats, definitions, update frequencies; system inconsistency – data is collected, stored and analyzed by a variety of different software programs, which makes integration complicated; stakeholder concerns – discussions around data sharing can become adversarial as stakeholders voice concerns around privacy, security, and liability.

A data trust helps agencies overcome these problems by establishing common rules for data security, privacy, and confidentiality: what data is shared, how it is shared, who can contribute data, and who can access data. It also creates clear, scalable data intake processes for securely uploading data from multiple sources into a single repository, reducing technical costs.

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CRYPTOSYSTEMS AND THEIR UNBREAKABILITY

Today many important aspects of IT security and e-commerce are based on cryptosystems. Does it really secure? Cryptosystems based on blockchain technology. A blockchain was created by Satoshi Nakamoto in 2008 to serve Bitcoin cryptocurrency transactions. Blockchain consists of a growing list of records linked together using cryptography. Each block contains a hash of the previous block. To edit any block of this chain you need to edit all blocks after it. For conventional computers, it would take centuries to break modern algorithms like AES-128, RSA-2048, ECDSA-256, etc. with suitable key lengths. Quantum computers work in a fundamentally different way, and it takes hours for quantum computers to break any of the current systems.

Calculations by English scientists show that this task requires a computer with 13 million qubits to break Bitcoin in a day. Today the most powerful quantum computer has 127 qubits. Google plans to reach 1 million qubits by 2029 year.

There are two main types of cryptographic algorithms. Symmetric algorithms use the same secret key to encrypt and decrypt data and asymmetric algorithms use a public key and a private key that are mathematically related. Symmetric algorithms are still safe but current asymmetric algorithms like RSA can become useless when quantum computers reach a certain computing power. Grover's Algorithm is a quantum search algorithm that impacts some symmetric algorithms. Also, it can break some of them.

Nowadays, scientists and governments are working on "quantum-resistant" algorithms that can't be broken by quantum computers. It takes years to design new algorithms and test them. The main problem is the adaptation of the old infrastructure. It can't be easily upgraded if it can be at all, because tons of information is encrypted using old algorithms.

Summarising, quantum computers will be very expensive and will have limited power, so only governments will be able to use them in near future. The development of these computers depends on how quickly and efficiently scientists solve the problems they face. It could take from 3 to 30 years to make quantum computers generally used if it is possible at all, but humanity has started preparing for it.

We already have Advanced Encryption Standart with 256-bit keys that are considered quantum-safe. The NIST Post-Quantum Cryptography Standardisation Process will result in draft standards available by 2022-2024. Also, IBM is committed to developing and deploying new quantum-safe technology.

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BENEFITS AND THE RISKS OF ARTIFICIAL INTELLIGENCE

Artificial intelligence was created to solve problems that are inherent in living beings. It can be solving simple mathematical equations or processing large amounts of data for an accounting report. According to sceptical scientists, all that AI is capable of is just a program. However, most believe that AI, with a lot of research, can unlock unprecedented potential for development. The question now is what to expect if the creation of stronger AI succeeds.

Of course, the debate about whether AI can be considered a full-fledged intelligence still continues. But this does not contradict the fact that smart systems that learn make human life easier, because with even more technological development, artificial intelligence can help prevent global problems of humanity, such as war or deadly diseases. If this ever becomes possible, it will undoubtedly be the greatest achievement of mankind in the history of its existence.

However, to all of the above, if we fail to properly coordinate our actions and plans with artificial intelligence, the same event can have terrible consequences for us. If we refer to the words of Alexey Reznichenko, the founder of the Robotics Centre, that the main property of any intelligence is the ability to learn, and what it learns in the environment of people, it will behave like that, we can assume that artificial intelligence is directly influenced by the views and values reflected in the databases it learns from and the algorithms it embeds.

It is important to emphasize that AI does not have any human character traits, so we cannot expect how it will behave towards us.

We should also not forget that artificial intelligence will always construct, not reproduce reality. It inherits this feature of thinking from its creator - a human. Superintelligence, capable of embracing and comprehending reality in all its diversity, is still science fiction for us.

It can be assumed that AI in the hands of an unreasonable person can turn into a real weapon against all mankind. And so that it does not interfere, it will be programmed so that it cannot be easily turned off, which means that a person will not be able to control it.

However, many researchers believe that the threat to humanity may be the perfect performance of artificial intelligence of its tasks, as a result of which the interests of people may not be taken into account or conditions impossible for human existence may be created.

In conclusion, I have to say that the research in this area that humanity has at the moment will help us better prepare for possible consequences and prevent them so that artificial intelligence does not pose a threat to humanity, and it, in turn, does not fall into its traps. Obstacles to the development of AI can be, if not completely overcome, then levelled: expand the training base, fight for the transparency of AI algorithms, increase the human literacy of developers and transfer AI systems to renewable energy sources. In any case, if it is impossible to stop the rapid development of artificial intelligence, then it is worth teaching this intelligence empathy, love for people and the desire to help and protect.

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PHOTONICS IN MODERN TECHNOLOGY

We all understand that electronics has now become such a huge part of our lives that we can't do without it. Electronics, moving along wires give light in our house including all household appliances, they give the opportunity to work with a computer also for all our gadgets and the Internet. Well, what if

instead of electrons we use light particles, photons that move at the speed of light are not subject to external electromagnetic fields, it has a much greater transmission range and a greater signal bandwidth. Photonics – it is the physical science and implementation of light (photon) generation, detection, and manipulation through emission, transmission, modulation, signal processing, switching, amplification, and sensing. Though covering all light's technical equipment over the whole spectrum, most photonic applications are in the range of visible and near-infrared light. The term photonics developed as an outgrowth of the first practical semiconductor light emitters invented in the early 1960s and optical fibers developed in the 1970s. Photons are the most common particles in the Universe in terms of their number, unlike electrons, they have no mass and charge. That is why photonic systems are not subject to an external electromagnetic field and have a much greater transmission range and signal bandwidth. As the field of science photonics began in 1960 with the invention of the first important technical device using a photon – it is laser. The term “photonics” began to be widely used in the 1980s. When the inventions began to widely use fiber-optic data transmission lines, we can say that these developments made a whole revolution in the field of telecommunications at the end of the last century. And they just became the basis for the development of the Internet, in fact, we are now only at the beginning of a revolution in the photonics, and then the device has already become ubiquitous, not in the modern world, but often goes unnoticed.

If Electronics is engaged in the generation of movement and control of electrons, then photonics is essentially an analogue of electronics, only using a quantum of an electromagnetic field instead of electrons. Lower energy losses and a greater ability to change the implementation of components.

Now “Intel” already produces Silicone-optical products, which is used to deploy a 5G network with more compact factors and increased speeds, as they say, from 100 Gigabits per second today to 400 GB and more tomorrow in mass sales, for example, there are already such optical transceivers with which help you can deploy stages of credit transmission lines, the next step will be the creation of the so-called integrated photonics, which will allow the introduction of optical components directly into the Chip, and for this, a complex for optical reception of data transmission must have several key elements - this is a light source, detector is a signal carrier, amplifier. All this, of course, has long been implemented for fiber-optic networks and now you need to integrate optics in the silicon, that is, use optical communication lines already directly inside the server, but reducing to such a scale, raises a lot of problems with the compactness of power consumption and its own integration with other semiconductor components, so far, their goal is to achieve a throughput of 1TB per second in integrated photonics.

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SDLC MODELS AND THEIR IMPACT ON THE EFFICIENCY OF SOFTWARE DEVELOPMENT

When the software product is developed, it goes through the structured sequence of stages called a life cycle. It defines the steps that should be taken to achieve the desired results. It typically covers such stages as planning, requirement analysis, design, coding, testing, deployment, and maintenance.

The success of a project depends on the following aspects: a modelling language, software engineering tools, project planning, SDLC model, and management of software development process. The right choice of the SDLC model provides the high efficiency of the development and significantly reduces the risks of a project. In this work, its impact on the efficiency of software development is considered and advantages and disadvantages of some popular SDLC models are analysed.

Being one of the oldest SDLC models, Waterfall covers the typical stages executed sequentially one after another. The model is time-consuming since a new phase cannot be started until the current one is completed. A large amount of time and sufficient financial investments might be required, especially in case of the problems occurred in the later stages. That in turn, could put at risk the success of the

whole project. Waterfall model clearly lacks flexibility, thus it is inappropriate for those projects, where requirements can be changed frequently. However, the model is simple for understanding and application. It is relatively easy to arrange tasks and control performing. The modifications to the Waterfall model help to solve the problems in the software development process [2].

V-model used in the context of software engineering is an improved version of Waterfall. According to this SDLC model, quality control should be carried out at every stage of the development. Each milestone of the development corresponds to its individual level of testing. Such an approach allows detecting shortcomings and eliminating them at early stages. An indisputable advantage of this model is verification of all intermediate results. V- model is the most effective when the project is small and has well-defined requirements and methods of implementation. Drawbacks of the V-model are absence of risk analysis and difficulty of making changes to the project. The improved V-model has been suggested by Ravi Shanker Yadav [1].

A combination of the iterative development process and elements of Waterfall is known as Spiral model. Planning, risk analysis, coding and testing, evaluation are the main stages of the model performed at every iteration. An outcome of each iteration is a small prototype of the software. The model is good for large projects. It is also suitable in cases when ongoing risk assessment of the project is crucial. However, introduction of Spiral model requires skilled personnel for risk analysis. Besides, the model is relatively expensive and unprofitable for smaller projects.

An outcome of every iteration in the Incremental model which is a sequence of iterations consisting of analysis, design, coding and testing processes is a working version of the software supplemented with new functions.

The models described have advantages and limitations [3]. When selecting a software development life cycle model, it is necessary to take into account such factors as model characteristics, user involvement in the project, project size, and associated risks.

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WFH – THE FUTURE OF OFFICE WORK?

In the beginning of 2020 many companies were forced to close their offices in favor of remote work, this measure was intended as temporary solution, but as years have passed from march of 2020, many employers started to realize that they can use remote work to their advantage.

In the beginning of WFH (Work from home) many doubted efficiency of such workplace organization method, managers thought that workers will just do nothing and miss their goals, but practice showed us that they were wrong, in fact several factors played in favor of the opposite effect.

Remote work eliminated need for commute to and from work, this added leisure time for workers, which in return increased their motivation and efficiency, lack of constant management control increased actual work time, but most important factor in the entire WFH was revelation, that in most cases office workers did little to no work in 8 hours a day 5 day per week working culture, most positions were actually requiring only 2-4 hours of active work per day, which added even more time to workers, who were now able to cook at home to cut costs, have time with family and just live their lives, but earning the same wage they could have got while sitting in office for 8 hours and looking at the window.

WFH may be one of most important events for most office workers, which revolutionized white-collar jobs and gave one advantage to employers many people forget.

WFH lets companies cut cost of maintenance by huge margins, no rent, no utilities, no cleaning etc. In theory companies can increase wages for average worker with this influx of money, but often they just spend them towards rewarding management for spending less to do more, in fact, even if companies rarely increase wages for workers, WFH benefits everyone, from clerk to CEO.

It is important to mention that not all white-collar jobs can be done remotely, but practice of work from home definitely increases quality of life for average worker, as for cons of WFH, some may say that it increases risks of data breaches, hacking and other computer-related issues, but those can be easily compensated with training and hiring cybersecurity experts to set up truly efficient workplaces for everyone.

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WILL THE LONG-AWAITED METAVERSE COME SOON?

The Internet has brought a completely new level of communication. Now we can keep in touch with our colleagues, friends, and family from almost every place on the Earth. But it is not the endpoint of our communication needs.

So, we need online communication to be more realistic, and more real-life. That's what metaverse is about.

Despite all the discussions around this word, "metaverse" hasn't got a single meaning yet. It is often called "the next generation of the internet". Nevertheless, in the midst of all that uncertainty, let us figure out what the metaverse can bring to our lives.

We have already discovered that the metaverse is going to make our communication more natural, but what does "more natural" mean in this case? There are obvious basic desires of people.

Firstly, we want to see the emotions of our interlocutor, body language. We wish to feel their presence in the same room. Virtual, augmented and mixed reality are some options for it.

Secondly, we should not forget about commerce. The Internet was created as a communication tool, it turned into an advertisement platform soon though. Obviously, we can expect the same destiny for the metaverse. It has pros and cons. An example of how it will be is NFT.

Thirdly, what about privacy? In the metaverse, it is possible to choose how you would like to look. For instance, I want to choose an avatar and customize it based on my real-life appearance, or I desire to radically change my appearance and look like some robot. I can present myself as a virtual hologram copying my look precisely.

We have already found out a person can have an avatar in the metaverse, there is a commercial activity, etc. In this case, there must be some identification mark, some kind of account to regulate following rules and prevent the possibility of bullying. Perhaps, there will be a personal identification card for every user. It is a substitute for a regular password in the virtual world. This document will contain information about the virtual belongings of the person, the account data, etc.

The metaverse is supposed to open a new era in communication. We still have plenty of questions, and we can only imagine how it is going to feel to be in the virtual world, to make it a part of our life. In spite of it, the metaverse is not in the far future. Giant companies, such as Meta, and Microsoft are working on it. Each company has its own concept of the new era and it makes us closer to the awaited metaverse.

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BUILDING A SECURITY INFORMATION AND EVENTS MANAGEMENT SYSTEM

Security information and event management (SIEM) systems are an important component of

building complex networks. They are designed to regulate and correlate incidents from different systems and platforms and allow analysis of underlying rules to detect advanced threats. Today, it is not enough to rely on firewalls, intrusion detection systems, intrusion protection systems and antiviruses. Large volumes of data generated by devices require the use of tools to control, monitor and combat potential threats. SIEMs allow monitoring of security events and detection of anomalous events in real time. This system automatically collects and processes information from distributed sources, stores it in one centralized location, finds correlations between different events and produces alerts and reports.

The main capabilities of SIEM include:

- data aggregation: log management of aggregated data collected from many sources, including network, servers, databases, applications, presenting an opportunity to consolidate the data being monitored to avoid missing important events;
- correlation: provides the search for common attributes and linking events into meaningful connections. This technology provides the ability to do different correlation methods to integrate different sources to turn data into useful information;
- notification: provides the ability to automate the analysis of interrelated events and generate alerts to notify the administrator of problems;
- monitoring panel display: tools that can collect data about events and turn them into information diagrams;
- compatibility of different types of data;
- storage of received events;
- forensic analysis.

One of the main tasks of the SIEM architecture is the support and management of system configuration changes, directory services, review and audit of logs, both service and privileged users, including reactive incidents. It should also be noted the features of anomaly detection, detection of polymorphic code and zero-day attacks.

In theory, the working principle of the SIEM solution is as follows: the system collects information, analyzes it "on the fly" (generating warnings), compiles the analyzed events into databases, and checks behavior based on previous observations.

In practice, the scheme is implemented using the appropriate components:

- agents (collection of data from various sources);
- collector servers (accumulation of information received from agents or directly from the sources);
- database server (information storage);
- correlation server (information analysis).

To build information and security event management systems, it is advisable to use an architecture based on network traffic scanning tools (Suricata), data collection (Filebeats), data processing, indexing and storage (Elasticsearch), as well as analysis, reporting and visualization tools (Kibana).

In conclusion we can state that SIEM allows you to collect, filter and normalize, alert and report any suspicious behavior. Therefore, the use of a complex of systems and the suggested architecture will ensure timely identification and notification of various types of attacks and security events.

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ADVANCED TECHNOLOGIES AND THE TRANSLATION ISSUE

Advances in technology have changed the way translation is getting done. With machine translation, or translation computer software, able to translate entire documents at the click of a button

and at very low costs, one might ask themselves why they might even bother to hire a human translator to do their business translation work. Machines can understand and translate human speech better than ever before. However, bots from Google to Amazon still struggle to understand your words, handle humor or do anything much beyond give you an approximation of what was originally said [1]. Translation demands a deep understanding of the grammatical structures in both the source and target language.

More importantly, as scientists point out, it also demands sensitivity towards differences in meaning and culture, which influences how a native speaker would perceive your brand. The challenge of translation is to find a common thread between them when it comes to:

1) words with no correspondents in the target language;
2) idioms and figure of speech;
3) cultural references;
4) humor and sarcasm [2].

In other words, each language is filled with unique quirks and perspectives that cannot be readily translated into other languages. Therefore, this translation problem is both a cultural and grammatical puzzle.

Furthermore, quality issues are perhaps the biggest problems you will encounter when using machine translation. No computer software is able to process the context in which a language is being used and thus to which the translation needs to occur. With tens of thousands of words in every language and several different meanings to thousands of words based on the context of a word being used, it is impossible for a computer program to understand context, especially in complex situations. Humans, on the other hand, are able to understand the language in the context it is used. The scientists are sure, that this is because we are able to understand emotions, non-verbal communication, and culture, which all have an effect on the context of language as it is used. Without being able to understand all of these factors, machine translation will always have problems with the quality of its translation.

All things considered, machine translation might be fast, but it's no match for human quality and accuracy. When your documents or files matter most, choose certified human translators to guarantee the translated work is the best it can possibly be. Professional translators could spend hours getting these rights, and they might still need the opinion of a native copywriter in the end.

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BIOMETRIC TECHNOLOGIES IN HUMAN IDENTIFICATION

Formal identification is a prerequisite for development in the modern world. The inability to authenticate oneself when interacting with the state or with private entities such as banks inhibits access to basic rights and services, including education, formal employment, financial services, voting, social transfers, and more. Unfortunately, under documentation is pervasive in the developing world. Civil registration systems are often absent or cover only a fraction of the population. In contrast, people in rich countries are almost all well identified from birth. This "identity gap" is increasingly recognized as not only a symptom of underdevelopment but as a factor that makes development more difficult and less inclusive [1].

Today, biometric technologies are increasingly being used to provide security, for example in systems such as access control. The most popular biometric technology is fingerprint identification technology. Biometric technologies are used to gather and analyse biometric data relating to physical or behavioural characteristics of a person, such as DNA or fingerprints. In other words, biometric technologies collect personal data that belongs to the unique identification of a person. The print is

usually a set of dark lines that represent raised parts of the skin, and the depressions between these raised areas represent the spaces between these lines. Fingerprint identification is based mainly on the arrangement of raised lines and the spaces between them.

The first case of using fingerprints for identification was registered in 1858. Thanks to advances in computer technology, fingerprint identification became an automated technology by 1960. Fingerprints are verified based on the external characteristics of the finger, which are unique to each person [2].

Biometric technologies are an integral part of security development in the modern world. The popularity of using this technology is high due to its reliability, safety, efficiency, and comfort. Biometric features of a person are unique, which minimizes the number of errors in recognition. The direction of fingerprints is starting to gain momentum. It is increasingly used not only in forensics (using fingerprints to identify a person) and government immigration services but also in many industries related to gadgets, various encryption methods, payments, finance, and health, instead of using some user-generated password protection [3]. For example, taking fingerprints on a paper medium in Asian countries is traditionally associated with investigating crimes or signing certain documents. The development of modern biometric data allows access not only to the above-mentioned activities but also to objects of household appliances (furniture, doors, safes, and smart home), cars, and other objects.

Since 1858, the development of biometrics has been constantly improved and will continue to develop. Security and privacy are the most important, but they also have disadvantages and drawbacks. A serious disadvantage of fingerprint scanning is the possibility of their theft and use not only for unauthorized access but also for falsification of evidence and certain criminal actions. Biometric characteristics cannot be changed in a computer database - unlike passwords, they are associated with a specific person throughout his life. Also, scars and scratches may appear on the fingers and palms, which distort the original pattern of the skin, and injuries and age, change the body and organism.

Critiques of biometric technologies are predominantly related to issues of surveillance, privacy and data protection, whereas the uncertainties and errors in biometric recognition practices have received far less attention.

Therefore, security and privacy are the most important questions to be concerned when developing a biometric system. Anyway, even with its limitations, the great message is that, at the present moment, there is no substitute for Biometrics in effective and automatic identification. Thus, Biometrics is, and will be from now to a far future, one of the most promising areas of the modern science, with a large field of improvements to be achieved for researchers and scientists

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SOLUTIONS OF THE DEEPFAKE ISSUE

It’s natural to look at deepfakes as needing a technological solution, considering it seems to be a technological problem. Deepfake is a new phenomenon heard by many internet users today. It is a combination of “Deep Learning” and “Fake”. As it is understood from combination, deepfakes are created by using artificial intelligence technology, in specific machine learning technique. Algorithms

work on massive data sets - fairly convincing deepfake can be done with as few as 300 images - belongs to the source person to create deepfakes. Then, algorithms swap one face - the source - to another - the target - with the face swap technic. However, there are three essential technics to create Deepfake contents that face swap, expression swap. Generative Adversarial Networks ("GAN"). Regardless of which technic is used, the process has generally the same steps that are extraction, training and creation [1].

Deepfakes have their roots in the triumph of the "neural networks," a once-underdog form of artificial intelligence that has re-emerged to power today's revolution in driverless cars, speech and image recognition, and a host of other applications [2].

The potential consequences from DeepFake technology could be more than your imagination. If it is not controlled timely it's consequences could be more devastating and use of AI-based technologies will get a negative conceptualization among the people around the world. Hence, there have generally been two approaches suggested to solving the problems created by deepfakes: use tech to detect fake videos, or improve media literacy. The tech solution is to try and detect deepfakes using the same kinds of AI that are used to make them. In April, the US Defense Advanced Research Projects Agency (DARPA)'s Media Forensics department awarded nonprofit research group SRI International three contracts for research into the best ways to automatically detect deepfakes. Researchers at the University at Albany also received funding from DARPA to study deepfakes. This team found that analyzing the blinks in videos could be one way to detect a deepfake from an unaltered video, simply because there are not that many photographs of celebrities blinking [3].

There are already plenty of widely-shared videos that use editing (and not deepfake technology) to disseminate misinformation. A deepfake might be more convincing, but if you believe in the message that is being presented anyway, you are not looking for signs that the video is a fake.

It should be underlined that the amount of deepfake content online is growing at a rapid rate. At the beginning of 2019 there were 7,964 deepfake videos online, according to a report from startup Deeptrace; just nine months later, that figure had jumped to 14,678. It has no doubt continued to balloon since then.

To conclude, it is obvious that today's deepfake technology is still not quite to parity with authentic video footage, it is typically possible to tell that a video is a deepfake. But the technology is improving at a breathtaking pace. Experts predict that deepfakes will be indistinguishable from real images before long.

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SCIENCE AND TECHNOLOGY

We live in the fascinating and challenging world of science. It is a world that more and more over the ages, and especially in the 20th century has come to affect so much of our lives. It is involved with the way we travel, the homes we live in and the clothes we wear, how we become ill and how medicine can make us better, and has given us fantastic means of communicating and exploring.

The list of the inventations is rather long. We are on-lookers of great scientific achievements such as television and a computer. We can't imagine our life withought a notebook or a radio. I'd like to speak in details about computers.

What is a computer?

A computer is an electronic device that stores information and allows changes in it through the use of instructions. A modern computer is capable of doing various tasks, like word processing and accounting. Personal computers are widely used but working on them requires some techniques.

A computer gives a lot of advantages to a user. The list of the advantages is rather long: computers give us access to the Internet- an international computer network. You can spread a lot of your free time surfing the Internet and get all sorts of information from it. You can enter the chat room with other Internet users and debate urgent problems on line. If you are connectable by e-mail, you can correspond with your own web page and place there information about yourself.

Today computers help people to do many things. Bankers use them to keep track of money. Telephone operators use them to put calls through. Without computers, weather forecasters would make more mistakes. Computers also help scientists to solve their problems. More than that computers help police to keep order in shops. Computers also help doctors to treat patients. Computers allow users to spend their free time and relax. But computers have some disadvantages. Computers can make people lazy. People waste their time when they play different games on a computer. People forget to go to the libraries, they often find information on the Internet. Wicked games can make people, especially children aggressive and stupid.

But in my view they have more advantages, that disadvantages. It's an open secret that the computer is a source of education, entertainment and communication. And in my life the computer plays a very important role. It helps me to find information and relax. Though scientists have archived so much, scientific minds are still working at some urgent problems. I would like to mention some problems. One of them is finding and using alternative sources of energy. Scientists are also learning how to save and conserve energy. They have many problems with creating highly effective systems of communication. I can't but mention one of the main problems. It is development of life on the planet.

I'd like to focus on the problem how to make our life longer and happier. It's a well-known fact that nowadays people have a lot of artificial parts or implants inside them. There are some people who have problems with their health, especially with their hearts. And surgeons operate them on and put on implant inside them. Surgeons think that within 50 years one person in ten will have at least one artificial part inside.

Because science will be around us even more in the future, I think we-tomorrows adults must start learning today to be ready to take our places in this computerized, transistorized, antibiotic, nuclear and supersonic age!

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COMPUTER TECHNOLOGIES ON THE RAILWAY

Due to increasing interconnectivity and smart automation, the concept of 'The Fourth Industrial Revolution' (or 'Industry 4.0') has been introduced to mark the phase of significant industrial changes driven by breakthroughs in emerging technologies in fields such as robotics, artificial intelligence, fully autonomous vehicles, the internet of things (IoT), and fifth-generation wireless technologies . It has since become a global trend and discussions around topics like "digitalisation", "big data", and "machine learning", never seem to cease.

The impact of Industry 4.0 across the railway sector is already transforming its operations. In recent years, owing to rapid digitalisation, a significant amount of data can now be collected, analysed, and interpreted in real-time to discover meaningful insights in a way that would have been unthinkable a decade ago. Railway companies have considerably widened the range of services they can offer: from smart ticketing, rail analytics, dynamic route scheduling to predictive and condition-based maintenance. These IoT applications have enabled operators to reduce costs, improve service quality and efficiency, optimise physical asset usage, and provide enhanced customer experience. Despite the recent developments, the railway industry remains one of the least technologically transformed in numerous economies. However, there has been growing financial and political backing for the more comprehensive digitalisation of rail systems since rail transport is a vital part of smart, reliable, and green mobility solutions.

The key to railway digital transformation is the seamless and continuous sharing and transferring

of data across all sensors, devices, subsystems, and applications.

In the railway industry, a significant amount of information is stored and accumulated in text format, including maintenance records, work logs, performance reports, diagnostic messages, passenger reviews, contracts, work orders, close call hazard reports, and accident reports. It is associated with almost every aspect of railways and can find applications in digital maintenance, inventory management, vehicle health inspection, and transport planning.

The ability to employ automated solutions to extract, process, and analyse useful knowledge from computer is key to enhancing efficiency and cost-saving for rail operators and increasing the reliability and performance of railways.

Railway operators need to do everything possible to keep the company working very quickly, and that's why, they are want to transfer all the text information into computer and they are looking for specialists, who know how to work with computer.

Currently, we cannot transfer everything from paper logs to computers quickly, because it's quite a large amount of information. How we know, railway must work continuously, so, in the case when, for example, there is no Internet, it will be more appropriate to write all the information in text format, but railway operators can use the services of several Internet operators, and this will not interfere to work on railway at all.

I think in a few years we will be able to move a lot of paper work to the computer and the people on the railways will work without paper logs.

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PROS AND CONS OF SMART HOMES

Nowadays, technologies have become an integral part of our lives. New technologies have impacted every industry over the past 15 years, and even our houses became smart. But are these devices which were designed to make our houses protected, are really secure?

The number of smart homes is increasing every year. While these technologies undoubtedly make our lives easier, there are also some downsides. They affect security and privacy of our lives, which is something to consider.

One of the biggest attractions of smart homes is the possibility to use Internet- and Bluetooth-connected devices to protect the home from break-ins, damage or accidents. However, this type of connectivity also exposes your devices to cyber-attacks. All devices connected to the Internet use digital protocols to link up. They are all connected through a home network router or smartphone that acts as a hub. Wi-Fi can be vulnerable due to weak encryption protocols, SSIDs or passwords, so any data stored on this network could be accessible to a hacker. Each connected device reports all actions to its corresponding app and sends a digital message to the router. Criminals monitoring a user's router could track their schedule using the usage patterns of some home devices and view images or videos from surveillance cameras.

In the event that your Internet goes down, most smart systems and devices have some form of backup that allows them to continue working. However, you run the risk of losing some of the more advanced features of your smart devices until connectivity is restored.

There are several smart home technology manufacturers, and not all of their products are compatible. Depending on their own technical knowledge, users may need to hire a professional to create a system where all devices work seamlessly together.

However, technologies are evolving every day, security protocols are getting stronger, data encryption is getting more complicated, information transmission is getting more protected, and smart home technologies evolve. Despite all the security issues, people still use these devices to make their lives easier and solve various problems.

Smart appliances are more energy efficient than traditional home electronics. Because networked devices are designed to decrease the amount of energy needed and provide feedback on the best way to conserve energy, the amount of gas, water and electricity used is reduced.

Elderly or disabled people can control home appliances with the help of various apps. This can increase their quality of life and allow them to live more independently. Smart homes can be equipped with accessibility features, such as voice control systems that can lock exterior doors, control lighting, and even operate a computer.

A home with smart features can draw a higher selling price. According to the National Association of Realtors, consumers are willing to pay more for a home with features such as smart security, climate control, appliances and entertainment.

Although the benefits of using smart home devices can be very enticing, users should also weigh all the risks and disadvantages and decide for themselves whether or not to use these technologies.

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ARTIFICIAL INTELLIGENCE AS THE FUTURE OF CYBERSECURITY

Today, many employees and managers would not be able to respond effectively or prevent critical threats without the help of artificial intelligence. Organizations are faced with the urgent need to constantly increase and improve their cybersecurity. Unfortunately, not everyone today has AI systems to protect against cyber-intrusion threats. Many company executives believe that just cybersecurity analysts are no longer enough to make business comfortable. Many professionals simply do not cope with such tasks as detecting and preventing attacks on large data sets.

The aim is to illustrate how artificial intelligence can improve cybersecurity and network security by reviewing existing systems and how they can be applied to network security and what the future of AI in this area looks like. By introducing more methods of artificial intelligence in cybersecurity, intrusion detection systems become better in detecting possible attacks.

The research methods used in this work are literature reviews and interviews.

We can see great progress literally over the last ten years, and there are good examples of how AI has been used in this area. Applying AI in these areas can increase the effectiveness of detecting anomalies and threats. It also reduces the amount of repetitive work that the security team has to do on a daily basis. Before using artificial intelligence, companies must evaluate the current system and find the problems they encounter. There are certain methods of artificial intelligence that have shown promising results in security problems, such as NDR but mostly these are machine learning methods that are not very complex. Many MLs still depend on heavy human intervention and manual control. Controlled methods are limited to specific tasks in the security infrastructure and do not have the ability to self-learn. Future AI research in the field of cybersecurity should further invest in experiments with uncontrolled methods. It is important to remember that AI is still a tool for security teams, and that AI can in no way replace the skill of human deduction or the ability to solve problems. It is necessary to continue to develop understanding of AIs, as this will improve the functions of security systems. In addition, AI can be used by attackers in the same way [1]. Sometimes there is more sophisticated artificial intelligence that is used during attacks than measures against it, and then the problem will be to keep up with the new methods used by attackers. Knowledge and know-how in the field of cybersecurity is the key to the success of advancing in cybersecurity. Currently, many employees lack skills in this area and because of this there is a high demand for people who understand this. We need to teach people cybersecurity more and more. This will help with the development of detection systems, improvements in artificial intelligence algorithms and offer security measures.

Due to the rapid increase in the complexity of cyber attacks and the emergence of new threats, we need more reliable methods. Today, the main goals of cybersecurity with artificial intelligence are the detection of malicious software and network attacks. Different studies have used a combination of different artificial intelligence methods, such as ML / DL methods with bioinspired computing, or

different teaching methods, such as supervised learning with reinforced learning. Such combinations give excellent results. While the role of artificial intelligence in solving cyberspace problems is inevitable, some of the challenges of trusting artificial intelligence and AI-based threats and attacks will be another challenge in cyberspace.

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DRIVER BEHAVIOR RECOGNITION BASED ON NEURAL NETWORKS

Traffic safety is a serious problem all over the world. The number of vehicles is growing rapidly, so this topic is becoming more and more relevant. Many traffic accidents occur due to the human factor. Unsafe actions while driving such as eating, using the phone, etc. can lead to serious consequences. Therefore, there is a need for smart vehicles, the functionality of which will help to recognize driving behavior. Such a monitoring system will be able to provide accurate information about driver's actions permissibility.

Recognition of driver behavior can be considered as one of the sections of human behavior recognition in general. However, there are some differences between human behavior recognition in real life and while driving. Driver behavior recognition includes the following aspects [2]:

- All images are recorded by a camera installed in the car. Thus, the stationary background does not allow providing global and semantic cues for behavior classification.
- The difference between driving styles is manifested in small details, such as the steering wheel, hands, face, seat position.
- Existing datasets of driving behavior contain insufficient images, so it is difficult to achieve high accuracy using deep neural networks.

Deep convolutional networks have high efficiency in object detection and image classification. In particular, region-based convolutional neural networks (R-CNN) use all available contextual cues for final action recognition [1]. Contextual cues are either the object that interacts with a person or specific human parts that contribute to an action. According to [1], the input regions of R-CNN include two parts – the primary and secondary regions. The primary area is formed by the whole person; the secondary area is formed by bounding frames generated by the algorithm which provide contextual signals for recognition actions.

The processing of the primary region is similar to a common conventional deep convolutional neural network. However, R-CNN offers a simple mechanism that uses the secondary region classification scoring operation to automatically select the most influential context parts for final recognition. This scheme can not only detect contextual clues but can also be applied to detailed recognition [1]. The classification scores of the primary and secondary regions are then added as inputs to prepare the final results.

The proposed driver action recognition system based on deep convolutional neural networks makes it possible to distinguish between different actions while driving a vehicle. Image-based recognition uses local feature detection to identify driver actions with higher accuracy.

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THE RISE OF QUANTUM COMPUTING

Quantum computing is a type of calculation which can use the foundations of quantum mechanics (superposition, interference, entanglement). Machines that execute these algorithms are quantum computers. Though current quantum computers are too small to exceed usual (classical) computers for practical applications, more powerful iterations are expected to be capable of solving special algorithmic problems, such as integer factorization (which underlies RSA encryption), considerably faster than usual computers. The study of quantum computing is a subfield of quantum information science.

Accelerating improvements in this field are potent indications that the technology is quickly growing toward commercial use. In 2021 a research center in Japan reported a development in entangling qubits (the basic unit of information in quantum) that could reduce the number of errors in these systems and probably make large-scale quantum computers possible. And one company in Australia has produced software that has demonstrated in experiments to improve the computing power of any quantum-computing hardware.

As developments speed up, investments are pouring in, and quantum-computing startups are appearing. Dominant tech companies keep developing their potential as well: companies such as Amazon, IBM, Google, and Microsoft have already started commercial quantum-computing cloud services.

Tech giant competition aside, this peculiar technology prompted more people to wonder: What will these things actually do? Applications, such as artificial intelligence, cybersecurity, drug development, financial modeling and so on wait for quantum computers to rise up to their challenges. But even once quantum computing becomes dominant, its potential impact remains largely theoretical. But that’s more a view of quantum computing’s beginner status than unfulfilled promise.

For the time being, business directors in every field should be prepared for the uprising of quantum computing. Until 2030-s, researchers think that quantum computing use instances are going to be a cross between quantum and classical high-performance computing. For example, classical high-performance computers may use quantum-inspired algorithms.

Before commercial quantum computations are possible, however, researchers ought to remove some large complications. The most important is increasing the number of qubits that these extraordinary pieces of hardware manipulate to do certain tasks. Whereas usual computer “bits” exist as 1s or 0s, qubits can be either — or both at the same time. That’s crucial for increasing processing speeds, which are required to simulate molecular-level quantum mechanics.

Despite quantum computing's abstract and undefined nature, predictions and investment flow. Google CEO Sundar Pichai correlated his company’s recent proof-of-concept advancement of achieving "quantum supremacy" (when a quantum computer is able to perform a task a classical computer can not) to the Wright brothers’ 12-second flight: Though very basic and short-lived, it revealed what’s possible. And what’s possible, experts say, is monumental indeed.

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OPERATION AND EFFICIENCY OF THE SECURE SOCKET LAYER

With the growth of technology and the expansion of the Internet, many services and sites have appeared. A large number of businesses are trying to automate and improve their sales. One of the many problems faced by customers who want to buy or receive something on the Internet is the security of their personal data.

From the very beginning of the of Internet resources development, HTTP protocol as a mechanism for access to documents on the Internet was proposed. The researchers considered it to be the most significant protocol used on the Internet [1]. It served to facilitate data navigation using the hypertext. The protocol included methods, options, GET parameters, POST parameters, PUT method, PATH method, DELETE method, and each request response had HEAD, TRACE and CONNECT. All of the properties were needed for the client to be able to receive and communicate with other servers hosting the sites.

In 2019, Google practically changed all the rules and announced all the laws according to which new resources and sites must work. The company offered the new protocol HTTPS, and all those who previously used the HTTP protocol and wanted to keep their ranking and attendance of their web resource had to go to the new protocol.

Google added to the protocol the letter S, which meant security. To implement this protocol, companies had to connect their Secure Socket Layer certificate to the web resource. An SSL certificate is a digital proof of a website. This certificate confirms that all information which will be transferred from the site and from the users will be encrypted through a secure channel [3].

SSL will provide and guarantee the website visitors that the received data will be given from the domain where the company's site is located; the data provided by the client will not be intercepted by unauthorized persons; and the data will not be corrupted during transmission.

Nowadays, there are many services which give the user the private keys for encryption and connection of the SSL certificates to the user`s site. For example, Let`s Encrypt is a big certification center connecting the SSL certificate to the user`s domain. This service uses the ACME protocol which is an automated environment for managing certificates. It is a protocol for automating domain validation, X.509 certificate negotiation and installation. The ACME protocol was developed by the ISRG and is described in IETF RFC 8555 [2].

The functions described are needed for online banking, mail services, online stores, payment systems, etc.

ACME protocol is used for organizing the interaction between the Certification Authority and web server, for example, for automating certificate reception and its maintenance. The requests are transferred in JSON format over HTTPS.

All systems which provide certificates give user and customer secure access to Internet portal and provide reliable connection to servers where websites are located.

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RECENT GLOBAL TECHNOLOGICAL INNOVATIONS IN COMPUTER TECHNOLOGY FIELD

Since I study at the Department of Computer Technology and Systems, I am going to talk about a recent novelty in the field of web technologies.

Accelerated Mobile Pages (abbreviated as AMP). is Open Source HTML Framework that was launched as a joint initiative by Google and several other technology and publishing companies, which allows developers to adapt any web page for mobile devices according to a standard template.

Characteristic features of AMP are reduced JavaScript and CSS elements, and the use of a Content Delivery Network.

The number of searches made from mobile devices has overtaken desktop. At the same time, the demand for short loading times has grown. The critical cut-off point is said to be at three seconds. So, AMP Framework was created with main goal: to create fast load times for mobile users.

AMP creates the best conditions for a mobile website to load quickly, even when data transfer is slow. To do this, it limits the number of JavaScript and CSS elements required, loading only the required resources. Another important factor is a proxy server that keeps a cache of the target page ready, which allows Google to use this functionality by preloading AMP documents using a single iFrame in the background of a search results page so that the documents load instantly.

Websites can serve AMP pages by implementing the rel=amphtml tag into their HTML code. Pages with AMP code contain a three-step AMP configuration.

- AMP HTML: The HTML Code of an AMP is limited to the essentials. When a http-request is made, the client receives the cached version while the document is requested again from its server to be updated. This ensures that the content in the cache is up to date.
- AMP JavaScript: AMP makes use of asynchronous JS Code. This allows the site to start building before all JS elements have been loaded.
- AMP CDN: A cache of every AMP website is saved on various servers worldwide. This content can be brought to the user via the shortest path possible using a Content Delivery Network.

While AMP caching does offer improved speeds, adopting AMP for your website comes with a few warnings. Researches have shown that the AMP library can reduce the number of server requests by 77 percent, but the AMP version is not always served if it’s not implemented correctly. Implementing AMP forced to reduce UX elements of your webpage. Also, AMP pages only allow one advertisement tag per page loads asynchronously, meaning that the user experience is not disturbed by the ads that prevent the page from loading. This may be disadvantageous for the advertisers.

The search engine Google has gone towards a mobile-first approach with its announcement that its mobile index is going to become the primary index for the Google search results since Google Update in 2015. This is only going to increase the importance of AMP.

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DEVELOPMENT OF NEURAL NETWORKS

In today's world, we are constantly exposed to the results of a wide variety of neural networks without even realizing it. They are everywhere: they predict the weather, recognize you in photos with your friends to tag your friends in social networks, recognize people and objects in video/camera/photo footage, help classify data, help in photo and/or video processing, help in personalized advertising, create from scratch pictures, write articles, work in autopilot systems and much more.

But it's worth starting with something simpler. What is a neural network?

A neural network is a mathematical model that is humanity's attempt to recreate the workings of biological neurons from the brain. They can do a wide variety of tasks, depending on the architecture and the training data.

Most often they are used for data classification tasks, and in this task they are almost unrivaled.

Since their inception, neural networks have come a long way in the development and optimization of training methods and architectures, but first things first.

The simplest network consists of just one neuron and is called perceptron, which for a long time was used in weather forecasting, because there should be classified a lot of data and based on this data to make conclusions.

Since then many architectures have appeared such as: perceptrons, generative-adversarial networks, convolutional networks, single layer networks, multilayer networks and a lot of different

architectures. Each architecture is good in its application area.

For example, besides weather prediction and other classification tasks there is image noise reduction with neural networks (many people's phone camera can do this), image generation (GAN architecture) and this variety of applications shows how deeply this technology is embedded in our lives, and how far this industry has come.

But the world and technology do not stand still, and humanity is constantly optimizing methods of training neural networks. So there was a method of reverse error propagation, which is now very often used. Another example, from May 2020, when researchers from all over the world, independently of each other, found a way to reduce the dataset for training GANs from tens of thousands of images to a couple thousand due to augmentations.

To summarize, I would like to say that the pace of development in this industry is only gaining momentum, and more and more applications of this technology in the home will soon await us.

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IMPLEMENTATION GNU/LINUX DISTRIBUTIVS IN SCIENTIFIC ACTIVITY OF STUDENTS AND YOUNG ERYDITE

Information Technology (IT) plays a vital role in today's personal, commercial, and not-for-profit uses. In its simplest terms, IT is the application of computers and other electronic equip
ment to receive, store, retrieve, transmit, and manipulate data. This data becomes information when it is put into intelligible and useful forms for communication.

The importance of IT is sometimes taken for granted because its applications are so widespread worldwide. We depend on it in our personal lives for communication, banking, social media, investments, research, and so much more. Organizations cannot exist today and expect to stay competitive without adequate Information Technology systems.

Artificial intelligence, cloud computing, home, and business security blockchain, drones, and IoT are some of the developing trends today that are revolutionizing the industry. IT is an ever-changing industry and those who want to stay at the forefront must adapt these innovations to their uses whether personal or otherwise.

During my study at this derection I faced with LINUX operating system. Linux is an open-source operating system unlike Windows and MacOS. It is used as a platform to run desktops, servers, and embedded systems. It provides various distributions and variations as it is open source and has a modular design. The kernel is a core part of the Linux system. Linux system is used to manage various services such as process scheduling, application scheduling, basic peripheral devices, file system, and more. Linux provides various advantages over other operating systems such as Windows and macOS. So, it is used in almost every field, from cars to home appliances and smartphones to servers (supercomputers).

Based on the practices of the Linux, along with the idea that human activity should be held as primary in human-Internet interactions, open source educational processes suggest that individuals will require new types of skills and self-efficacies in order to realize the potential of their Internet activities. Education for these skills is at least in part dependent on development of curricula that recognizes the dialectical relationship between individual agency and goal driven, online communities. It is the communities which drive individual motivations to search for new problem solving possibilities, create well-functioning communities that are capable of organizing and differentiating distributed sources of information, and act as inflection points in the flow of information, recognizing that knowledge is not an object but an ongoing activity.

To sum up Information technologies bocome an integral part of nowadays life. The Linux operating system is one of the uppermost in IT. To improve and develop IT we have to pay attention of students and young erydite to learn a basic skills of usage Linux.

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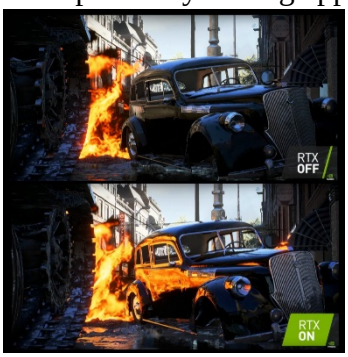
RTX TECHNOLOGY

Technology always advances fast, especially in the modern age. One of such advancements happened to appear in sphere of entertainment – breakthrough on application and usage of ray-tracing technology in video game industry.

First of all, let's establish what does it mean and brief history behind this topic. In 3D computer graphics, ray tracing is a technique for modeling light transport for use in a wide variety of rendering algorithms for generating digital images. On a spectrum of computational cost and visual fidelity, ray tracing-based rendering techniques, such as ray casting, recursive ray tracing, distribution ray tracing, photon mapping and path tracing, are generally slower and higher fidelity than scanline rendering methods. Thus, ray tracing was first deployed in applications where taking a relatively long time to render could be tolerated, such as in still computer-generated images, and film and television visual effects (VFX), but was less suited to real-time applications such as video games, where speed is critical in rendering each frame.

Example of ray tracing applied in real time:



How does ray tracing work?

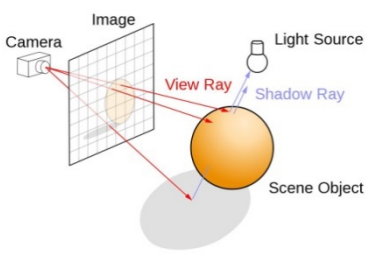
In real life, light comes to you. Waves made up of countless little photons shoot out of a light source, bounce across and through a variety of surfaces, then smack you right in the eyeballs. Your brain then interprets all these different rays of light as one complete picture.

Ray tracing functions nearly the same way, except that everything generally moves in the opposite direction. Inside the software, ray-traced light begins at the viewer (from the camera lens, essentially) and moves outward, plotting a path that bounces across multiple objects, sometimes even taking on their color and reflective properties, until the software determines the appropriate light source(s) that would affect that particular ray. This technique of simulating vision backward is far more efficient for a computer to handle than trying to trace the rays from the light source. After all, the only light paths that need to be rendered are the ones that fit into the user's field of view. It takes far less computing power to display what's in front of you than it would to render the rays emitted from all sources of light in a scene.

Still, that's not to say it's easy. "Thousands of billions of photons enter your eye every second," says the NCSA's Christensen. "That's way more than the number of calculations a computer can do per second … so there's a lot of optimizing and efficiency and hacking that needs to happen in order to even begin to make something look realistic."

Rather than try to map out every single ray of light, the solution for developers at Nvidia is to trace only a select number of the most important rays, then use machine learning algorithms to fill in the gaps and smooth everything out. It's a process called "denoising."

"Rather than shooting hundreds or thousands of rays per pixels, we'll actually shoot a few or maybe a few dozen," Tamasi says. "So we use different classes of denoisers to assemble the final image."



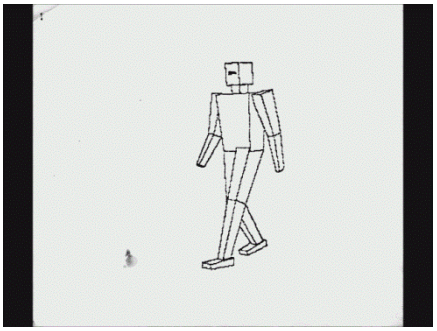
Now to the history of the subject:

The idea of ray tracing comes from as early as the 16th century when it was described by Albrecht Dürer, who is credited for its invention. In *Four Books on Measurement*, he described an apparatus called a *Dürer's door* using a thread attached to the end of a stylus that an assistant moves along the contours of the object

to draw. The thread passes through the door's frame and then through a hook on the wall. The thread forms a ray and the hook acts as the center of projection and corresponds to the camera position in ray tracing.

This woodcut by Albrecht Dürer from 1525 shows the use of a Dürer's door.
Another early instance of ray casting came in 1976, when Scott Roth created a flip book animation in Bob Sproull's computer graphics course at Caltech. The scanned pages are shown as a video on the right. Roth's computer program noted an edge point at a pixel location if the ray intersected a bounded plane different from that of its neighbors. Of course, a ray could intersect multiple planes in space, but only the surface point closest to the camera was noted as visible. The edges are jagged because only a coarse resolution was practical with the computing power of the time-sharing DEC PDP-10 used. The "terminal" was a Tektronix storage-tube display for text and graphics. Attached to the display was a printer which would create an image of the display on rolling thermal paper. Roth extended the framework, introduced the term *ray casting* in the context of computer graphics and solid modeling, and later published his work while at GM Research Labs.

Turner Whitted was the first to show recursive ray tracing for mirror reflection and for refraction through translucent objects, with an angle determined by the solid's index of refraction, and to use ray tracing for anti-aliasing. Whitted also showed ray traced shadows. He produced a recursive ray-traced film called *The Compleat Angler* in 1979 while an engineer at Bell Labs. Whitted's deeply recursive ray tracing algorithm reframed rendering from being primarily a matter of surface visibility determination to being a matter of light transport. His paper inspired a series of subsequent work by others that included distribution ray tracing and finally unbiased path tracing, which provides the *rendering equation* framework that has allowed computer generated imagery to be faithful to reality.



Flip book created in 1976 at Caltech

"A game needs to run 60 frames per second, or 120 frames per second, so it needs to compute each frame in 16 milliseconds," says Tony Tamasi, vice president of technical marketing at graphics card developer Nvidia. "Whereas a typical film frame is pre-rendered, and they can take eight or 12 or 24 hours to render a single frame."

This newfound excitement around ray tracing comes just as home gaming hardware is on the cusp of being able to process lighting effects in real time. The graphics chips that will go into the next generation of gaming PCs and videogame consoles should have the rendering power to produce ray-traced scenes on the fly. When that happened, it resulted in a tectonic shift for visuals in gaming. Such well known games as Cyberpunk 2077, Spider-man Remastered, Minecraft, Portal RTX Update and others use ray tracing tech to create even more immersive environments for a player to experience.

SECTION 5. ENERGY EFFICIENCY

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ENERGY-SAVING LIGHTING TECHNOLOGY IN UKRAINE

It is known that in total there are about 300 million lanterns on the streets of the world. Of these, in Ukraine - 2 million. At the same time, their distribution in our country is very uneven: the central streets of large cities are stuffed with lanterns, while the rest of the territory is in darkness. But the matter is not even in the amount of lighting, but in its quality, because, unfortunately, old incandescent lamps

are still mainly used in Ukraine, and energy-saving technologies remain a rarity. Many lighting systems have expired and require constant refurbishment. Now, in all countries of the world, street lights work at full capacity even during periods of extremely low car and pedestrian traffic. It is believed that the brighter the light, the better. Meanwhile, it is clear to everyone that this is a waste of resources and an increase in environmental damage. According to the researchers, street lighting should become smart, that is, one that will adjust its intensity itself depending on the traffic. LED lamps are not only economical, but also have the ability to "adapt".

So why is it that traditional lighting is still used on our streets, which does not meet modern requirements? Because experts at one time convinced the authorities that bright road lighting is a guarantee of road safety at night. But, scientists believe that in this case we use street lighting like a butcher's knife, and not like a surgical scalpel. As for the solution of this problem some scientists consider the innovative scheme. This innovative scheme has already been tested in the American city of Cambridge (Massachusetts) and on the campus of the University of California. In both places, LED lamps and smart lighting systems were installed in the lanterns. At dusk, these streetlights reduce the light intensity by 30%, from 10 pm until sunrise by 50%. The intelligent system of such lighting is able to detect the decrease / increase in activity. When the street is empty, the lights dim. When a car or a pedestrian is detected, the light "flashes". The result of the experiment: 80% energy savings, and no complaints from either motorists or pedestrians.

But if adaptive lighting technology saves so much money and doesn't seem to have any drawbacks, then why isn't it being adopted everywhere? The first reason is a smart controller that needs to be installed in every street light. It costs about $ 100. Although it pays for itself quickly with energy savings. The second reason is the lack of knowledge at what intensity of street traffic it is necessary to "kindle" or "extinguish" the lights. So far, scientists are only studying this issue. After all, the level of illumination directly affects road safety. The third reason is the way to pay for electricity. In Ukraine, and in many other countries, the applied form of payment for electricity does not give city authorities any incentives to seriously save this same electricity. Today we will look at the essence of the smart lighting strategy included in the transnational concept of creating smart cities. The principle of operation of such lighting is reduced to the use of adaptive and energy-saving equipment. For this, special lamps are used, equipped with sensors and included in the automated control network. For example, lighting can be completely turned off or minimized during periods when there are no objects in its area that require light. Of course, when a car or a person approaches, it will turn on. Depending on the subtlety of the setting, the automation can ignore the movement of animals or provide them with a light of minimum brightness in order to avoid damage to private property. In addition to the aspects already mentioned, such lighting helps to increase safety on the streets, especially where there is heavy traffic.

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SMALL MODULAR REACTORS IN THE FUTURE

For the development of any country, energy plays a key role, because it is the lifeblood of the industry. The energy factor is an important infrastructure of social and industrial development and it is indicator of the country status.

Energy could be generated in the different ways, there are hydropower, thermal power, renewable energy, nuclear power. I would like to talk about the nuclear power industry. Each of the energy production ways have own specific advantages and disadvantages. The most speculative energy source is nuclear fission. Most of us remember TM2, Chornobyl and Fukushima-Daichi accidents. But from other side, nuclear fission is one of the most perspective and promising energy sources now and in nearest future. Why exactly is it promising and interesting both today and for the future?

Let's look into history and recall the Kyoto Protocol (1992), the main goal of which was to

stabilize the concentration of greenhouse gases in the atmosphere and reduce or stabilize greenhouse gas emissions in 2008 – 2012 to the level of 1990. The Paris Agreement (2015) was also adopted on the regulation of measures to reduce carbon dioxide emissions from 2020. It is nuclear energy that does not emit CO_2. In addition, the European Parliament recognized nuclear energy as "green energy", that is, one that corresponds to the concept of sustainable development. This further increases the market of opportunities for the development and spread of nuclear power plants in the whole world.

Let's consider the chronology of the development of atomic energy. The traditional "big" nuclear energy, which began its existence in 1949, rapidly developed and improved. There were many different reactor installations, some of them found demand and were successfully operated, some, on the contrary, lost relevance. Over time, new trends and developments of small modular reactors (SMR) appeared. But how do they differ from traditional large reactors and what are the advantages of using SMP? Let's look at table.

	"Big" energy	**SMR**
Investment	Big	smaller
Construction time	Long	short
Sefety level	High	even higher
Pipelines, loops and external components	Yes	No
Consideration of local needs	No	Yes
The need for developed infrastructure	Yes	No
Flexible choice of site	No	Yes
Work in cogeneration with Renewable Energy Sources (RES)	?	Yes

Table 1. Comparison of "big" energy and SMRs

We can conclude that small modular reactors can conquer the energy market in the future. Because it is with SMPs that you can replace outdated power units of thermal power plants; to provide the electricity needs of remote areas where the power grid is not developed; to increase the safety reserves of nuclear energy due to passive systems; to create potential hybrid energy systems with RES.

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EARTHQUAKE PROTECTION OF NUCLEAR POWER PLANTS

To protect nuclear power plants, a seismic isolation system was developed to minimize damage from moderate to large earthquakes. However, this technology has not become very popular for nuclear power plants because they are most often installed in areas with weak to moderate earthquakes, and fewer and fewer nuclear power plants are being built. Still, seismic isolation for nuclear power plants has become more common because of the renewal of nuclear power development in the United States (Whittaker & Kumar, 2014).

In a seismically isolated nuclear structure, insulators and bearings are installed under the base plate, which gives support to the entire nuclear power plant. The horizontal installation of such insulators in the superstructure, that is beneath the foundation, is used because the ideal form of three-dimensional insulation system for nuclear power plants has not yet been developed.

In case of seismic activity (earthquake), the insulated superstructure is to move without restriction in a special moat. In general, a total of 3 types of insulators are used in US nuclear power plants: low-damp (natural) rubber (LDR) insulators, lead (natural) rubber (LR) insulators, and friction pendulum (FP) sliding insulator.

Low-damping elastomeric bearings are available in stock, their components being made of natural rubber and steel. The equivalent viscoelastic components provide 2-4% of the critical damping. Another type of bearing that is similar in design, but has a lead core inside for the energy generated by an earthquake to dissipate, is called a lead-rubber elastomeric bearing. Friction pendulum bearings are widely used to insulate nuclear structures in the USA, and they have single, double and triple concavities. In designing FP insulators, one should consider the interconnection of bi-directional movement in horizontal directions, interconnection of vertical and horizontal movement, and the intense heat that will arise when the surface is sliding and reduce the strength of the bearings.

A very useful designing tool is the simulation of insulation and bearings in the program that displays the real behavior of the insulation in an emergency situation and as a result gives the answer whether it is possible to save a nuclear power plant from the terrible consequences of an earthquake or not. Such an earthquake modeling program is OpenSees. There, you can choose mathematical models of bearings, including low-damping rubber, lead rubber and high damping rubber ones, and their names are ElastomericX, LeadRubberX and HDR, respectively.

This software allows you to analyze any seismic protection system in nuclear power plants. Take the elastomeric bearings as an example. They have the following features:

- interconnected motion in two directions and in the horizontal direction;
- interconnection of horizontal and vertical motion;
- the presence of cavitation and post-cavitation behavior under tension conditions;
- a decrease in cyclic tensile strength, caused by cavitation;
- possible critical bearing load capacity;
- reduced strength because of high slip surface heating.

In conclusion, to increase the safety of nuclear power plants, it is necessary to have tested and maximally reliable insulators. What is important, before using them directly in a power plant, it is worth checking them with mathematical models in OpenSees, which should impart the precise behavior of the insulator.

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ENERGY EFFICIENCY IS THE GREATEST PROBLEM OF THE DAY

Energy remains one of the critical challenges of the future. Businesses need to strike the balance between operational efficiency and sustainable development. With soaring energy prices and increased scarcity of natural resources, pinpointing energy efficiencies – from planning to manufacturing to operations - makes good business sense.

One way of reducing energy costs is to become more energy efficient so as to optimise existing resources and plan the right investments in new technologies. This will help manage operating costs and provide better delivery of services to customers while reducing environmental impacts and mitigating risk. Additionally, a documented commitment to sustainable development is a powerful and effective way to demonstrate social responsibility and meet changing customer preferences.

The energy efficiency of energy systems is classically assessed by looking at the energy conversion efficiency. Matters related to energy efficiency are among the priority areas of work of the Committee on Sustainable Energy, and are addressed by one of its subsidiary bodies – the Group of Experts on Energy Efficiency. I think, broader and expeditious deployment of energy efficiency measures across buildings, industry, transport, and other sectors serves maintaining and increasing resilience of energy systems in a cost-effective manner, improves their durability and flexibility, reduces system's redundancy, and strengthens ability to absorb shocks and recover.

The most common example of calculating energy efficiency is a conventional power plant where heat is converted into electricity by using a turbine and a generator. In such thermal power plants, energy

input would refer to the heat fed into the process and the electricity produced as the useful output. Both elements are energy flows and can be quantified by using thermodynamic calculations which result in an absolute value for efficiency.

The drivers to improve energy efficiency are usually to:

- Reduce carbon emissions and fuel bills,
- Improve comfort levels
- Comply with statutory requirements such as the building regulations or the Private Rented Sector Regulations

Energy efficiency benefits a wide range of sectors:

To make these kinds of changes, countries need the right policies and regulations in place. These will target overall energy policy; demand-side and supply-side measures; energy tariff regulations; power sector reform; energy efficiency policies, laws, targets and plans; establishment of energy efficiency agencies; and promotion of energy efficiency audits.

Although energy efficiency has long been mentioned as a means toward achieving Paris Agreement goals, the “more exciting” announcements such as carbon capture and storage grabbed attention. Big projects offering big solutions proposed by big corporations and governments outshone energy efficiency, which also called for personal actions. Although that may be an unpleasant truth, more attention may be turning to it.

Global energy prices are high and volatile – an unsettling mix – and are hitting hard the wallets of individuals, households, industries, and entire economies. Gasoline, other fuels, and electricity prices are high (and likely to get higher), and added to inflation, are increasing the cost of most everything else.

SECTION 6.
ECOLOGICAL SAFETY

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ECOLOGICAL FAFETY

Environmental safety is the challenge of dangerous threats to people and the environment. The foundations of environmental security in Ukraine are proclaimed in the Declaration of Independence and at the constitutional level - in Art. 16 of the Constitution of Ukraine, which states that ecological safety and ecological balance on the territory of Ukraine, preservation of the gene pool of the people is the duty of the state. The Law of Ukraine "On the Protection of the Natural Environment" (Article 50) also defines environmental safety as the state of the natural environment, in which prevention of the deterioration of the ecological situation and the occurrence of danger to human health is ensured, which is guaranteed by the implementation of a wide range of interconnected ecological, political, economic, technical, organizational, state-legal and other measures.

The environment is considered safe when its condition meets the criteria, standards, limits and regulations established in the legislation regarding its cleanliness (non-pollution), resource intensity (non-depletion), ecological sustainability, sanitary requirements, species diversity, ability to satisfy the interests of citizens.Today, the process of improving the legislation on ensuring environmental safety by adopting the law "On ecological (natural and man-made) safety" continues (now it is being revised by the relevant ministry). Since the beginning of the year, the government "hotline" has received about two thousand appeals, which were generally related to ecological safety of the environment. The applicants mainly raised issues of pollution of the atmosphere, water bodies and soil, protection of green spaces. In the autumn of this year, the residents of Kyiv and the suburbs felt the smog in the atmosphere, which caused foci of ignition of peat in the Kyiv region. Thus, at the beginning of September, a pensioner from the Svyatoshyn district of Kyiv reported to the government hotline about the smog in the capital and asked to establish the reasons and take appropriate measures to solve the problem. He noted that atmospheric smog is also observed in Kyiv, Zhytomyr, Volyn and Rivne regions. The State Service of

Ukraine for Emergency Situations reported that the smog in the capital was caused by a fire on the territory of the Bilodibrov Forestry of the Darnytskyi Forest Park Service. The pensioner was informed of measures to contain and eliminate the fire, which was confirmed by feedback to the applicant. A pensioner from the city of Dniprodzerzhinsk, Dnipropetrovsk region, has repeatedly addressed various authorities with the issue of atmospheric air pollution of PJSC "Dnipro Metallurgical Plant named after F.E. Dzerzhynskyi", located in her hometown. She complained about smog, stuffy air that made it difficult for her and other citizens to breathe. An indifferent pensioner first appealed to the city council, but the issue was not resolved. Then she reported it to the State Environmental Inspection in the Dnipropetrovsk region. And it was only after she called the government's hotline that she was finally heard.

The representatives of the inspection recently informed the woman that in September of this year, an unscheduled inspection of compliance with the requirements of environmental protection legislation of Ukraine regarding the protection of atmospheric air was carried out by the specified metallurgical plant. Based on the results of the inspection, an inspection report was drawn up, prescriptions were issued to eliminate deficiencies, and officials were held administratively liable for violating the requirements of the Law of Ukraine "On Atmospheric Air Protection". As a result of the feedback with the applicant, it was found that she is satisfied with the answer, and the air condition in the city has improved. A resident of Chernihiv complained about the felling of trees in the city's "Cordivka" forest park zone, near the Desna River, which she observed back in the summer. The representative of the Chernihiv City Council informed the applicant that the cutting of green areas was carried out by Eurocon Polissya LLC in accordance with the warrant issued on the basis of the decision of the executive committee of the city council back in 2010. However, in order to avoid social tension (since the concerned woman was joined by public activists of the city who filed a lawsuit in court), the municipal enterprise "City Improvement Control District" of the Chernihiv City Council, on the instructions of the city mayor, revoked the warrant. "Eurocon Polissia" LLC was served with the corresponding letter of July 2015, which declared the above-mentioned warrant invalid. Feedback from the applicant confirmed that the cutting of greenery in the park has been stopped and the case has been resolved in favor of the city's residents.

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EMISSIONS IN THE BOF STEELMAKING PROCESS AND THE WAYS TO REDUCE THEM

Ecological safety in Ukraine is based on its environmental policies that use different instruments such as monitoring, permitting system, environmental accounting, etc. Despite of the wide variety of measures and tools, metallurgy (including the BOF steelmaking) still has a great impact on the environment. Emissions from the BOF production have an impact on all biosphere elements, especially when the source of the discharge is located close by the residential areas.

Follow-up analysis of a previously performed study shows the amount of emissions in Dnipro city in 2021: the number of suspended solids exceeds the maximum permissible concentration by 1.4-1.8 times; nitrogen dioxide – by 2.0-2.3 times; phenol – by 0.6-1.6 times; formaldehyde – by 2.4-3.6 times. Thus, we can conclude that the city population lives on polluted territory that doesn’t meet the standards and as a result affects the morbidity.

Having analyzed the technological processes of BOF steelmaking and the ways of waste treatment, we can see that the main amount of dust and gas emissions is removed through the special gas tracts, dust and gas purification systems and smokestacks. Still, disorganized emissions might capture and purified and be not removed with the help of plants’ lanterns.

An analytical study has been held considering the ways to reduce the influence of BOF production on environment. The greatest number of gases occurs when purging the cast iron with oxygen. Carbon and other impurities combustion takes place in the converter. Dust and gas emissions are the oxidation products of carbon that while being purged contains 85-90% CO, 8-14% CO_2, 1,5-3,5%

O_2, 0,5-2,5% N_2 and 2-5% H_2. Also, together with gases, 13% of sulfur and fine dust (up to 250 mg/m2) are carried away. Dust usually consists of particles in a size of up to 3 micrometers and in amount of up to 65%.

Emissions reduction is possible in the event of melting technological processes improvements, mechanization and automatization of the processes, upgrade of furnaces that are used for the oxygen supply. In addition, using the cutting-edge technologies for filtering, purification systems with full or partial afterburning of CO, and their full automatization.

In order to store converter purified gas and have the ability to use it further, gas tanks should be utilized.

One of the essential measures to reduce gas emissions from BOF steelmaking is to capture and purify the disorganized discharge. For capturing such gases when the converter is tilted, special umbrellas should be used at the sides of the cast iron pouring and steel release, as well as at the top of a load span. Captured emissions should be directed to the existing gas purifying systems or additional ones.

To solve the problems of environmental protection in modern conditions, it is possible to use various software for modeling and forecasting the spread of pollutants in atmospheric air, conducting thermodynamic calculations, etc. Upfront simulation in Autodesk CFD allows for design optimization, innovation, and validation before construction of treatment facilities or ventilation systems. In particular these software products provide the ability to use Architecture, Engineering and Construction (AEC) models in Revit software, as well as import these models into Autodesk CFD, for simulation research.

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ECOLOGICAL SAFETY

According to article 50 of the Law of Ukraine "On Environmental Protection" emphasizes that “Ecological safety is such state of environment in which prevention of deterioration of the ecological situation and danger to human health is provided”.

Nowadays the question of ecology and ecological safety is sharp as ever. Humanity accustomed to comfort, in connection with which the culture of consumerism developed. The nature resources sources are exhaustive that is why we have to delay the moment, when all necessary resources will be exhausted.

There are a lot of ways of alternative conditionally exhaustless energy sources usage, such as energy of sun, water or air etc.

Sun energy production is providing with solar panels. The silicon semiconductor that catches the sun's rays heats up. Photons of light "knock out" electrons from the structure of the conductor, forming a charge

The energy of wind is produced with the help of energy conservation principle. The wind sets the blades of the windmill in motion, and the energy of motion is converted into electrical energy. According to this principle working also hydroelectric power plants. The main difference is that in their work used not wind but water

These and other ways of energy production are widely spread. If you have such an opportunity, you can set solar panels even at your house`s roof. In hot countries, for example in Turkey, the sun is used to heat the water in the tap. Water tanks are installed on the roofs of houses, where water is heated under the sun's rays, saving fuel for boilers for most of the year.

In addition to excessive fuel production danger for ecological safety are rusts from factories and lack of recycling. But the main danger is wars, because soil is getting unsuitable for agriculture due to mass burials and shelling damage. Sea battles are harming to the sea animals, damage dolphin`s echo sounders and litter the water. On the land animals are escaping from their natural habitat, scared by loud noises. Damage of vehicles creates lots of junk which sometimes not reusable, and broken infrastructure creates a lot of waste and causes gas and water leaks. There is also permanent danger of atomic plants

destruction.

The usage of explosives and fuel for military vehicles are spoiled the air and soil. The military oriented plants are working in the huge scales. Danger of atomic blast is also a huge problem. Unfortunately, none of alternative energy sources cannot to safe environment if there are wars in the world.

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ECOLOGICAL SAFETY IN UKRAINE AND THE WORLD

According to the division of XI of Law of Ukraine "About the guard of natural environment", ecological safety is such state of natural environment, that warning of worsening of ecological situation and origin of health hazard is provided for people. Ecological safety is guaranteed to the citizens of Ukraine by implementing a wide range of interrelated political, economic, technical, organizational, state-legal and other measures. If we read the Encyclopedia of Modern Ukraine, we understand that it means the level of protection of vital human interests, as well as society, the environment and the state from real or potential threats caused by anthropogenic or natural factors.

In my opinion, this type of safety means an ecological balance, in which all components of the environment (biosphere, lithosphere, hydrosphere, etc.) do not threaten human life. International cooperation in the field of solving environmental problems is based on the following principles: recognition of international law; scientific validity of international norms of rational nature management; inadmissibility of irrational nature management; inadmissibility of national appropriation of international space; inadmissibility of impact on the environment for military purposes, which is incompatible with the interests of people. In addition, the structure of ecological safety is: study of disasters and phenomena of natural and anthropogenic origin, which cause deterioration of the ecological state of the environment, in order to prevent and exclude them; assessment of the potential hazard of sources of environmental safety violation; comparison of methods of prevention or reduction of environmental degradation; development and improvement of the methodology for forecasting and assessment of environmentally hazardous phenomena in order to prevent them.

Also, there are four main levels of ecological safety in the world. Particularly, environmental safety of the individual - to preserve health and normal life ; regional environmental safety - adaptive actions are aimed at optimizing human economic activity to environmental conditions; global ecological safety - a type of security for all mankind, that is protection from threats, challenges, dangers that give rise to global security problems and it is a set of international conditions of coexistence of agreements and institutional structures, in which each member state of the world community is provided with the opportunity to freely choose and implement its development strategy in accordance with the principles of globalization; and ecological safety of the state. The last one bases on principles of maintaining ecological balance on the territory of Ukraine and overcoming the consequences of the Chernobyl disaster; legal responsibility for violation of legislation on environmental protection; accessibility, timeliness and reliability of ecological information from the executive authorities; state support of domestic business entities that carry out their activities to reduce the negative impact on ecological safety.

So, the level of ecological safety affects all spheres of life in general. Without it, humanity could not survive. Effective environmental protection is impossible without international cooperation on a global scale. The world, where there is absolutely ecological safety, is an utopia.

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EFFECTS AND SOLUTIONS OF WATER POLLUTION

British poet W. H. Auden once noted, "Thousands have lived without love, not one without water." Yet while we all know water is crucial for life, we trash it anyway. Some 80 percent of the world's wastewater is dumped - largely untreated - back into the environment, polluting rivers, lakes, and oceans. Water is uniquely vulnerable to pollution. Known as a "universal solvent," water is able to dissolve more substances than any other liquid on earth. It's the reason we have Kool-Aid and brilliant blue waterfalls. It's also why water is so easily polluted. Toxic substances from farms, towns, and factories readily dissolve into and mix with it, causing water pollution. Covering about 70 percent of the earth, surface water is what fills our oceans, lakes, rivers, and all those other blue bits on the world map. Surface water from freshwater sources (that is, from sources other than the ocean) accounts for more than 60 percent of the water delivered to our homes. But a significant pool of that water is in peril. According to the most recent surveys on national water quality from the U.S. Environmental Protection Agency, nearly half of our rivers and streams and more than one-third of our lakes are polluted and unfit for swimming, fishing, and drinking. Nutrient pollution, which includes nitrates and phosphates, is the leading type of contamination in these freshwater sources. While plants and animals need these nutrients to grow, they have become a major pollutant due to farm waste and fertilizer runoff. Municipal and industrial waste discharges contribute their fair share of toxins as well. There's also all the random junk that industry and individuals dump directly into waterways.

Water is an essential resource for human survival. According to the *2021 World Water Development Report* released by UNESCO, the global use of freshwater has increased six-fold in the past 100 years and has been growing by about 1% per year since the 1980s. With the increase of water consumption, water quality is facing severe challenges. Industrialization, agricultural production, and urban life have resulted in the degradation and pollution of the environment, adversely affecting the water bodies (rivers and oceans) necessary for life, ultimately affecting human health and sustainable social development [1]. This widespread problem of water pollution is jeopardizing our health. Unsafe water kills more people each year than war and all other forms of violence combined. Meanwhile, our drinkable water sources are finite. Less than 1 percent of the earth's freshwater is actually accessible to us.

Without action, the challenges will only increase by 2050, when global demand for freshwater is expected to be one-third greater than it is now [2]. Anyone can help protect watersheds by disposing of motor oil, paints, and other toxic products properly, keeping them off pavement and out of the drain. Be careful about what you flush or pour down the sink, as it may find its way into the water. The U.S. Environmental Protection Agency recommends using phosphate-free detergents and washing your car at a commercial car wash, which is required to properly dispose of wastewater. Green roofs and rain gardens can be another way for people in built environments to help restore some of the natural filtering that forests and plants usually provide. Several measures are necessary to tackle water pollution. Relevant authorities should enforce existing regulations concerning water pollution and come up with an even stricter penalty for those who pollute water [3]. Secondly, people should use less plastic and avoid littering by using designated dumping sites. Farmers, as well as householders, should minimize the use of chemicals such as fertilizers and adopt the use of environmental friendly fertility boosters like animal wastes. Since cars emit particles that lead to acidic rains, people should drive less and where possible use public transport to minimize emissions into the atmosphere [3].

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ENVIRONMENTAL SAFETY AT THE FACILITIES OF UKRZALIZNYTSYA

Transport is one of the largest sources of greenhouse gas emissions on the planet making up about 16%. Most of them are cars (11.9%), airplanes and ships generate 1.9% and 1.7%, respectively, trains — 0.4%. Reducing transport emissions plays a crucial role in the climate change control.

The advantage of rail transport is its environmental friendliness, unlike other types of transport, but there is significant environmental pollution near railway stations. The reason is emissions of harmful substances, the causes of which are: rolling stock, numerous production and auxiliary enterprises, which contribute to the maintenance of the transportation process and lead to soil, water bodies and air pollution. Also, one of the disadvantages of railway transport is its noise and heat pollution.

The impact of transport on the environment is significant. It leads to the strengthening of the greenhouse effect, air and water pollution, noise pollution, soil erosion. On account of burning coal or fuel oil, trains are also the sources of emissions of greenhouse gases and toxic substances: carbon dioxide, methane, carbon monoxide, nitrogen oxides and oxides, sulfur dioxide and solid particles.

Freight and high-speed trains, city electric trains are the main sources of noise and vibration that negatively affect human health increasing anxiety and stress levels, reducing the number of insects and birds inhabiting near the railways area.

A significant part of the country's population lives in areas where the levels of air, soil and water pollution exceed the established standards. To assess the level of the impact of transport objects on the ecological state of nature, the following integral characteristics are used: absolute losses of the environment, expressed in specific units of measurement of the state of biocenoses (flora, fauna, people); compensatory capabilities of ecosystems, characterizing their renewability in a natural or artificial regime created by force; the danger of disturbing the natural balance, the occurrence of unexpected losses and local ecological shifts that may cause ecological risk and crisis situations in the surrounding natural environment; the level of environmental losses caused by the impact of transport facilities on the environment.

In 2021, 331 million hryvnias were earmarked for environmental protection measures in the UZ: 88 million hryvnias for the cleaning and prevention of contaminated soils, 66 million hryvnias for the detection of system violations and the prevention and elimination of these violations, 26 million for obtaining DSTU ISO 14001 certificates and 150 million for current works, removal of solid waste, etc.

The world imploys new technologies to clean pollution. None of the new technologies can be implemented quickly, and Ukrzaliznytsia is currently developing the implementation of modern technologies to improve Ukraine's environmental safety. The construction of an environmental safety system in Ukrzaliznytsia has a long way to go. In order to obtain a certificate of the environmental management system, it is necessary to create the Environmental Safety Department, the latter should develop an environmental safety system and ensure its implementation. The main goal of the functioning of the ecological security system of Ukraine should be the development of the conceptual foundations of the general strategy in the field of rational nature management and environmental protection, as well as their implementation in practice for the purpose of sustainable economic and social development of the state.

SECTION 7.
MODERN TECHNOLOGIES IN BUILDING

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URBAN DESIGN AND URBAN PLANNING

Urban design combines urban planning and architecture, and combines planning and architectural concepts of buildings – an artistic work for the formation of the city. Urban design and planning is based on architectural theory and differ among themselves although they are used in the same industry. City designers have more opportunities of building a city, they take care of people and try to make the city a pleasant place to live.The interaction of these two specialties of urban planning and urban design form the achievement of high quality of living. These specialties should work together to achieve the goal.

PROBLEMS

Not everything made by designers is coordinated by planners and architects. Urban design has goals that are difficult to achieve due to inadequate urban policies: poor networks, excessive zoning, and lack of accessibility. Also, the theoretical goals of urban design can be influenced by: laws (distribution of resources), racial and ethnic differences (neighborhood formation), cultural norms and traditions (affect practice), policy (determines the authority of the planning sphere).

Analysis of stakeholders and conflicts and needs according to policy, helps to balance urban design and expand its possibilities. Stakeholders are divided into three groups: regulators, manufacturers and users. The main movement of urban design is set by regulators from the point of view of government bodies, planning bodies, economic regulators, etc. The threat is political and economic considerations and decrees coming from "above" which are indicated by the political and bureaucratic dynamics of urban planning, and not according to social and economic needs.

Urban design is a systematic solution of trial and error problems in an interactive way. The project is transmitted by the designer interactively in architectural thinking. Unlike architects, who know everything about building materials and how to use them, urban planners are poorly informed and there is little literature that would allow them to create successful urban spaces. It is very difficult to understand and discover how urban design should interact with other forms of design and urban planning.

The relationship between urban design and other disciplines such as architecture, planning, policy, law, etc... Theoretical models proposed for the urban development design process often show that the decisions made during the development process are iterative in nature between planning, policy, urban design, architecture, etc., rather than a linear process. However, when it comes to practice, in various disciplines, things do not work as dynamically as suggested.

The lack of urban design at the regional, national and local levels hinders successful urban planning. Short-term planning without taking into account the long-term plan with buildings and space, excessive regulation and lack of design quality control can lead to poor urban design. The design of the city also faces the difficulty of financial implementation.

The difference between urban design, architectural design and urban planning

There are many examples of projects that change during the execution stage or are not completed, thus many efforts of urban designers are ignored. This calls discipline into question. The overlap between urban design and engineering is also a problem, so these two disciplines decided to separate in the 60s, when a clearer line between them appeared. Planning focused more on land use, and architectural design on buildings. A bridge that refers to urban spaces called the "third place" - a term for public meeting places. The decision to build a city appears in the conflict of these three specialties.

Urban design is based on the theory of urban planning and takes into account socio-political aspects and cannot deal with economic-political aspects. Most of the theories come from architectural design and more often architects work on urban design, the urban designer is concerned about the undeveloped area and takes into account the objects nearby. Unlike the creativity of architects, the urban

designer is more consistent and applies to human settlements.

Urban design situations are quite individual and require a lot of experience in different theories of urban design and architecture. Although urban design was created to bridge the gap between city planning, dreams and reality, it has many criticisms on its side and in many cases does not increase the likelihood of creating a quality urban product. It is not possible to implement urban design in many realities, but architects can set the movement for urban design, although it often concerns urban planners.

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GREEN ROOFS TECHNOLOGY AS A MEANS OF ENERGY EFFICIENCY

Energy savings in private buildings are very important for climates with mild winters and hot summers, where both thermal insulation and protection against overheating must be provided. Roof greenery is seen as the evolution of the roofs of grass-covered houses, which have been widely used in construction since ancient times in both hot and cold climates. Roof landscaping is not a new phenomenon, as the first memories of it date back to ancient Babylon. There is historical evidence of the cultivation of plants on the roofs in the Renaissance, one of these gardens has survived to this day in northern Italy. A green roof can be defined as a space or a certain area of the roof, which is formed with the help of special additional layers of soil and plants. In the cold climates of Iceland and Scandinavia, sod roofs have long helped to solve the problem of heat retention in buildings in the cold season, and in hot countries such as Tanzania, keep the air cool in homes.

Green roofs have many useful properties, including improving the aesthetics of the building, creating additional space for outdoor recreation, reducing CO2, capturing dust and other pollutants, accumulation and use of rainfall, improving microclimate conditions in the area through evaporation and absorption. solar radiation.

Due to the growth of green roof plantings and the creation of shading of the building envelope as a result, the heat inflows to the building in the summer period are significantly reduced and the costs for its cooling are reduced accordingly. No less significant contribution of green roofs to increase thermal insulation is in the winter.

Studies show how much the thermal behavior of buildings with uninsulated roofs improves after planting plants with a high leaf area index. The thermal insulation characteristics of such a roof become similar to the characteristics of a well-insulated roof. At the same time thermal loadings both on the roof surface, and heat receipt in the building are eliminated.

The expected benefits of planted roofs are further confirmed by Greek scientists who studied the temperature of the ceiling of adjacent office rooms during the summer over one of which was a traditional roof, and over the other - a roof planted with plants. It was found that the temperature of the green roof ceiling was 2°C lower than that of a conventional roof, despite the fact that the traditional roof was adequately insulated.

Modern alternative technologies involve the use of so-called "cold coatings" in conventional residential buildings, and studies show that this results in a large reduction in the cooling load. However, the benefits of such technologies in the winter are absent and this limits the geography and economic content of their use significantly. This confirms the advantages of green roofs once again, as their thermal insulation characteristics allow in winter to reduce heat loss of the building through the roof and, accordingly, the cost of heating it.

Over time, attitudes towards green roofs have changed: until the middle of the twentieth century, green spaces were used as a technical necessity for heating / air conditioning, and with the development of urbanization, traditional green spaces in large cities decreased, the ecological situation deteriorated, so there was a need to increase just on the roofs

And finally, we can highlight the great aesthetic value of green roofs, because the landscape of "air gardens" will decorate any city or town and bring real emotional satisfaction to their residents and guests.

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MATHEMATICAL MODELS FOR THE WASTE WATER TREATMENT FACILITIES

Mathematical modelling of wastewater treatment is an important task in the field of building and civil engineering in the terms of the aeration stations reconstruction. In practice, it is very essential to predict the efficiency of the wastewater treatment under different operating conditions of the treatment facilities. In regard to the mathematical models, required by specialists, the hydrodynamics of the flow, the geometric shape of the treatment facilities and the change in the operation regime should be taken into account.

The report examines a range of mathematical models developed to calculate the hydrodynamics of the flow and mass transfer in various facilities used at aeration stations. The developed mathematical models can be divided into two groups.

1. Models evaluating efficiency of bioreactors.
2. Models evaluating efficiency of the mechanical treatment facilities, where the dominant factors are the processes of hydrodynamics and mass transfer (vertical clarifiers, horizontal clarifiers, horizontal clarifiers with the inclined plates, horizontal clarifiers with a set of the vertical plates).

The following equations are used to describe the operation of the biological wastewater treatment facilities (first group):

1. Balance equations based on the Mono model in the oxygen regime in the bioreactor.
2. Two-dimensional equations of transport of substrate, activated sludge and oxygen in the biological treatment facilities.
3. Three-dimensional equations of transport of substrate, activated sludge and oxygen in the biological treatment facilities.
4. The equation for the velocity potential (Laplace's equation). These equations are used to calculate the hydrodynamics of the flow in bioreactors.

To solve problems of the second group, the following approaches are applied:

1. Model of the vortex flow of perfect fluid.
2. The Navier-Stokes equation
3. Potential flow model.
4. The mass transfer equation usage under the convective transport of the pollutant and turbulent diffusion.

Numerical integration of the modelling equations of the transfer of the activated sludge, substrate and oxygen is carried out using implicit difference splitting schemes. These schemes are clear dependencies for calculating the concentration of the required values.

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MODERN TECHNOLOGIES IN CONSTRUCTION

Technology is developing extremely rapidly in the world, which cannot but be said about construction as well. Modern technologies in construction are aimed at saving time, ease of construction, as well as reducing construction costs.

The Chinese construction company Broad Group, thanks to its specialists, built a residential

building in 28 hours and 45 minutes, which is very hard to believe, but it is true. The 10-story building is composed of parts - modules, the construction of which is stainless steel, in which the wiring is laid, the ventilation and glazing system is installed. The modules are designed so that they can be delivered to the work site without any problems. After transporting the elements, the house is assembled. As the company assures, hotels, hospitals and many other things can be built using this technology.

The Belgian company promotes the technology of building small houses with an area of 15 to 20 square meters. First of all, with the help of computer modeling, they create a house project and coordinate all points with the customer. After that, the components of the future construction are manufactured on a special machine with numerical software control. At the same time, geodetic works are being carried out on the territory of the future house, and the foundation is being poured. When the parts are ready, the building is assembled, which takes about three to five days. This option of building a house is great for suburban areas, gardens, etc.

Fixed formwork is a new technology in construction, started in the USA. This is a structure that has two interconnected walls, between them there is a space intended to be filled with concrete mortar. Thanks to such a system, reinforced concrete structures are formed. The advantage of this technology is a significant saving of costs for the delivery of construction materials to the object, which is about 50-55 percent compared to traditional materials. The unique complex design of the formwork allows you to save space in the body of the truck. Such a smart selection of materials allows you to reduce the carbon footprint of the building without sacrificing the strength and productivity of the work.

An idea from the Americans to eliminate the need to clean the roads in the winter season. The system consists of heating elements that are placed under the asphalt layer. The heating elements are connected via a network to a special installation or are controlled remotely. This technology ensures the melting of snow and ice.

Construction 3D printing has long been known to the whole world, but despite this, this construction technology still amazes us. China is considered to be the pioneer in this field. The printer can print not only houses, but also their parts, as well as restore them after destruction or other impacts. Construction of this type is a progressive technology with great potential. There are many implemented projects in the world with such a system. An important part of the equipment is not only the construction printer itself, but also the system of automatic mixing, preparation and supply of the mixture, which almost completely excludes the presence of human labor. The construction time of a small house takes about one week on average.

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PARAMETRIC DESIGN IN BUILDING AND ARCHITECTURE

Parametric architecture is a unique style in which such concepts as sculpture, mathematics, architecture are interconnected. Parametric design, unlike other styles, has a relationship with mathematics. Digital design must take into account the relationship between the building being built, the environment and human factors. This is a style aimed at creating a specific model that goes beyond simple forms and constructive solutions.When creating and designing parametric architecture, designers and engineers use new modern programs, they allow not only parametrically modeling, but also developing mathematical algorithms, logical conditions. That allows you to find the optimal solution to the problem in automatic mode, as well as expanding the possibilities for creating complex forms and structures.

This work is still associated with constructive, aesthetic, functional things. At the beginning, designers create algorithms for computer programs, then introduce variables necessary for the external environment. After that, the program takes into account the variables and following the algorithm creates the shape of the building. If you need the same building, but in a different place, with different conditions, then the variables are changed - and the program will recalculate the shape of the building.All this greatly facilitates the design process, since the main work is performed by the computer. Now the

buildings conceived by architects will adapt to the surrounding environment. The emergence of new materials allows you to create plastic structures that adapt to such parameters as: topography, temperature, wind, sun, time of year and day. Genetic algorithms are a natural selection system, the so-called stability test. The idea of this system is the exclusion in the special program of elements with poor bearing capacity and the subsequent crossing of the remaining structural elements with each other. The purpose of the above manipulations is to identify the most viable structures. An important aspect in this process is the mandatory presence of a mutation. Many argue that a computer cannot take into account and understand user needs and environmental requirements. In the future, parametric design will reach a level where the computer will design itself, based on predefined rules and tasks.. Parametric design is still at an early stage of development, but modern research shows that in the near future it will be implemented in real design.

Drawing sketches of plans will be inextricably linked with accurate three-dimensional visualization. Customers will be able to see the objects they ordered at an early stage in the design process. At the same time, in evolutionary architecture, the human factor will become the most important. Functional errors will not be possible. However, the most interesting is that the development of computer technology gives rise to new architectural styles. An innovative look at design determines its own place in history. This creates new opportunities in the fields of art, fashion, architecture and the construction industry. Digital design should always consider the relationship between an object, an environment, and a person. Some argue that the computer is not able to take into account user needs and environmental requirements. However, with good reason, it can be argued that in the future, parametric design will reach a level where the computer will begin to design itself based on certain rules. But each machine is controlled by a person who sets (right / wrong) parameters for a specific location, functions and the most important human factors associated with the design object. Thanks to parametric technologies, architects and engineers can process large amounts of data and on this basis determine the shape of a building so complex that it would be impossible to create it using traditional methods.

SECTION 8. HUMANITIES AS THE COMPONENT OF THE PROFESSIONAL TRAINING

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JOURNALISM DURING THE WAR

Journalism is a rather difficult and dangerous profession. And during the war, the level of danger only increases. But we, as future journalists, must understand our mission to the people. Everyone is afraid to remain in the unknown: what is happening, where it is happening and with whom it is happening. And we, in turn, have to reliably, accurately and promptly inform the entire population. But it is very difficult during the war. Therefore, I decided to study the issue of "Journalism during the war" in more detail and prepare a small instruction for journalists.

1. The work of journalists during the war is important, necessary and responsible.
2. During the war, journalists cannot continue to work in the same mode in which they worked in peacetime.
3. Some of the standards of journalism in the conditions of hostilities are dangerous for the life and health of both the journalists themselves and other people, and some may harm state security.
4. It is impossible to present a "balance of opinions", "another point of view" during the defense of the country against military aggression.
5. Journalists and the media should bear responsibility (moral and not only) not only for the reliability of the information being disseminated, but also for the possible consequences of its publication from the point of view of security.
6. The enemy constantly monitors the information field. 80% of intelligence is taken from open sources.

This should be constantly remembered and filtered through all public information, and even more so media materials.
7. Pursuit of information disclosure as soon as possible should be postponed until peacetime. If there is even a chance that the rapid dissemination of some news could be harmful from a security point of view, the release of such material should be delayed.
8. During the war, the main sources of information that can and should be made public without additional verification are the authorities, primarily the General Staff of the Armed Forces and the Ministry of Defense.
9. Journalists and editors will have to consult with law enforcement agencies and engage in self-censorship when preparing materials.
10. No plot or article is worth the life of its authors. A journalist is obliged to worry about his own safety and the safety of all members of his team. This point should be considered in more detail.

It is important to remember that an objective and sober assessment of risks; thorough preparation taking into account all possible threats, acquiring skills in providing first aid are not desirable, but mandatory conditions for the work of journalists and all members of film crews in the war zone. It is worth noting that classic trainings and advice on the security of journalistic activities may not be enough to ensure an acceptable level of security during the current full-scale military conflict in Ukraine.

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THE ROLE OF JOURNALISM IN WARTIME

Journalism plays an extremely important role in the formation of a conscious society. It is journalists who are the main means of delivering information that affects the development and renewal of people's views on today's political, spiritual and social life. Especially in our troubled times, journalists have a very important role in the world. Currently, a full-scale bloody war is going on in Ukraine with russia for our freedom and history. Ukrainians are a totally strong, rebellious and freedom-loving nation. I am sure that we will defeat this terrible totalitarian machine of injustice and cruelty. Journalists are enlightening to the whole world about the realities of the genocide being perpetrated against the Ukrainian people now. Thus, they participate in the information war, which is very important in our time. Journalists have shouted about the terrible events were taking place in Ukraine. The whole world has believed in our people and country, and that is why we are receiving much more help now that brings us closer to the victory.

Only journalists can give publicity to certain facts of war crimes and humanitarian disasters, attracting the attention of the international community. In time of war, journalists cannot continue to work in the same mode in which they worked in peacetime. So, now they have taken on a huge amount of work that is very important in information warfare. Also, during a war, journalists and the media must be responsibile not only for the truthfulness of the information being disseminated, but also for the possible consequences of its publication from the point of view of security. In addition, journalists and editors will have to consult with law enforcement agencies and engage in self-censorship when preparing materials. Subsequently, journalists have dramatically changed their working climate and increased their professionalism tremendously.

These days, full-time journalists who specialize in hot spots are in great danger to life and health in the conditions of hostilities. Journalists began to risk themselves even more for the sake of the truth, which should be brought to the world masses. Also, many journalists combine their work with the real war on the front line. An example of this is Yuriy Lelyavskyi, who was a professional journalist and

worked in many publications throughout his life, but was also on the front line and covered the realities of war. Moreover, the man was several times in the occupier's field. Unfortunately, this hero died defending our country. Yuriy is an example of what kind of journalists there are in Ukraine, who give their lives for freedom and truth.

We are fighting for our sovereignty and freedom. Now the Ukrainian language is a weapon, because it is the main sign of Ukrainian identity. Currently, journalists must create works exclusively in Ukrainian, so our society will once again restore our ethnic identity. Editors must learn to write correctly in the native language restoring Ukrainians' native language in their memory. Therefore, during the war, journalists also contribute to the education of the citizens of our country. In conclusion, journalism is the bright hope of truth, which must achieve a justice. People who have this specialty perform an amazing role in war. They are guides of truth and honesty in society.

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PROFESSIONAL TRAINING OF PHILOLOGISTS OF THE ENGLISH LANGUAGE

At the current stage of the development of Ukrainian higher education, and in particular philological education, the need for high-quality professional training of philologists of the English language is acute. Professional training is a mandatory final stage of training a future philologist. The professional training of English language philologists is based on the general and fundamental principles of the educational process and at the same time significantly supplements it with specific knowledge, in higher schools it is necessary to strengthen the requirements for graduates, taking into account the peculiarities of the future professional activity of English language philologists.

A level approach to the professional training of future philologists is not only a challenge of our time, but also a necessary innovation that must be introduced into the domestic training of future philologists in institutions of higher education in order to match their level of English language proficiency to the European level and to recognize their diplomas abroad [1].

The Pan-European Recommendations describe three global levels of foreign language proficiency, which correspond to the traditional three-level system consisting of basic (Starter, Elementary, Beginner), of the Intermediate and of the Advanced levels of foreign language proficiency.

Level A – this is a basic user. This level is divided into level A1 (Breakthrough) – Introductory level and level A2 (Waystage) – Medium / Survival.

Level B – this is the level of an Independent User. This level also has two components: Level B1 (Threshold) – Frontier level and B2 (Vantage) – Advanced level.

Level C – this level describes an advanced user (Proficient User) and includes level C1 (Effective Operational Proficiency) – Autonomous and C2 (Mastery) – Competent user [2, p. 22–23].

Professional training of future philologists of the English language is carried out according to the above-mentioned levels.

The career-oriented approach is a new paradigm of continuous professional education, aimed at ensuring students' motivation for personal and professional growth and career activity by analyzing the adequacy and perspective of the chosen professional trajectory in relation to the degree of realization of their abilities, intellectual and practical needs, and professional ambitions. Professional training of philologists on the basis of a career-oriented approach is a continuous process of forming their competitiveness, which reflects the positive dynamics of changes in the formation of professional

competence and career orientation. The positive dynamics of the formation and development of philologists' readiness for a career is achieved thanks to the use of scientifically based methods and the provision of appropriate psychological and pedagogical support for this process [3].

It is appropriate to note that the professional training of future philologists of the English language takes place under the influence of scientific and technical progress, dynamic changes in higher education with the introduction of innovative technologies, as well as the development of the labor market. Modern learning, teaching and assessment methods allow future English philologists to develop critical skills, data collection skills, presentation skills, communication skills and intercultural communication skills.

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COMMUNITY INTERPRETING FROM THE WAR IN UKRAINE PERSPECTIVE

Following the unprecedented large-scale Russian aggression in Ukraine, many Ukrainian citizens had to leave the country saving their lives. All in all, as of 3 October 2022, the number of Ukrainian refugees reached 7.7 million people. Most of them settled in Europe, with some applicants waiting for their US, Canadian, or UK visas. All these people seeking temporary protection are in need of interpretation services as they address migration authorities to get a residence permit, social services to get financial support, hospitals to get health care services, etc. All this has drastically increased the demand for professional, well-trained community interpreters with the working Ukrainian language.

The concept of community interpreting (CI) has been thoroughly studied by Pöchhacker, Pöllabauer, Hale, Garzone and other. In this research, we understand CI as a special type of interpreting, which occurs mostly in situations that involve a community, rather than an organization. The main principle is to give the voice for those who require some general social services, but do not speak the target language. Typical settings are healthcare, educational, social and judicial.

Previous studies in CI focused on a variety of settings in which CI takes place, which resulted in developing a classification, which includes: dialogue interpreting; liaison interpreting; court interpreting; medical (health care) interpreting; ad-hoc interpreting; interpreter-in-aid at disasters. While the initial CI research was based on the English language, currently the papers on CI involve a variety of target and source languages. *Bilingual Courtroom* by Susan Berk-Seligson, which is considered a fundamental study of legal interpreting research, offers a study based on the interaction between the interpreter, the legal system, and the Spanish-speaking witness from the analytical and ethnographic perspectives. *Visibility of Chinese ad hoc medical interpreters through text ownership: A case study* by Wei Zhang and Cui Xu focus on the Chinese language, etc. Although CI has also been the subject of study by some Ukrainian researchers (Osinska and others), the Ukrainian language has never been in the focus of such research.

Since the majority of Ukrainian refugees moved to Poland, Polish research in the field of CI is of special significance. In their paper *Public Service Interpreting and Translation in Poland* K. Kerremans, M. Štefková, B. Bossaert argue that according to Polish Law, a sworn interpreter is the only profession that is entitled to deal with the activity of bilingual communication in Poland. Their main responsibility is to provide translation for police, prosecution, courts, and administrative bodies both in written and spoken forms. Moreover, "a sworn translator is entitled to provide certified translations for other clients in the country and abroad". It is also worth mentioning that the idea of CI is rather new in Poland as well

as in Ukraine. Our Polish colleagues highlight that community interpreter is a profession that is still vague in Poland. However, recent events pushed the development of CI as a science. While regulations have failed to meet market demand, higher education institutions have embedded the growing demand for community interpreters into their curricula, offering a number of courses and programs to prepare candidates for this field.

Regretfully, one of the reasons stimulating the most recent development of CI is the huge number of Ukrainian refugees with the Ukrainian language becoming the key in all types of CI in Europe, which in a turn requires a more detailed attention on behalf of Ukrainian researchers themselves.

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SOME ISSUES ON ENGLISH KNOWLEDGE DEVELOPMENT IN UKRAINE

Taking into consideration the special status of English in the modern world it has been recognized as advisable to concentrate the efforts at the first stage – supporting and learning English, which is now the leader among the Internet languages (800 million users; 55% of the world's web pages are written in English). For almost a century English is the lingua franca of the scientific community, 80% of all scientific publications are issued in English. English is also the language of diplomacy, international congresses, conferences and sports events.

According to the information from International Educational Center Education First:

– English is the most powerful language in the world, and is becoming a basic skill for the entire global workforce;

– English is a key to a country's economic development – the better is country's English, the more money its people make;

– Ukraine is ranked #41 in the Worldwide English Proficiency Rating, # 24 out of 26 in Europe;

– Female population of Ukraine has better English knowledge than male.

According to *work.ua* surveys:

– 43% of Ukrainian university students are confident in their English knowledge, making them the most confident group overall;

– 75% of Ukrainian IT specialists know English on level higher than intermediate;

– English knowledge plays an important role in marine jobs, consulting and management.

According to TNS survey, 89% of the questioned studied English well, but only 18% of them know English on higher level.

2016 was proclaimed the Year of English in Ukraine. A campaign called "Ukraine Speaking" was created, with its main goals being improving the quality of English education in our country, increasing the number of summer language camps and making learning of English more popular.

It is obvious that knowledge of English is becoming a key competence in a globalized economy. It is necessary to develop mutual exchange of pupils and students between educational facilities of Ukraine and foreign states where English is the main language of communication. Ukrainian general education institutions should take active part in the EU program "E-Twinning Plus".

Ukraine should involve foreign professionals and native speakers in teaching English, simplify their entry, and staying in Ukraine.

The Government should introduce gradual certification for teachers of foreign languages in accordance with European recommendations on language education in order to determine their level of proficiency and appropriate wage differentiation.

It is also planned to establish TV and radio programs of learning English for different categories of people and demonstrate movies in English with Ukrainian subtitles.

Under the Decree, it is necessary to evaluate public servants' knowledge of English and organize language course for its study. Learning English should be included in training programs for public servants and local government officials.

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PROBLEMS OF INTERPRETATION

It seemed that the problem of communication remained in the past, with the advent of online translator sites. Time has shown that the problem has not gone away, and when people face difficulties, urgent interpretation is needed, which is one of the most difficult tasks for a specialist.

The problem of highlighting the principles of training in translation training has not been developed enough.

Having analyzed the learning goals, we highlight the leading principle - the communicative principle in a bilingual environment. This principle involves the use of a set of features in classes that allow us to consider the educational process communicative and as close as possible to real conditions. Due to this, it is possible to create specific conditions for interpretation with a list of the following components (the source of the message, the recipient and the translator), taking into account the motivation; personal meaning, when the student realizes the purpose of communication and sees its character, motivated for him; informativeness, when the content corresponds to the intellectual and age capabilities of the student and is interesting; novelty, which determines not only the content of texts for work, but also learning techniques, situations; problems that affect the formation of students' independence, the development of their logical, critical and creative thinking.

The principle of strength of assimilation, which occurs due to the system of exercises, is formulated on the basis of the analysis of learning goals. The strength of assimilation depends on the amount of repetition of the material. Each degree involves the use of the specified material or skill at a higher level.

It is necessary to implement the principle of professional orientation taking into account the professional interests of students for the effective preparation of philologists for professional activity. This principle is implemented in the selection of texts, situations for translation, topics, tasks. One more important principle is the principle of the dominant role of exercises. An important factor at the same time is the intensity of exercises, thanks to which translation skills and abilities are developed and formed.

The principle of independence is formed on the basis of the skills of organizing the independent work of philologists in the process of completing tasks and exercises, as well as in the process of acquiring additional professional knowledge.

One of the most important principles is the principle of considering the native language and culture. Attention is focused on overcoming the linguistic differences of three groups of linguistic phenomena (complete correspondents, partial and non-correspondents) through translation transformations.

The educational process in the context of synergistic, cognitive and competent approaches is based on the professional needs of translation students and the creation of pedagogical conditions for the development of professional consciousness, thinking and behavior.

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LANGUAGE IN THE HUMANITIES AND LANGUAGE IN SCIENCE

Since the field of modern Linguistics first emerged as a research discipline in the early part of the 20th century, it has made many significant and lasting contributions to our understanding of how

language works, illuminating the unique aspects of language as a behavior reserved to human beings. By applying scientific research methods to the analysis of language, linguists have exposed the critical components that enable us to better understand the most basic aspects of what it means to be human. The mission of linguistics, as defined by the Linguistic Society, includes three goals: Promote the systematic study of language, Mark the vital functions language performs in society, and Document the relevance of linguistic research to promoting interests.

Linguistic research is conducted in two intersecting approaches. In basic research, focused on describing languages and building theoretical models of language, linguists seek to understand how languages work as mental processes. In applied research, linguists focus attention on the influences language has in society, including its relevance to economic issues, social and political dialogue, education, and its cultural identification.

As with any science, theoretical work in linguistics creates the knowledge base and inspirational impetus for constructing successful applications. For example, curricula used to promote the learning of English by the growing numbers of immigrant children in schools is critically informed by applied linguistic research in how English is acquired as a second language. Language acquisition principles and practice, in turn, are informed by basic research linguists have conducted into the structure of English grammar, the patterns of its sound system in relation to its writing system, and historical study into how its vocabulary arose. All of this research makes its way into the instructional techniques and curriculum used by teachers of English language learners, most of whom will have had some specialized training in linguistics.

Linguistics research has played a pivotal role in contributing to the nation's well being, including by bringing direction and insight into the fields of information and computer science. The businesses that have driven the success of the computer industry in our country have benefitted enormously from the contribution of basic linguistic research. For example, the insight of linguistics into the systematic nature of language has informed the creation of computer languages. The increasing sophistication of computer languages in emulating human mental capabilities can be seen in applications such as machine translation and artificial intelligence programs.

Linguists contribute importantly to the interdisciplinary research teams creating these computer-based tools. Their contribution ranges from providing individual language descriptions, to describing the grammatical patterns that distinguish different languages, to shedding light into how the brain comprehends and produces language. The close association of linguistics with the information technology (IT) industry today is marked by the fact that IT is one of the principal employers of linguistically trained individuals.

Language forms an important base for a people's conception of themselves and it pervades cultural institutions in many aspects. Language asserts itself, for instance, in our legal and political systems, in the operation of mass media, in religious practice, and in the arts. Our appreciation for how language operates in culture generally is enhanced by the comparative study of cultures, the entrance point to those studies being accessed through language. With many languages and cultures teetering on the verge of extinction today, linguists play a critically important role in assuring the preservation of the full treasure of human knowledge through their documentation of endangered languages.

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LINGUISTIC REPRESENTATION OF CONCEPT “PUNISHMENT”

In this article we are examining the specific features of concept PUNISHMENT representation in terms of *punishment, penalty*. The term *punishment* means: "some pain or penalty warranted by law, inflicted on a person, for the commission of a crime, or for the omission of the performance of an act required by law, by the judgment and command of some lawful court" [4]. The term *punishment* is a derivative of the verb *to punish*: "to make someone suffer for a crime which he has committed" [2, 194].

In the term *punishment* definition we can see the term *penalty*, defined as:

1) "in criminal law, a money fine or forfeiture of property ordered by the judge after conviction for a crime" [3];
2) "punishment (such as fine) which is imposed if something is not done or if a law is not obeyed" [2, 175].

According to the above definitions, the legal concept "penalty" is narrower than concept "punishment", since it unites only property punishments ('fine', 'forfeiture of property'). However, the term *penalty* can also refer to other types of penalties ("a penalty of five years' imprisonment") [2, 15]. Thus, the correlation of the term *penalty* only with property sanctions can be considered as interpretative cognitive features of the concept PUNISHMENT.

In English language lexemes *punishment* and *penalty* have the following meanings respectively:

1) "causing (someone who has done something wrong or committed a crime) to suffer, by hurting them, forcing them to pay money, sending them to prison, etc." [1, 1147];
2) "a penalty is a punishment, or the usual punishment, for doing something that is against a law" [1, 1044];

Lexeme *punishment*, as opposed to lexeme *penalty*, implies punishment not only for illegal, but also for any other wrong acts. Both general language and terminological meanings of analyzed lexemes imply the suffering of the subject of punishment. At the same time, the general language meaning of the lexeme *punishment* suggests that the essence of any punishment is to cause suffering. According to the first of the above definitions of the term *punishment*, property punishments are not perceived as causing suffering ('pain or penalty'). Apparently, this is due to the fact that property losses are possible not only as punishment for crimes, but also in other life situations. All other penalties currently in use in Britain and the USA are only possible as such. Therefore, non-property ones are perceived as more severe and causing real suffering. However, the definition of the term *to punish* does not imply such a distinction. Therefore, the opposition of property punishments and other punishments can be considered an interpretative cognitive feature of the legal concept PUNISHMENT.

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THE RECONQUISTA: THE MERCANTILISM OF THE SPANISH ADVENTURERS OR THE REVIVAL OF THE CRUSADING MOVEMENT?

The relevance of this question lies in the fact that in our times many people think about the causes of wars, but not everyone can give an unequivocal answer. The Reconquista, on the other hand, makes it possible to consider the war from a religious point of view.

Throughout the history of mankind there have been many important and remarkable wars. Some armed conflicts went down in history because of the abundance of heroic battles, cunning moves by statesmen or the use of new weapons, while others because of the role played by the outcome of the war. The Reconquista also became notable. This is a whole chain of battles that have had a significant impact on modern history. It can be called the liberation war, which determined the fate of the Christians of the Iberian Peninsula.

On the one hand, the Reconquista, like the Crusades, is considered a holy war. By the beginning of the VII century, Muslim Arabs (Moors) captured almost all of Spain. Here they formed their own state, the Caliphate of Cordoba. The capital was the city of Córdoba. Initially, they coexisted peacefully with Christians, but over time, religious moderation was replaced by forced conversion of the population to Islam. The rights of Christians were limited, unlike the rights of Muslims. This was the reason for the deployment of hostilities against the Arabs, called the Reconquista. Crusades 1096-1270 under the

slogan "liberation of the Holy Sepulchre and the Holy Land" to the countries of the Middle East also had religious motives. So, the Reconquista can indeed be considered a revival of the crusading movement.

Over time, even in the era of the Crusades, those who saw the crusader movement as a benefit for themselves began to appear. People ruled by mercantilism also began to appear in the Reconquista. For example, feudal lords gained new titles, positions and lands, peasants gained plots of land and personal freedom, a lot of land was received by the Catholic Church, such spiritual and knightly orders as Sant'Iago, Alcantara, Calatrava also became large landowners. But their appearance was only a consequence of the unfolding of religious struggle.

So, from its beginning, the Reconquista was purely religious in nature, like the Crusades in its early years. Confirmation of this fact may be the fact that other European states helped Spain in the struggle against the Moors. Even the positions of knighthood have strengthened. It played a major role in the fight against Muslims. And already later, as is the case in every war, different social strata of people began to see in the Reconquista a certain benefit of their own.

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GENDER CHARACTERISTICS OF CONCEPT “MANAGEMENT” IN UKRAINIAN AND AMERICAN LINGUISTIC CULTURES

Concept "management" was imported into Ukrainian culture from the West business culture. Concept as an integral part of the worldview of a certain ethnic group is "culture clot" in the individual consciousness [1; 2], that in which form a culture comes into the mental world of the person. In addition, thanks to the concept a man immersed in the culture, and even can affect it.

We must recognize that the original concept "management" was developed by masculine culture, since all economic activity was concentrated around a person of "owner" – the dominant of male, that determines the management. Creative, intellectual and economic functions in employment and production activities are carried out by a man, while the role of woman was downplayed and erected to the role of the employee, deprived the voting rights in predicting and developing production activities. In Ukrainian and English linguistic cultures this situation lasted for quite a long period of historical time. Echoes of this situation remain in the proverbs: «Чоловік – усьому голова», «A woman's place is in the home", "Every man to his trade" (but not woman), "The eye of a master does more work than both his hands" (master, but not mistress).

Male model of building language and statement structure has a high degree of rigidity formulations and brief concise directions in business organization. Society is sympathetic to such verbal behavior of business entity. For example, in Ukraine for a long time the epithet "great business manager" was welcomed to and only now this role has ironic rethinking and gets a negative connotation as relapse of communist past of the country; while negative attitudes towards women as the head were dominated for a long time both in the Soviet and post-Soviet society. Interestingly, the conservative British society, initially disapproving management capabilities of Margaret Thatcher, saw in her style of behavior, first of all, masculinity and determined masculine structure of her management discourse but later changed its attitude towards this person in connection with the results of tightly held by her political and economic course. In general, the masculine expression in behavior (including language) of female-manager and female-head in English society is still not welcomed and negatively evaluated. One could say that modern West business and linguistic culture has predominantly unisex nature: manager is defined by his abilities and professionalism, not gender.

Structural model of female verbal behavior is very different from male's, first of all, by discourse and strategic parameters that determine the management communication. For female business discourse

is typical living reflection of actions and their consequences, imagery of evaluations, records of psychological type of the communication partner. It is clear, that female model of business communication is more emotional than men's, which manifests itself equally in ethnocultural terms – in the Ukrainians and the Americans. Ukrainian linguistic culture balances between acceptance and rejection of masculine behaviors in manufacturing and in business life. For Ukraine gradually growing trend towards the Western model of unisex relation to business activity is typical, but still cautious attitude of the male business community to the participation of women in the business process is still typical too, while female verbal behavior gradually smoothes masculine dominant and more implements in a civilized Ukrainian business, however, still has the features of masculinity in formulating business decisions. The American model of developing the concept "management", which clearly defined unisex relation to the managers roles, still distinguishes between male and female style of business communication, which, of course, can't help appearing in male and female managerial discourse.

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THE WORK OF JOURNALISTS IN TODAY'S REALITIES

In this article, I want to consider such questions as: how important is the work of journalists now and how it affects their lives.

Now, in the conditions of war, and for journalists in particular, it is hard for everyone to work, but this is extremely important, because it is journalists who now perform one of the most important functions: they spread the truth and give people the opportunity to follow all the news.

Words are weapons, and journalists are warriors on the information front. On the one hand, if it is military journalism, then it is very dangerous and there is a great risk of dying while filming your report. That is why a journalist must be prepared for various developments: capture, death, or psychological and physical injuries.

On the other hand, the war is now the main topic, and since it affects everyone, it flows into every field of journalism: show business tells about stars and their lives during the war, social journalism prepares reports on egg prices and the heating situation, fashion magazines publish interviews with doctors and tell the stories of Ukrainians who survived the war, such as ELLE. Chief editor Kateryna Popkova told about this in an interview with her. Therefore, regardless of one urgent topic, the work is not just enough, but too much: journalists work overtime and without days off, because they take on the responsibility and obligation to convey information to people. It is they who, in the conditions of the propaganda war, play the role of knights who fight against evil and bring the truth to the world.

Another aspect of work now is the fight against fakes. All of us have repeatedly come across news in Telegram channels, which are lies and all for the purpose of causing people to panic. Journalists have to fight with this as well: refute fakes and be careful and check the information they cover in their publications. Regardless of the large volume of work, the information must be verified and comply with the rules of ethics Ukraine's journalist.

Journalists are now fighting not only for the right to work, but also for the right to convey the truth to Ukrainians. For many, it seems like a promising job now, but everyone, who is engaged in journalism now, is stepping over themselves and their needs. They are full-fledged soldiers of this war, because it is thanks to them that many people can save their lives and the lives of their loved ones.

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AUDIOVISUAL TRANSLATION CHALLENGES

At the current development stage of society, scientific and technical thought, the level of interest in translation and various issues related to it is growing. However, it should be noted that not all aspects of translation as a science are equally researched. Audiovisual translation (AVT) should be referred to such little-studied aspects. The purpose of scientific research is to analyze and identify the characteristic features of audiovisual translation, its types and factors and characteristics of the main challenging issues.

Audiovisual translation is the translation of a multimedia text into another language. The main ways of constructing the content of an audiovisual text are language, drawing, music, color and perspective, and the main forms of AVT are subtitling and dubbing [1].

At the turn of the 20th century, written language in the form of subtitles was included in the semiotics of cinema. Aline Remael considers the translation of silent film titles to be the earliest form of AVT, and the need for such translation increased significantly with the appearance of sound cinema at the beginning of the 20th century [3, 5]. Since then, AVT has gradually gained popularity all over the world.

There are four main types of AVT: dubbing, subtitling, synchronization, and voice-over translation and each has its own challenges. Dubbing is most appropriate for countries whose population has no interest in learning foreign languages. At the same time, subtitling is used in countries where the population is interested in such a study, as they use several languages in everyday life. Voice-over translation is used mainly in those countries that cannot afford to dub a large number of films, as it requires significant capital investments [4, p. 121].

The task of the translator of an audiovisual work is to reproduce the original text in the target language while preserving the cinematic illusion. The translation strategy depends a lot on the specialist's linguistic and cultural knowledge and the skills in analyzing audiovisual texts. Among the factors that influence the choice of a translation strategy in AVT are the following:

– the need for reduction in subtitling, labial synchronization during dubbing;
– the type of audiovisual text (feature film, TV series, documentary, TV news, etc.);
– the target audience (age - children, adults; viewers with in-depth knowledge in the field, without special knowledge, general audience, with limited knowledge);
– the production format chosen for distribution – television, cinemas, DVD;
– the specifics of the genre (specific requirements of the content of the program itself), for example, comedy, drama, musical, etc. [2].

Audiovisual translation in general can be interpreted as localization or cultural adaptation of film translation and related types of translation. For example, when the title of the feature film *Вій* is localized, it is translated as *Viy* or *Spirit of Evil* (*Вій, або Злий дух*). The title of the feature film *Морозко* is translated as *Jack Frost (Дух зими* from English folklore). French translators also have an interesting approach to localization. Often, they take the title of an English film and retitle it again in English. For example, *Судна ніч* (the original name of *The Purge*) turned into *American Nightmare* (*Американський кошмар*).

Therefore, translation activity is of great importance in the field of mass communication, namely in the field of AVT. The research makes it possible to assert that this type of translation, perhaps understudied in some respects, is effective and successful today. Each type of audiovisual translation has

its challenges that should be considered and overcome.

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JOURNALISM IN DEMOCRATIC AND TOTALITARIAN SYSTEM

Journalism is not just an activity of collecting and presenting information. Journalism is a tool that provides comprehensive and objective information to society about social reality. Journalism protects interests of public and is based on the principles of ethics and respect for human rights. One of the main problematic situations in the practical work of journalists remains the issue of relations between the press and the government, politics. In a democratic system, journalism can be guided by its own rules, build its own policy, while in a totalitarian system, the government uses journalism as a tool of propaganda and influence on society. That is, depending on the type of system, the perspective of journalism also changes. In a democratic system, journalism works for the interests of society, and in a totalitarian system, for the interests of the government.

Using the example of the USSR, we will consider how journalism developed in a totalitarian system. It is important that Soviet journalism significantly contributed to the formation of the cult of Stalin's personality. The mass media of the times of the cult of the personality and the period of stagnation are characterized by political intolerance, the preaching of a single government, and an attempt to impose "monotheism" on everyone. The constant delay in informing the population, the incompleteness and distortion of information, the silencing of the peculiarities of people's lives abroad are all tools of Soviet journalism. The Soviet authorities at the state level used propaganda as a means of instilling communist ideology, controlling society, and realizing their own goals. Today, this is defined as "brainwashing", "zombification", "targeted disinformation". At the same time as propaganda, censorship was also powerful. The mass media were used in an anti-religious campaign to aggressively spread atheism.

Even in these difficult conditions, on the pages of newspapers and magazines, on the television and radio, courageous, principled speeches that awakened thought and conscience appeared. Mass media, literature in general prepared society for drastic changes. Such a concept as «glasnost/publicity» appeared, it is a kind of transitional stage between the period of silent consensus and freedom of speech. This was precisely one of the factors of democratization.

Returning to the present, we can consider the peculiarities and trends of the development of journalism in a democratic system. Print media play an important role in providing quality journalism in the UK, providing public access to a wide range of beliefs and views and supporting democratic citizen engagement. Local and regional press, in particular, have a significant social weight in covering local problems and needs, uniting communities, as well as ensuring accountability of local authorities and other public service providers. In general, the position of mass media in Great Britain is related to the specifics of legislation in the country. Freedom of the press is considered as much an individual right as the right to breathe.

Now in Ukraine we can observe how journalism works during the war. Even in a democratic state there is some censorship. Journalists cannot cover information that could harm the military, civilians, or

the territorial integrity of the state. What should not be done by the mass media during the war: name the coordinates, names of military facilities, the number of personnel, disclose information about planned military operations, publish information about the deployment or movement of their troops. This is just a small list of what should not be made public. The inviolability of private life and the dignity of the dead should always be respected. It is also necessary to avoid unjustified large-scale showing of serious injuries. So, in conclusion, we can say that permissiveness ends where safety begins.

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LABOR ACTIVITY OF THE POPULATION OF THE WESTERN FOREST IN FOLK PROSE

The formation of the regional specificity of the territory of Western Polissia is determined by the character, level of economic development, culture, lifestyle, production of activity products, spiritual culture, family and calendar rituals of the population. The texts of the oldest traditional recipes of the population of Western Polissia and the western part of Volhynia are finds of ancient culture and everyday life not only for ethnographers, but also for scientists of other fields - historians, folklorists, culturologists, linguists, etc. Samples of folk prose, which describe the calendar and temple holidays of Western Polissia, are full of motives of folk festive Christmas, Easter, summer and autumn traditions, customs that contain the spiritual culture and worldview of the Polish people and Volhynia. Since the community, church life, the church in the city or in the village was the basis of people's social life, the established customary norms and traditions of people's communication have always been church events, prayer services, temple and throne holidays.

The study of the genesis of Polish houses, interiors, the origin and development of the oldest types of folk handicrafts, ways and methods of farming and caring for livestock provides an opportunity to trace the oldest traditions, reveals the historical background, the basis of material culture and labor activity of the population of Western Polissia and the western part of Volyn. The rite of creation of a new family in the territory of Western Polissia and the western part of Volyn was accompanied by a large number of folk customs and rites, accompanied by towels, images, flowers, cowhides, various types of ritual wedding breads and cookies.

The wedding ceremony of the population of Western Polissia and the western part of Volyn has been preserved to this day. The main stages of the wedding were: matchmaking, engagement, invitations, baking a loaf of bread, the procession of the wedding train from the groom to the bride, the wedding, the wedding itself, distribution of the bread among the guests. Many children were born in the territory of Western Polissia, they gave birth to all children, because they believed that children are a gift from God. Pregnancy was not terminated, because it was considered a great sin. Children were always baptized in the church. Even in those times when it was forbidden to baptize children, poleschuks and Volhynians baptized children secretly. The birth of a child was considered a norm, a welcome gift of fate. Folk prose folklore texts once again convince us that in the territory of Western Polissia and the western part of Volyn there are rich natural opportunities for the development of certain economic, cultural and ethnic

regional features, inherent only to the population of Western Polissia.

On the basis of samples of folk prose, it can be concluded that a certain regional type of culture was formed on the territory of Western Polissia over the centuries, which consisted of a large number of elements, forming a multi-variable, multi-layered hierarchical system of material and spiritual heritage.

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POLONIZMY WE WSPÓŁCZESNYCH UKRAIŃSKICH MEDIACH

Proces zapożyczania jednostek leksykalnych jest charakterystyczny dla wszystkich języków świata. Obecnie język ukraiński zapożycza najwięcej słownictwa z języka angielskiego albo z języka polskiego.

Polonizmy przenikają w codzienną mowę i w media masowe. Polonizmy pojawiają się nie tylko w tekstach artykułów, ale także w tytułach. Na przykład leksema атракція, który w słowniku ma kilka znaczeń: 1. атракція - przyciąganie jednej osoby do drugiej. 2. Coś niezwykłego, co przyciąga uwagę; widowisko, zabawa. Na stronach „Wiadomości Wołyńskie" słowo to używane jest w drugim znaczeniu: «Відреставровані мости, нові лавки та сучасна атракція: як змінювались парки та сквери Луцька». [1] Atrakcją dziennikarze nazywają park, skwer, fontannę z muzyką rozrywkową. [1]

Innym słowem polonistycznym, które czasami pojawia się w „Wiadomościach Wołyńskich", jest опінія. W akademickim słowniku ono wyjaśnione jako „głośna opinia". W codziennym użyciu słowo to nabrało szerszego znaczenia i jest używane jako „opinia", a w źródłach informacyjnych zachowało swoją szerszą interpretację: «Ця опінія з'явилася в обігу ще рано-вранці в суботу, щойно світ дізнався про поразку путчистів» [1].

Kolejny polonizm używany w ukraińskich środkach masowego przekazu to штука . Ma kilka znaczeń: 1. Odrębny przedmiot od liczby jednorodnych, który jest traktowany jako jednostka rozliczeniowa. 2. Część czegoś, która sama w sobie jest odrębną całością, przedmiotem; kawałek. 3. Niedokończona rolka materiału o określonej długości, która pochodzi z fabryki na sprzedaż. 4. Każda rzecz, zjawisko, okoliczność. 5. Żart, sztuczka. 6. Sztuka. Najczęściej używaną z podanych opcji jest czwarta. I choć jest to wersja dla mowy potocznej, jednakże jest używana nawet w artykułach publicystycznych: «Контроль – штука крихка»: чому через міграційну кризу до Луцька з'їхалися силовики, посли та міністри».

Czasami polonizmy są używane jako kolokwializmy. Na przykład polski хлоп w ukraińskim tytule nabiera nowego znaczenia: prosty wieśniak: «Як сільський хлоп у фюрери подався».

Polonizm огидний ma dwa znaczenia: szerzej – obrzydliwy – wywołujący uczucie wstrętu. Węższy - podły. [2] W artykułach częściej używa się słówo o pierwszym znaczeniu: огидний запах, огидний сморід, огидний акт варварства [1].

Polonizm слушно jest dość często używany w środkach masowego przekazu. Ma dwa znaczenia: 1. Co jest odpowiednie, najbardziej akceptowalne, wygodne, korzystne dla kogoś w danych okolicznościach, w tym przypadku. 2. Co odpowiada prawdzie; poprawny, sprawiedliwy. Najczęściej słowo to jest używane w drugim znaczeniu: слушно запитує, як слушно зауважили, слушно говорить. [1]

Więc współczesne artykuły charakteryzują się użyciem polonizmów w szerszym lub węższym znaczeniu. Dziennikarze używają jednych częściej, innych rzadziej.

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A FUTURE OF JOURNALISM AFTER THE WAR

The war will change journalism, and the quasi-media, which only pretends to be mass media, will cease to exist. The new generation of journalists doubts that objectivity is even desirable in a hyper-engaged digital world.

Objectivity has not always been a journalistic ideal. The word "objectivity" hides the most dangerous delusion that journalists once believed. Very often it is mistakenly confused with independence and impartiality. In addition, this stereotype is very persistent, because it seems very simple and accessible. It's dangerous because it's the biggest lie you've ever told in public. In addition, it is an illusion, because objectivity does not exist.

At the heart of every news or report is necessarily a point of view based on ontological (what is real?), epistemological (what is truth?), methodological (how do we know this?) and moral (why does it matter?) assumptions. According to Gelauf's terminology, news has a position. Under the influence of global changes in society and the rapid popularity of social networks, people of the 21st century have developed clip thinking. Nowadays, almost anyone who has access to the Internet can be a primary source of information (if we are talking about future decades, then everyone). And therefore, the truthfulness and credibility of the news will be called into question. It is worth adding that the authors of the book "The New Digital World" make their own prophecies: *"Mainstream media will mostly collect, store and verify news. They will become a kind of truth filter that will carefully study all information and select what is worth believing, what is worth reading and analyzing, and what is not."*

Today, there is a myth that the journalism of the future is connected exclusively to an online product. If we analyze the global trends in the development of the newspaper industry over the past years, we can see that in highly developed countries, for example, in the USA, the printed press is experiencing a real crisis. However, in developing countries, the income of periodicals, on the contrary, is growing. Print publications will not disappear from the market, if only because they will become a sharp contrast in the chaotic flow of information on the Internet. When an overabundance of fakes flood the social networks and online media, despite the fact checking, newspapers will be trusted more. After all, they will be the embodiment of commented, analytical and verified materials. Journalists of the future will have to put away their notebooks, pens and even recorders. Innovation will dictate new rules, and the most important characteristics that a future representative of this profession should have are the ability to learn quickly, adapt to modern trends, and be able to seek and apply the modern privileges of the digital society according to the needs of their audience.

I would like to add that you should not worry in advance, because the changes that await us in the future will definitely bring journalism to its best times.

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MASS MEDIA AS A TOOL OF INFORMATION INFLUENCE ON SOCIETY

One of the most important elements of political struggle is information warfare using various tactics. War in our usual sense ceases to be the only means of gaining and spreading influence. We observe an active influence on consciousness through the mass media. Media virtualization contributes to the activation of the spread of influence in modern society. The relevance of this problem in today's world is difficult to overestimate.

The problem of the importance, place of mass media and communication in the information war in modern political society is always relevant. It has an interdisciplinary character and does not remain without the attention of political scientists, journalists, psychologists, sociologists, including such domestic scientists as O. Senchenko, L. Yevdochenko, P. Shpyha, I. Zavadskyi, etc. Such foreign scientists as S. Morgan, A. Klimburg, M. Liebiki, S. Thompson and others also devoted their attention to this problem. Given that Russia's military and information aggression against Ukraine is currently ongoing, the study of media influence (both from within and outside) on public opinion, the mood among various categories of citizens, ethnic communities, their manifestations and expression of Will regarding political transformations in the country is important and relevant. The study of the role of mass media in this process and the attitude of the population to the media is one of the main indicators for studying, analysing the content of the information component, assessing public, electoral moods, media literacy, as well as further development of state information policy, ways to resist information weapons, manipulative information, etc.

It should be noted that modern media have a huge impact on a person's consciousness and actions. On the one hand, the media publish information that arouses the interest of the audience. On the other hand, they broadcast various value attitudes, stereotypes, and form public opinion, being the main means of changing mass consciousness. The influence on people's consciousness occurs not during direct contact, but through mass media, which create the illusion of objective presentation of information and therefore have a high degree of persuasiveness [1]. It is known that "information warfare is actions aimed at achieving information superiority, supporting a national military strategy by acting on information and information systems of the enemy while simultaneously ensuring the security and protection of the information owner" [2]. Information warfare is now the most promising way to"continue politics by other means." It is legitimate to interpret information warfare as a component of information warfare.

As a result of scientific and technological progress in the field of information and communication technologies, the development of mass communication media, unprecedented opportunities have been created for aggressive information influence on the population of other states in order to impose the principles of the structure and life of society, destroy national spiritual values, reduce the economic and military potential of states by influencing individual, group and mass consciousness. Due to the high intensity of disputes, information wars are difficult to manage and consciously regulate and therefore act as a double-edged weapon for the warring parties. Achieving goals in such ways increases political confrontation, reduces the possibility of spreading a consensus culture, and undermines stability in society. Thanks to new technical means, today it is possible to reach millions of people simultaneously with propaganda. Mass media can act as a tool for waging information warfare and as a non-state entity for ensuring the protection of the information space.

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TEACHING ENGLISH FOR ARCHITECTS AND URBAN PLANNERS IN UKRAINIAN UNIVERSITIES

O.M. Beketov National University of Urban Economy in Kharkiv is Ukraine's leading higher educational establishment training highly qualified staff in the area of architecture and urban development. Furthermore, the University is engaged in international scientific research in the area of architecture and urban planning. The unprecedented russian aggression in Ukraine, forced many researchers from Kharkiv to escape their native city and relocate to Europe, which makes the issue of professional English for architecture training even more pressing.

For teaching English in universities that develop specialists in the area of architecture, the concept of English for specific purposes is used. In his article Teaching English for Specific Purposes (ESP) Lorenzo Fiorito claims that the ESP is integrated into their professional needs, not being a separate topic from them. This means that students are able to use what they learn in the ESP classroom right away in their work and studies. The ESP approach improves the relevancy of what students learn and allows them to use the English they know to learn even more English, since their interest in their field will motivate them to engage with speakers and texts.

Therefore, first and foremost, for this approach, professional documentation, textbooks and manuals, separate terminological dictionaries intended for students of non-linguistic universities to study English must be available and accessible. Teachers should prepare specific material that would broaden students' knowledge of both the English language and the architectural field. For architects, for example, texts about the history of architecture, most recent inventions, advanced technologies, unique facilities around the world, etc.

Moats, Wong-Filmore, and Snow highlight that the ESP in architectural universities requires the use of relatively different approaches which differ from the extensively used methods of teaching the language in four skills: listening, writing, reading, speaking, and sometimes they include the grammar and lexical composition of the language. As for developing speaking skills, small debates on controversial topics in architecture can be used. Listening and reading should be covered by texts about the history of architecture with the following understanding checking tasks. For writing students can make some reports and write design descriptions and specifications.

The English teachers do not necessarily need to be architects, however, they should freely operate with frequently used English words in the area of architecture and urban development. Dutro and Mooran also argue that architecture students need to learn certain vocabularies and find them to be a great help in their learning process especially in terms of gaining more opportunities for acquiring the relevant competences. During the educational process various games, flashcards, puzzles, etc. can be used. Fidyati in Improving Architecture Students English Vocabulary through the Use of Architectural Drawings Focuses on using architectural drawings as one of the most effective tools for widening the architect's vocabulary. The use of architectural illustrations can serve as a visual assistant for them to capture unknown words in their memory. It is also useful and necessary to learn new words without translating them into their native language, but to study their definitions in a foreign language.

To sum it up, vast damages caused to Ukraine by Russian aggression raise the need for a large scale reconstruction of Ukrainian cities, towns and villages with a broad international support and aid, which, in a turn, requires high level of professional English competence in graduates specializing in architecture and urban planning.

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MODERN TOOLS (ICT) FOR LEARNING ENGLISH

The progressive development of international contacts and ties in education, politics, economy, culture and other fields determines the consistent orientation of modern methods of learning foreign languages to the real conditions of communication. The position of English in the world as the leading means of international communication is associated with the development of high technologies.

At present, the need to learn English with a help of informational and communicational technologies has become generally accepted. ICT makes English language environment flexible, innovative. The application of computer technologies in language learning instructions provides a student-centered learning environment and gives the opportunity to be more creative and highly motivated. ICT tools provide learners to take responsibility for their own learning. Furthermore, ICT provides authentic situations and real life learning environment.

With the rapid progress in technology and the advancement in learning systems, it is now embraced by the masses. The introduction of computers was the basis of this revolution and with time, as we get hooked to smart phones, tablets; these devices now have an important place in the classrooms for learning. Books are gradually getting replaced by electronic educational materials like optical discs or pen drives. Knowledge can also be shared via the Internet, which is accessible 24/7, anywhere, anytime.

Internet is the most useful technology of modern times which helps us not only in our daily lives but also in professional lives. For educational purposes, it is widely used to gather information and to do research or add to the knowledge of various subjects. The Internet has become a major tool for effective teaching as well as a learning tool. The learning process becomes interesting and diverse with the use of tutorial videos and notes. Teachers can teach with the use of animation, PowerPoint slides, and images to capture the students' attention.

YouTube videos can be used in a language classroom for various aspects of English to enhance vocabulary, accents, pronunciations, voice modulation, and many more. The real advantage of using YouTube in teaching English is that it offers authentic examples of everyday English used by everyday people.

The use of mobile phones as a learning tool has a wide variety of applications. It helps to conduct online classes anywhere anytime. It is easy to carry and comfortable to manage.

Blogging has become increasingly popular, especially in the realm of education as they are a great way to share information and generate discussion. Instead of textbooks and traditional methods, many educators prefer using these new techniques to help teach students and gain experience with various forms of social media. Setting up a course blog doesn't have to be complicated. Educators can use a free platform such as BlogSpot, Word press, or Tumbler to host the blog.

To sum up, the modern technology provides interaction between teachers and learners, provides comprehensible input and output, helps learners to develop thinking skills, makes learning and teaching becomes more student-centered, promotes learners' autonomy and helps them feel more confident, and increases learners' motivation to effectively learn a foreign language.

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COMMUNICATING ACROSS CULTURES

My report is about the features of intercultural communication. Our typical heuristic, understandably, is a culture. We read a book, an article, or a blog post about cultural differences. We learn about how Germans, Chinese or Italians are different from us – how they think or act or even express their emotions in a different way – and we feel like we've done our homework. We feel prepared.

The problem comes from the questions we ask ourselves. The obvious one is "What culture does this person come from?" It is not irrelevant because we are all individuals, and there is no guarantee that two people belonging to the same culture are to respond in the same way exactly. National cultural differences do matter.

Communicating across cultures is challenging. Each culture has set rules that its members take for granted. Few of us are aware of our own cultural biases because cultural imprinting began at a very early age. And while some of a culture's knowledge, rules, beliefs, values, phobias, and anxieties are taught explicitly, most of the information is absorbed subconsciously.

There are some types of cultures in the world. Among them are High-Context and Low-Context. All international communication is influenced by cultural differences. Even the choice of communication medium can have cultural overtones. The determining factor may not be the degree of industrialization, but rather whether the country falls into a high-context or low-context culture.

High-context cultures (Mediterranean, Slavic, Central European, Latin American, African, Arab, Asian, American-Indian) leave much of the message unspecified, to be understood through context, nonverbal cues, and between-the-lines interpretation of what is actually said. In contrast, low-context cultures (most Germanic and English-speaking countries) expect messages to be explicit and specific.

Sequential and Synchronic are another cultures. Some cultures think of time sequentially, as a linear commodity to "spend," "save," or "waste." Other cultures view time synchronically, as a constant flow to be experienced in the moment, and as a force that cannot be contained or controlled.

In synchronic cultures (including South America, southern Europe and Asia) the flow of time is viewed as a sort of circle, with the past, present, and future all interrelated.

Orientation to the past, present, and future is another aspect of time in which cultures differ. Americans believe that the individual can influence the future by personal effort, but since there are too many variables in the distant future, we favor a short-term view. Synchronistic cultures' context is to understand the present and prepare for the future.

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DIGITALIZATION OF JOURNALISM

The era of the internet is certainly a unique stage in the development of mankind, as it radically changes the system of information relations in all spheres of life, according to the scale can only be compared with the use of electricity [2 p.1].

Today, digitalization refers to journalism that is undergoing serious, controversial, and not always relevant changes. Modern media tend to digitalization, multimedia, convergence, they develop new formats and types of content, conciseness and infotainment, and change approaches in interaction with the audience when the media consumer becomes central. [1].

Digitalization is one of the defining trends in the development of human civilization, which forms a more inclusive society. It was the Covid-19 pandemic and the war between Ukraine and the Russian

Federation that proved the importance and necessity of digital technologies for the well-being of the population, the development of economies and the delivery of up-to-date, truthful and useful information. The consequence of digitalization of all spheres of society is a change in the priority of qualification of the working-age population. There was a profession such as SMM. It combines several professions such as marketing, copywriting, web design and journalism. As for the purely related features, with the use of digital technologies in journalism, it is necessary to point out the decreasing volume of texts and the narrowing of genre diversity when presenting them to readers on the Internet [2 p.85].

There are many digital tools that every modern journalist should have for verifying information and creating content. Let's start with social networks, because these are not only platforms for distributing content, but also an opportunity to diversify this content-to find new forms, thereby impressing the reader with something interesting and not banal. Nowadays, people have become lazy," consuming " content very passively. They stopped liking, distributing, and even more so writing comments. Journalists are faced with a task - a person must finish reading the message and view the video or photo. To do this, you need to create interesting, short and maximally accessible content, the format of which will provoke people to react. These can be interactive formats, Tests, and surveys. For example, let's take how to create native ads. We create a message with graphics and large letters of the question, people go to the comments and write their opinion, start a discussion about the topic, respectively, the post collects a large number of comments and "flies" into recommendations. If this issue of society is very painful, then you can create a mini-project where people's stories will be interesting.

At the moment, there are many useful and interesting additions to the tools for high-quality content that help create a beautiful visual, and facilitate the work of a journalist, which makes it faster to publish information. Here is a small selection of free online resources for creating the best content: Video Creation • Facebook workshop • Boomerang • Hyperlapse • Stayfilm • VidLab photo processing and editing • Juxtaposer • Layout • Snapseed • Lightroom • TouchRetouch • Facetune graphic design and infographics • Piktochart • Pixlr • Adobe Spark Post • Canva • emojis content royalty-free (no royalties) images • Burst • Pexels • Unsplash [3 p.28].

Thus, we can conclude that digitalization is the future! It brings a lot of new and interesting things to journalism by learning and practicing, we will achieve great success and progress. But in any case, the mission of a journalist will not change – he must work for society, bringing the necessary information to people that allows us to make our lives better [2 p.87].

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INTERTEXTUALITY AS A CODE: PHENOMENON AND SPECIFICITY

General intertextuality is the most common phenomenon in artistic texts nowadays. As a term, it indicates that all texts are in some way related to each other. In this way, author wants to convey to readers specific thoughts that appear in various texts and with the help of special “coding” hides the meaning between the lines. Sometimes these references are made deliberately and depend on reader`s experience with previous author`s works.

This term was first used by Julia Kristeva, her theory says there is a kind of dialog between works of the same author, especially the echoing of phrases and concepts. Using “coding” writer conducts a conversation between his texts and in most cases uses quotes or terms that are mentioned in past works. Generally, the quote conveys an emotional and meaningful load, it serves as the basis for the characters and time concept [2].

In literary studies intertextuality is traditionally considered in two aspect: as literary itself and as a method of text reading, although most researches do not distinguish these both concepts. To highlight the intertextual material, it is referred to classification of intertextual connections by J. Gennet, who proposed a five-step classification of types of intertextual interaction in his book “Palimpsests: Literature of the second degree”. The first type called intertextuality itself involves co-presence of two or more previously written texts in one work in the form of quotation, allusion etc. Such involvement, according to S. Zhigun`s opinion, performs several game functions: “intertextuality as a trap”, “intertextuality as an alternative”, “intertextuality as a code”, “intertextuality as riddle”, “intertextuality as a key” [1].

Fundamental component is a reader`s readiness to accept intertextual game. There is always specific background that can be felt only after diving into the atmosphere created by writer in other works. The depth and breadth of intertextuality is more than just dry text, it is also about heroes’ mindsets, time when actions happen and place where situation occurs.

Considering phenomenon of intertextual interaction, Van Zoonen L. established that “…such interpretations are referred to as ‘reading’, and just like ‘text’ can refer to a much wider variety of things than written words alone, ‘reading’ similarly involves watching and listening, and - when it comes to material artefacts - feeling and sensing as well. The words ‘text’ and ‘reader’ signify the origins of these theories in literary studies, but have been taken up to describe a wide array of interpretative processes and actors” [3].

To sum up, if there is a text, there is a reader, there are other author’s works and references within it. Paradoxically intertextuality is not only a product of artists, writers and media producers, but also of a particular process of interpretation and reading.

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GERMAN LANGUAGE SECTION

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WAS BEDEUTET DIE NEUE ABGASNORM EURO 7?

Die EU-Kommission legt eine neue Abgasnorm für Straßenfahrzeuge vor. Deren Schadstoff-Emissionen sollen stärker begrenzt werden. Was regelt die Norm Euro 7, für welche Fahrzeuge gilt sie und welche Grenzwerte werden strenger? Fragen und Antworten zu den neuen Anforderungen. Nach Euro 6 kommt Euro 7: In der zweiten Hälfte des Jahrzehnts will die EU die Abgaslimits bei PKW und LKW noch einmal straffer ziehen. Erstmals sollen dann auch Bremsstaub und Reifenabrieb eine Rolle spielen, wie der nun vorgelegte Entwurf zeigt. Und auch E-Autos müssen dann neue Regeln einhalten.

Die Einteilung in Schadstoffklassen wurde Anfang der 1990er-Jahre in der EU eingeführt, um den Abgasausstoß von PKW, Nutzfahrzeugen, Motorrädern und LKW schrittweise zu reduzieren und so die Luftqualität zu verbessern. Es startete mit der Norm Euro 1, seit 2014 ist Euro 6 in Kraft. Parallel zu den PKW-Normen gab es bislang Nutzfahrzeug-Regularien, die meist mit der römischen Ziffer

bezeichnet wurden, zuletzt also als Euro VI. Euro 7 führt beide Spielarten nun in einer Norm zusammen.

Reaktion auf E-Auto-Boom EU plant verschärfte Abgasnorm Euro 7. Die Euro-7-Norm wird in angepassten Varianten für PKW, leichte Nutzfahrzeuge, LKW und Motorräder gelten.

Stickoxide, Ozon, Feinstaub, CO2. Diese Stoffe kommen aus dem Auspuff. Neu sind außerdem Grenzwerte für Formaldehyd und ultrafeine Partikel aus Bremsen- und Reifenabrieb. Bei LKW und Bussen spielt künftig außerdem Distickstoffmonoxid eine Rolle.

Für E-Autos spielen die Verbrennungs-Schadstoffe keine Rolle. Wohl aber die Partikelemission aus Reifen und Bremsen. Wegen ihres hohen Gewichts können diese sogar stärker ausfallen als bei Verbrennerfahrzeugen. Dazu kommen neue Standards für die minimale Batterie-Lebensdauer. Bei LKW und Bussen gelten etwa weniger strenge Mindestwerte von 75 Prozent und 65 Prozent.

Die Kommission erklärt gleich mehrere Ziele. Neben der Aktualisierung und Verschärfung der Verschmutzungs-Limits geht es ihm um eine bessere Kontrolle der Umsetzung durch die Industrie, auch auf digitalem Wege. Nicht zuletzt soll die Neuregelung die Marktdurchdringung des Elektroautos stützen. In dieser Hinsicht kann die neue Abgasnorm auch als Mittel im Kampf gegen Klimawandel gesehen werden - in erster Linie geht es der Politik aber um Luftqualität.

Die neuen Vorschriften sind kraftstoff- und technologieneutral. Wer denkt, E-Autos wären fein raus, irrt. Neben den Schadstoffen aus dem Auspuff berücksichtigt die neue Norm nämlich auch Partikel, die von den Bremsen oder den Reifen stammen – eine Weltpremiere, sagen die Gesetzgeber. Damit fallen auch Elektrofahrzeuge und Plug-in-Hybride unter die Euro-7-Abgasnorm. Für Stromer sieht die EU-Kommission zudem eine Mindesthaltbarkeit ihrer Batterien vor. Nach fünf Jahren oder 100.000 Kilometern darf die Speicherkapazität der Batterie nicht unter 80 Prozent des ursprünglichen Werts fallen, nach acht Jahren oder 160.000 Kilometern sollen es 70 Prozent sein. Damit liegen die Grenzwerte im Bereich dessen, was auch die Autohersteller in ihren Garantien zusagen. Für Verbrenner soll künftig zudem die Lachgas-Emission reguliert werden, was für Transporter über 3,5 Tonnen Gesamtgewicht eine besondere Herausforderung darstellt.

Die EU strebt eine Einführung für Juli 2025 an. Für schwere Nutzfahrzeuge soll die Abgasnorm zwei Jahre später gelten. Allerdings handelt es sich beim EU-Papier erst um einen Vorschlag, der noch vom EU-Parlament und den 27 Mitgliedsländern beschlossen werden muss, was im Schnitt 18 Monate dauert – also bis etwa Mitte 2024.

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ZEHN AUßERGEWÖHNLICH SCHÖNE BAHNHÖFE WELTWEIT

Sie stehen für Fernweh und manche auch für eine vergangene Epoche: Bahnhöfe. Von verschnörkelt bis streng stellen wir hier zehn sehenswerte Zug-Stationen vor, die durch ihre Architektur hervorstechen.

Der Ort Kanazawa liegt etwa in der Mitte der japanischen Hauptinsel an der Ostküste - quasi gegenüber von Tokio. Seit 2015 ist der Bahnhof auch an den Schnellzug Hokuriku Shinkansen angeschlossen. Am neuen Osteingang haben die Konstrukteure ein Holztor erbaut, das Tsuzumi-mon. Tsuzumis sind Handtrommeln. Das Tor soll an deren Struktur erinnern. Hinter dem Tor eröffnet sich der "Wilkommens-Dom" - ein Atrium aus Stahl und Glas, das sich hoch über den Köpfen der Passagiere wölbt. Die Kombination aus dem Holztor und dem Glaspalast macht Kanazawa Station so besonders.

Auf der Südinsel Neuseelands liegt Dunedin. Dort ist sie die zweitgrößte Stadt nach Christchurch. Sie besitzt einen ganz außergewöhnlichen Bahnhof, gerne auch als "das größte Lebkuchenhaus der Welt" bezeichnet. Das liegt an der Kombination der Steine, die zum Bau verwendet wurden: dunkler Basalt und weißer Kalkstein ergeben zusammen das Aussehen von Lebkuchen mit Zuckerguss. Nach ihrer Eröffnung 1906 verkehrten durch Dunedin Station rund hundert Züge pro Tag. Aber mit den Jahrzehnten nahm die Bedeutung des Bahnhofs immer weiter ab. Heute fährt dort hauptsächlich noch die Museumsbahn Taieri Gorge Railway. Der Bahnhof gehört mittlerweile der Stadt, die ihn renovierte und Gärten davor anlegen ließ. Im Inneren befinden sich eine Galerie, ein Restaurant und Büros. Der Name "Dunedin" geht übrigens auf Edinburgh in Schottland zurück. Deren gälischer Name lautet "Dùn Èideann", was dann zu "Dunedin" verkürzt wurde.

Rund 1.000 Züge und drei Millionen Menschen frequentieren den Bahnhof täglich. Chhatrapati Shivaji Terminus - kurz CTS - ist damit einer der betriebsamsten Bahnhöfe der Welt und dazu noch UNSECO Welterbe. Ursprünglich hieß das Gebäude Victoria Terminus, stammt es doch aus dem Jahr 1888. Zu dieser Zeit regierte Königin Viktoria das britische Weltreich, zu dem auch Indien gehörte. Daran erinnert man sich heute nicht mehr so gerne, darum benannten die Inder den Bahnhof um nach Chhatrapati Shivaji Bhonsale, einem Herrscher aus dem 17. Jahrhundert. Das Bahnhofsgebäude ist in der Stilrichtung der Neogotik gehalten, Ähnlichkeiten zu alten Kathedralen aus dem Mittelalter sind also gewollt.

Strenge Formen prägen diesen Bahnhof, dessen Eingang jeweils zwei riesige Statuen links und rechts bewachen. Der Uhrenturm ist gekrönt mit einem grünangelaufenen Kupferdach und verziert mit strengen geometrischen Linien. Die Architektur des Helsingin päärautatieasema ist damit ziemlich einzigartig. Eliel Saarinnen entwarf das Gebäude 1904, musste aber noch 15 Jahre warten, bis der Bahnhof endlich eingeweiht wurde. Saarinen wanderte 1923 in die USA aus und lehrte dort Architektur und Design. Zu seinen Schülern gehörten unter anderem die Gebrüder Eames und sein eigener Sohn Eero Saarinen. Sowohl die Namen Eames als auch Saarinnen gehören heute zu den Designklassikern des 20. Jahrhunderts. Die Statuen am Eingang des Bahnhofs tragen Lichtkugeln in der Hand, die nachts strahlen. Und Nacht ist es ja lange in Finnland.

Sie gilt als der schönste Bahnhof Thailands: Hua Hin Station. Gelegen im Süden am Golf von Thailand steht sie an der Strecke von Bangkok bis nach Malaysia. Bereits 1911 wurde Hua Hin Station eröffnet und sie gewann an Bedeutung, denn der thailändische König baute die Sommerresidenz Klaikangwon hier in Hua Hin.

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ROBOTISIERUNG DES BAUENS

Die Robotisierung des Bauwesens ist der Prozess der Errichtung von Häusern, Gebäuden, Strukturen oder deren Komponenten unter Verwendung mobiler automatisierter Maschinen (Roboter) mit bestimmten Funktionen, die bei der Durchführung bestimmter Bauarbeiten helfen und das Bautempo erheblich beschleunigen. Zum Beispiel mithilfe von 3D-Drucktechnologien mit Beton oder einem speziellen Verbundmaterial.

Die Hauptkategorien von Robotern, die im Bauwesen verwendet werden:

Industrieroboter - Um eine Vielzahl von Operationen auszuführen, handelt es sich normalerweise um Knickarmroboter. Äußerlich und in ihren Bewegungen sind sie der menschlichen Hand sehr ähnlich, sie werden von der einfachen automatisierten Montage bis hin zu komplexen Schweißarbeiten vielseitig eingesetzt.

Kartesische Roboter – für den schnellen 3D-Druck zum Beispiel mit einer speziellen Zusammensetzung aus Beton oder Verbundwerkstoffen. Die Arbeitskörper solcher Roboter bewegen sich in einem dreidimensionalen kartesischen Koordinatensystem.

Kollaborative Roboter - um mit einer Person zusammenzuarbeiten, Aufgaben zu erledigen, die für eine Person zu schwierig wären. Sie können auch menschliche Bewegungen wiederholen, um Arbeiten auf schwer zugänglichen oder gefährlichen Baustellen auszuführen. Robotik ist in der produzierenden Industrie seit Jahrzehnten als effizienter Weg zur Automation wiederkehrender Arbeitsschritte etabliert. Insbesondere in Zeiten von Digitalisierung und Industrie gewinnt aber auch das gemeinsame Wirken von Menschen und Robotern immer mehr an Bedeutung. In den Fokus rückt hier das Einsatzgebiet Mensch-Roboter-Kollaboration – also die Zusammenarbeit von Menschen und Robotern. Hierbei werden Erfahrung, Urteilsvermögen und Flexibilität des Menschen mit der Kraft, Ausdauer und Genauigkeit von Robotern kombiniert. Eine Besonderheit: Menschen und Roboter werden nicht durch einen Schutzzaun getrennt, sondern teilen sich einen Arbeitsraum und können sogar dieselben Komponenten bearbeiten.

Drohnenroboter sind Robotermechanismen des gleichen Typs, die sowohl gemeinsam (durch

gegenseitige Kommunikation) als auch einzeln die aktuellsten Informationen über den Fortschritt der Arbeit auf einer Baustelle liefern können, ohne eine Person einzubeziehen, oder irgendwelche Aktionen an einem Bauwerk ausführen können Seite.

Selbstfahrende Baufahrzeuge – Upgrades von Standard-Schwermaschinen durch Kombination mit KI -basierten Steuerungssystemen wie Bulldozern, Baggern, kompakten Raupenladern sowie Systemen, die mit Spezialkomplexen für den 3D-Druck oder das Schweißen von Metallstrukturen ausgestattet sind.

Humanoide Roboter sind anthropomorphe menschenähnliche Roboter für die Ausführung einer Vielzahl unterschiedlicher Arbeiten, wie z. B. Veredelung, Lackierung usw. Ein Beispiel ist der Bauroboter aus Japan HRP-5P. Es sei darauf hingewiesen, dass der Roboter für die meisten Konstruktionszwecke überhaupt nicht universell oder anthropomorph sein muss, sondern dass es völlig ausreicht, eine an seine spezifischen Aufgaben angepasste Form zu haben.

Mini-Baumeister sind ein Team von miteinander verbundenen und voneinander abhängigen Robotern, die im Verhältnis zu der zu bauenden Struktur klein sind. Jeder von ihnen erfüllt seine Rolle je nach Bauzustand und unter Verwendung von Anweisungen des Zentralcomputers in Kombination mit Messwerten seiner eigenen Sensoren und lokalen Ortungssysteme. Ein weiterer „Lieferant“-Roboter versorgt jeden Roboter des Teams nach Bedarf mit flüssigem Baumaterial.

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DURCHFÜHRUNG VON INSTANDSETZUNGSMAßNAHMEN ZUM SCHUTZ DER ANREINER GEGEN LÄRM AN EINEM BRÜCKENZUG

Einige Verkehrswege führen durch dicht besiedelte Gebiete der Stadt, was den Anwohnern erhebliche Unannehmlichkeiten bereitet, da der Schienenverkehr während der Fahrt viel Lärm verursacht. Ich schlage vor, am Beispiel der Bahnstrecke in Hainburg Wege zur Lösung dieses Problems zu erwägen.

Schon 2013 wurde im Projekt STAIRRS der Europäischen Union ein Kosten-Nutzen Verhältnis von Lärmschutzmaßnahmen erarbeitet. Dabei hat sich sehr deutlich gezeigt, dass sich nur in Kombination verschiedener Maßnahmen ein Optimum erreichen lässt. Beginnend bei den Fahrzeugen als eigentliche Lärmquelle sind dann weitere Maßnahmen im Oberbau und in den Tragwerken durchzuführen. Um diese Kombinationsmöglichkeiten und den Einfluss verschiedener Systeme im Zuge der Eisenbahnstrecke 91, Wien Rennweg – Wolfs Thal, liegt in der Gemeinde Hainburg ein Brückenzug mit insgesamt 35 einfältigen Tragwerken. Diese Tragwerke sind Stahlbrücken mit offener Fahrbahn und haben ein Alter von über 60 Jahren (die Tragwerke wurden 1889 errichtet und 1972 teilweise umgebaut). Die damalige Konstruktion der Tragwerke berücksichtigte noch nicht die heutigen akustischen Randbedingungen, so dass es in der Vergangenheit bei den Anrainern so in betrieblichen Zugpausen unter Sicherungsaufsicht erfolgt. Planung für die Bauausführung waren zwei längere Sperrpausen an aufeinander folgenden Wochenenden geplant, in denen jeweils ein Abschnitt umgerüstet wurde. Vor Beginn der Arbeiten erfolgte eine Nullmessung, die Aufnahme der bestehenden Schallemissionen im Altzustand. Nach jeder Umbauphase wurde eine Messphase durchgeführt, um die Auswirkungen jeder einzelnen Maßnahme zu dokumentieren und zu bewerten. Durchführung begonnen wurde mit dem Einbau der FFU-Kunsthölzer im Bereich 2. Da die Tragwerke genietet und die Nietköpfe auch im Auflagerbereich der Brückenhölzer vorhanden waren, wurden die neuen Hölzer entsprechend dem vorhandenen Niet Bild ausgenommen. Ein weiterer Vorteil der FFU-Kunsthölzer lag in ihren Genauigkeiten, da sie entsprechend vorher aufgenommener Geometrie passgenau gefertigt werden konnten. Dadurch wurde eine normalerweise aufwändige Bearbeitung vor Ort erspart. Im Anschluss an die erste Umbauphase erfolgte dann der Umbau des Bereiches Hier wurden die Sylomermatten unter den neuen Brückenhölzern eingelegt. Es ergaben sich einige zusätzliche Anpassungsarbeiten, da die Nietbilder doch teilweise abwichen. Auch die seitlichen Bereiche der Brückenhölzer wurden mit dem Sylomer gedämmt.

Nach einer Woche erster Messungen in dieser Phase erfolgte dann in betrieblichen Zugpausen der Einbau der Schienenabsorber und Schienenbedämpfungssysteme.

Auswertung Nach Abschluss der einzelnen Arbeitsphasen wurden die Messungen durchgeführt und in einem Gesamtvergleich dargestellt. Es wurde die Abklingrate der einzelnen Messtragwerke bestimmt. Als Resümee ist festzuhalten:

Die untersuchten Systeme basieren auf unterschiedlichen physikalischen Prinzipien und haben daher auch unterschiedliche Wirkweisen, was in der Abklingrate deutlich wird.

Bereich 1 • Die Maßnahmen im Bereich 1 zeigten eine Entkoppelung des Gleises vom Träger, daher ein besseres Schwingverhalten, bei allerdings kaum erhöhtem Pegel. Durch die Absorber wurden die Schwingungen signifikant reduziert, was zu einer Pegelreduzierung führte. In Summe erfolgte eine Reduzierung durch die Maßnahmen von ca. 3 dB 30 %.

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DER BAHNHOF DER ZUKUNFT

Reisen beginnen und enden nicht an Bahnhöfen. Wie können diese daher so gestaltet werden, dass Reisende zum Beispiel noch einfacher die „erste“ und „letzte“ Meile bewältigen können? Die intelligente Verknüpfung mit anderen Verkehrsmitteln, aber auch die Steigerung der Attraktivität von Bahnhöfen als Aufenthaltsorte, sind wichtige Bausteine der Verkehrswende. Mit dem Projekt „Bahnhof der Zukunft“ hat das Bundesministerium für Digitales und Verkehr über das Deutsche Zentrum für Schienenverkehrsforschung beim Eisenbahn-Bundesamt ein Konsortium unter der Leitung des ISOE – Institut für sozial-ökologische Forschung beauftragt, einen modularen Maßnahmenkatalog dafür zu entwickeln.

Dem Verkehrsmittel Bahn kommt bei der Verkehrswende eine Schlüsselrolle zu. Im Fokus steht insbesondere die Verknüpfung des Schienenverkehrs mit anderen umweltfreundlichen Verkehrsmitteln, wie Straßenbahn, Bus, Rad oder Sharing-Angeboten. „Anschlussmobilität ist ein entscheidendes Kriterium für die Attraktivität der Bahnmobilität, die sogenannte „erste“ und „letzte“ Meile bilden das Nadelöhr zum Ziel- und Ankunftsort“, sagt Jutta Deffner, Leiterin des Forschungsschwerpunkts Mobilität und Urbane Räume am ISOE.

Für Akteure wie die Deutsche Bahn, Verkehrsunternehmen, Mobilitätsanbieter und Kommunen sei die komfortable, einfache und verlässliche Verknüpfung mit dem Verkehrsmittel der Wahl zum Bahnhof und zum Ziel eine echte Herausforderung. „Mit Blick auf den Erhalt von Bahnhöfen und ihre Modernisierungen sollten unterschiedliche Reiseansprüche berücksichtigt und Mobilitätsmöglichkeiten mit bedacht und für eine nachhaltige Mobilität umgesetzt werden.“

Im Projekt „Bahnhof der Zukunft“ untersucht ein Forschungs- und Praxisteam unter der Leitung des ISOE im Auftrag des Deutschen Zentrums für Schienenverkehrsforschung, wie Bahnhöfe so gestaltet werden können, dass sie zu Knotenpunkten für eine nachhaltige Mobilität werden. „Wir forschen für einen konsequenten Wandel vom Bahnhof als Station des Schienenverkehrs hin zu einer Mobilitätsplattform, die einen Gewinn für Reisende und Gäste darstellt“, sagt Mobilitätsexpertin Deffner. Ein Ziel im Projekt sei es deshalb auch, Maßnahmen zu identifizieren, wie die Attraktivität von Bahnhöfen und ihrem Umfeld erhöht werden können – indem sie zugleich Treffpunkte und Orte für Kultur, Gastronomie und Freizeit werden.

Für die Studie werden sozial-empirische Erhebungen durchgeführt, um die Bedürfnisse von Reisenden an Bahnhöfen als multimodale Schnittstellen zu erheben. Darauf aufbauend werden Maßnahmen entwickelt, die nicht nur die technische Seite der Mobilitätsfunktion von Bahnhöfen in den Blick nehmen, wie zum Beispiel Wegweisung, Sicherheit oder Barrierefreiheit. „Es geht uns auch darum, symbolisch-emotionale Aspekte der Mobilität zu berücksichtigen,“ sagt Deffner. „Wir wollen auch die Bedeutung von Design und Anmutung, Sicherheit und Sauberkeit systematisch in die Maßnahmen aufnehmen“.

In einer Machbarkeitsanalyse wird die Umsetzbarkeit der möglichen Maßnahmen abgeschätzt und durch Befragungen potenzieller Nutzer in Virtual-Reality-Simulationen sowie anhand von 2D-Visualisierungen von Bahnhofsbereichen geprüft.

So soll ein modularer Maßnahmenkatalog entstehen, eine Art Werkzeugkasten aus unterschiedlichen Möglichkeiten, der es den beteiligten Akteuren – Bahnhofsbetreibern und Kommunen – ermöglicht, flexibel die für ihre Situation geeigneten Lösungen zu wählen. „Je nach Art, Ausstattung und Lage des Bahnhofs können spezifische Maßnahmen dann auf die Bedürfnisse der unterschiedlichen Nutzer zugeschnitten werden, um die Bahnhöfe im Sinne einer Mobilitätsplattform zukunftssicher machen zu können," so sagt Jutta Deffner.

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DIE GRÖßTEN BEDROHUNGEN FÜR UNSEREN PLANETEN

Die fünf Megatrends sind die größten Bedrohungen für unseren Planeten - Probleme, die wir besser heute als morgen in den Griff bekommen sollten. Nur wie? Die Antworten kennen wir - nur die Umsetzung ist die Krux.

1. Luftverschmutzung und Klimawandel. Problem: Seit Beginn der industriellen Revolution Mitte des 18. Jahrhunderts pusten wir fleißig CO2 in die Luft. Die Konsequenz: Es wird wärmer und wärmer. Nicht nur auf der Erde, sondern auch in unseren Ozeanen. In Maßen ist CO2 tatsächlich gut - denn ohne das natürlich freigesetzte CO2 - zum Beispiel durch die Vegetation, wäre es ganz schön frostig - wenn nicht sogar eisig - bei uns. Nun steuert der Mensch aber eben auch einen nicht unerheblichen Teil dazu bei - und das ist in der Summe zu viel gut.
2. Abholzung. Problem: Immer mehr Bäume müssen weichen, wenn ganze artenreiche Wälder zerstört werden. Besonders in den Tropen müssen sie Platz machen für die Viehzucht oder den Anbau von Sojabohnen, für Palmöl-Plantagen oder für andere landwirtschaftliche Monokulturen. Heute sind etwa 30 Prozent der Fläche unseres Planeten von Wäldern bedeckt - das ist nur noch etwa halb so viel wie vor rund 11.000 Jahren. 7,3 Millionen Hektar Wald werden jedes Jahr zerstört. Tropische Wälder machten einmal 15 Prozent der Landfläche aus; heute sind es nicht mehr als sechs oder sieben Prozent. Der Großteil wurde abgeholzt oder abgebrannt.
3. Artensterben. Problem: Während an Land die Tiere für ihr Fleisch, Elfenbein oder andere "medizinische" Produkte bis zum Aussterben gejagt werden, rotten auf See riesige industrielle Fischerboote ganze Fischpopulationen aus. Aber nicht nur die direkte Jagd, sondern auch der Verlust und die Zerstörung des Lebensraums sind Hauptfaktoren, die zum Dahinschwinden vieler Arten beitragen - wenngleich für all diese Gefahren eine ganz bestimmte Spezies verantwortlich ist: der Mensch. Nicht nur, dass Arten von Natur aus eine Existenzberechtigung haben, sie tragen auch zum Überleben des Menschen einen großen Teil bei. Ja, wirklich! Denken Sie nur einmal an die Bienen und deren Bestäubungsarbeit. Ohne sie gäbe es keine Samenbildung, die wiederum Grundlage für den Fortbestand der Pflanzen ist. Die kleinen Helferlein sind unverzichtbar für Natur und Erzeuger.
4. Bodenerosion. Problem: Überweidung, Monokulturen, Erosion, Bodenversiegelung, Überdosierung von Schadstoffen, Umwandlung von Grün- in Ackerflächen - die Liste von Möglichkeiten, unseren Böden möglichst große Schäden zuzufügen, scheint schier endlos. Und davon nehmen wir auch eine ganze eine Menge wahr: Ungefähr zwölf Million Hektar Ackerland werden jedes Jahr degradiert, heißt es nach Schätzungen der Vereinten Nationen.
5. Überbevölkerung. Problem: Die weltweite Bevölkerung wächst rasend. Während wir zu Beginn des 20. Jahrhunderts noch 1,6 Milliarden Menschen zählten, sind es heute weltweit etwa 7,5 Milliarden. Bis 2050 könnten es zehn Milliarden sein. Und dann wird es eng! Denn die steigende globale Bevölkerung - kombiniert mit dem ebenfalls wachsenden Wohlstand - übt immer mehr Druck auf wichtige natürliche Ressourcen aus, zum Beispiel aufs Wasser.

Die beiden bevölkerungsreichsten Staaten der Welt, China und Indien, werden nach Prognosen der UN voraussichtlich schon im nächsten Jahr die Plätze auf dem Podium tauschen. Indiens

Gesamtbevölkerung wird demnach 2023 auf rund 1,4 Milliarden und bis 2050 auf 1,7 Milliarden anwachsen. Die chinesische Bevölkerung wird dagegen laut Prognose bis 2050 auf 1,3 Milliarden zurückgehen.

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ERNEUERBARE ENERGIE AUS DER TIEFE

Das Potenzial der Geothermie übertrifft die von der Menschheit benötigte Energie um ein Vielfaches. Es ist jedoch nur schwer zu erschließen. Dennoch kann Geothermie zur klimafreundlichen Energieversorgung beitragen.

Ein ganz besonderer Bodenschatz und Energielieferant schlummert auch bei uns unter der Erdoberfläche: die Erdwärme oder geothermische Energie. Hiermit sind die vom flüssigen Erdinneren aufsteigenden Energieströme gemeint. Sie entstehen zum größten Teil, wenn radioaktive Elemente in der Erdkruste oder im Erdmantel zerfallen. Diese Energie erwärmt das Gestein und die wasserführenden Schichten in der Erdkruste. Das zur Verfügung stehende Potenzial übertrifft die von der Menschheit benötigte Energie um ein Vielfaches. Aus geothermischer Energie kann fast emissionsfrei Strom, Wärme oder Kälte erzeugt werden. So lange lediglich so viel Energie entnommen wird, dass genügend Energie nachfließen kann, steht ein unabhängig von Witterung, Tages- oder Jahreszeit kontinuierlicher Energiestrom zur Verfügung. Das macht die Geothermie für eine nachhaltige Energieversorgung attraktiv. Sie ist wie die Biomasse und Wasserkraft nicht nur spitzen-, sondern auch grundlastfähig. Positiv ist auch ihr besonders geringer Flächenbedarf im Verhältnis zur Leistung. Daher kann sie im Energiemix der Zukunft eine wichtige Rolle spielen. Island deckt seinen Wärme- und Strombedarf bereits zum Großteil durch Erdwärme ab.

In Deutschland sind Erdbohrungen bis in zwei Kilometer Tiefe erforderlich. Deutschlandweit gibt es zwei Arten von Geothermie: hydrothermale Geothermie und Erdwärmesonden. Die hydrothermale Geothermie fördert die in der Tiefe vorhandenen heißen Thermalwässer und versorgt damit Siedlungen und Gewerbegebiete. In Deutschland wurden bisher mehr als 42 hydrothermale Heizwerke gebaut. An insgesamt neun Kraftwerksstandorten wird Geothermie mittlerweile auch zur Stromerzeugung genutzt. Eine Möglichkeit zur Nutzung der Erdenergie in heißen und trockenen Gesteinsschichten ist das Hot-Dry-Rock-Verfahren. Es wird Wasser in große Tiefen gepumpt, um das heiße Gestein als eine Art Wärmetauscher zu nutzen. Beide Verfahren sind Beispiele für die Tiefen Geothermie. In Deutschland und Mitteleuropa sind Erdbohrungen bis in zwei Kilometer Tiefe oder mehr erforderlich, um Temperaturen zu erhalten, die für die Energieversorgung von Siedlungen und gewerblichen Verbrauchern geeignet sind. Die oberflächennahe Geothermie nutzt dagegen die Wärme in Nähe der Erdoberfläche, des Grundwassers oder der Luft. Auch diese relativ niedrigen Temperaturen lassen sich zum Heizen und Kühlen nutzen. In Deutschland werden in diesem Bereich bisher ausschließlich Erdwärmesonden oder -kollektoren in Kombination mit Wärmepumpen verwendet. Über 440.000 Anlagen gibt es davon bereits. 2022 betrug die gesamte installierte Leistung bisher für die direkte Nutzung der geothermischen Energie in Deutschland etwa 4.700 Megawatt (thermisch) und 47 Megawatt (elektrisch).

Die Geothermie kann einen erheblichen Anteil zur klimafreundlichen Energieversorgung beitragen. Geothermische Kraftwerke prägen die Landschaft weniger deutlich als beispielsweise die Windenergie und können gut in den Siedlungsbereich eingepasst werden. Die Standortwahl muss jedoch sorgfältig erfolgen, so dass Mensch, Natur und Umwelt nicht unnötig belastet werden. Modellrechnungen zufolge steht in einem geothermischen Reservoir mindestens 30 Jahre lang ausreichend Wärme zur Verfügung, um ein Kraftwerk damit zu betreiben. Nach der Wärmeausbeute muss der Standort verlagert werden, die entstandene Wärmesenke regeneriert sich durch den aus dem Erdinneren erfolgenden Wärmestrom von selbst.

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MODERNE TECHNOLOGIEN IM BAUWESEN

Rund um die Entwicklungen von K.I.-Lösungen gab es in den letzten Jahren große Fortschritte. Nun dringen Anbieter verstärkt in das Bauwesen. Der Trend wird dadurch begünstigt, dass auch in der Baubranche mit immer größeren Datenmengen gearbeitet wird. Darum verwundert es nicht, wenn immer mehr Unternehmen daraus weiteren Nutzen ziehen wollen. Künstliche Intelligenz wird in Zukunft eine immer wichtigere Rolle spielen und in verschiedenen Prozessen am Bau zum Einsatz kommen.

Building Information Modeling ist quasi das „Leittier" und die Haupttechnologie im modernen Designwesen. Es beinhaltet nicht nur die virtuelle Modellierung eines Gebäudes, sondern eine umfassende digitale Darstellung der physischen und funktionalen Eigenschaften eines Objekts. BIM berücksichtigen nicht nur die Konstruktion, sondern auch die Ausrüstung, das Management, den Betrieb eines Objekts, inklusive Wartung und Instandhaltung. Somit deckt die Technologie die den gesamten Lebenszyklus eines Objekts ab. Alle für das Objekt relevanten Komponenten und Nuancen im Design werden notwendigerweise berücksichtigt und in einem Projekt berücksichtigt. Wenn ein Element oder eine Ergänzung entfernt oder ersetzt wird, wird das gesamte Modell mit dieser Korrektur neu berechnet.

So fördert BIM die Digitalisierung der Baubranche:

Einfacherer Visualisierung von Projekten: Mit BIM können Anwender Projekte planen und visualisieren, bevor die ersten Arbeiten auf der Baustelle beginnen. Raumnutzungssimulationen und 3D-Visualisierungen geben Nutzern einen besseren Einblick in ein Gebäude, so dass bei Bedarf einfacher Änderungen vorgenommen werden können.

Flexibilität bei Prozessen: Bei jedem Bauvorhaben kommt es zu Designänderungen. BIM ermöglicht eine bessere Überwachung dieser Änderungen, wodurch es sehr einfach ist, zu einem früheren Entwurfsmodell zurückzukehren, wenn bei einem neuen Entwurf ein Fehler angezeigt wird.

Nutzbarkeit über den gesamten Gebäudelebenszyklus hinweg: Einmal im Modell erfasste Daten lassen sich dauerhaft hinterlegen, so dass Änderungen, bestimmte Entwicklungen, oder erfolgte Maßnahmen im Objekt auch im Nachhinein schnell nachvollzogen werden können.

Die BIM-Technologie reduziert: Materialkosten, Fehlerquoten, Zeitaufwand.

Das Zukunftspotenzial von BIM im Bauwesen:

In der DACH-Region verwenden bei steigender Tendenz ca. 10% – 15% der Unternehmen BIM, hauptsächlich in Ballungszentren und großen Organisationen, andere neue Bautechnologien sind in der Region unterschiedlich häufig vertreten. In den USA verwenden etwa 72% der Baufirmen BIM, um massiv Kosten für Projekte einzusparen. In Großbritannien müssen seit 2016 alle staatlich finanzierten Bauprojekte BIM Level 2 implementieren. In Frankreich hat die Regierung seit 2017 den Einsatz von BIM für eine halbe Million Haushalte im Wohnungssektor vorgesehen. In Spanien ist BIM seit 2019 in Infrastrukturprojekten obligatorisch. Deutschland hat den Einsatz von BIM seit 2020 in allen Infrastrukturprojekten implementiert. Auch in den Benelux-Ländern wird diese Technologie immer häufiger eingesetzt. Bauherren möchten ihre Projekte immer öfter mit BIM realisieren. Anreize bestehen durch das Einsparen von Konstruktionskapazitäten sowie die Reduzierung von Fehlerkosten. Eine Entscheidung für BIM zieht jedoch auch tiefgreifende Änderungen beim Projektmanagement und den Prozessen eines Bauprojekts nach sich. Deshalb ist professionelles BIM-Management ein entscheidender Faktor für den Erfolg eines Projekts.

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DIE UNTERWASSERSTRECKE VON EUROPA NACH AFRIKA

Eine alte Idee wird wiederbelebt. Wird der Tunnel unter der Straße von Gibraltar – der die Kontinente Europa und Afrika verbinden soll – nun doch gebaut? Laut „Euro Weekly" wurde von der Regierung Marokkos eine neue Leitung für das Gibraltar-Tunnel-Projekt ernannt. Abdel-Kabir Zahoud soll als Generaldirektor der „Nationalen Gesellschaft für Studien über die Straße von Gibraltar" die Planung übernehmen. Auch in Spanien ist man nicht untätig und hat die Nationale Gesellschaft für Studien zur Festnetz-Kommunikation entlang der Straße von Gibraltar (SEGESCA) mit der Durchführung von Machbarkeitsstudien beauftragt.

Das Gibraltar-Tunnel-Projekt wird bereits seit mehr als 40 Jahren verfolgt. Wie die Frankfurter Allgemeine Zeitung berichtet, hat sich der spanische König Juan Carlos I. und der marokkanische Monarch Hassan II. vor mehr als 40 Jahren – bei einem Treffen in Fez über eine Verbindung „ihrer" Länder entlang der Straße von Gibraltar geeinigt. Ein angedachtes Projekt für den Gibraltar-Tunnel war die 14 Kilometer lange Verbindung von Punta Canales nach Punta Cires. Die größte Schwierigkeit war, um den Gibraltar-Tunnel zu realisieren, waren Bohrungen in 900 Metern Tiefe notwendig gewesen.

Neue Planungen für den Gibraltar-Tunnel – der nach dem Vorbild des über 50 Kilometer langen Eurotunnels gebaut werden soll – ist die 23 Kilometer lange Verbindung zwischen Tarifa und Tanger. Der jetzt geplante Unterwassertunnel soll mehr als 40 Kilometer lang werden. Das würde dann nur noch 30 Minuten dauern, um die Strecke von Europa nach Afrika zu bewältigen.

Es wird ein Mega-Projekt, denn die Bauzeit wird bereits mit 15 Jahren veranschlagt, und die Baukosten werden auf mehr als 5 Milliarden Euro geschätzt. Damit ist der Gibraltar-Tunnel eines der teuersten Bauvorhaben dieser Art. Der Tunnel of Gibraltar soll in einer Tiefe von bis zu 300 Metern unter der Meeresoberfläche liegen. Der Tunnel unter der Straße von Gibraltar wird auch von der Europäischen Union unterstützt. Nicht ganz uneigennützig natürlich, hat man doch bereits im Blick, dass über den Unterwassertunnel möglicherweise auch grüner Wasserstoff nach Europa transportiert werden könnte. Auch die Versorgung mit Strom aus Afrika könnte mit dem Tunnelprojekt wieder realistisch werden.

Im Dezember 2003 einigten sich Spanien und Marokko auf einem Gipfeltreffen, das erstmals 1980 diskutierte Projekt wiederaufzunehmen. Der spanische Tunneleingang sollte 40 km westlich von Gibraltar, bei Punta Palomas, entstehen; das marokkanische Portal bei Tanger. SNED und SECEGSA gaben mehrere Meeresboden-Explorationen in Auftrag. Den Planungswettbewerb für den Tunnel gewann 2006 Giovanni Lombardi. Die spanische und die marokkanische Regierung haben einen gemischten Ausschuss ernannt, um die Machbarkeit der Verbindung der beiden Kontinente zu untersuchen. Dies resultierte im EUROMED-Transport-Projekt von 2003 bis 2009. Im Jahr 2013 wurde von spanischen, marokkanischen und anderen europäischen Politikern die Notwendigkeit der Realisierung des Gibraltar-Tunnels bekräftigt, auch hier ging man von Kosten in Höhe von etwa 5 Milliarden Euro aus. Gibraltar ist bereits mit einem Tunnel berühmt, das Gibraltar-Tunnellabyrinth – The Great Siege Tunnels – das vielleicht eindrucksvollste von Menschen erdachte Verteidigungssystem.

Die Tunnelbauer in Gibraltar haben mit Vorschlaghammer und Brecheisen den Tunnel in den Berg geschlagen. Verwendet wurde natürlich auch Kanonenpulver. Wie das Portal Visitgibraltar auf seiner Seite ausführt, haben 18 Männer in fünf Wochen einen 25 Meter Tunnel in den Felsen gehauen. Als die Belagerung im Februar 1783 endete, war der Tunnel 113 m lang.

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VERKEHR ÖKOLOGISCHER GESTALTEN

Zu einem Zeitpunkt, zu dem der Klimawandel im Mittelpunkt der politischen und sozialen

Anliegen steht, ist die Anziehungskraft des Schienenverkehrs angesichts seiner geringen Umweltbelastung noch größer. Von den 25,1 % an CO2-Emissionen, die dem Verkehr innerhalb der EU-27 im Jahr 2017 zuzurechnen sind, rühren nur 0,6 % vom Schienenverkehr her, obwohl dieser mehr als 6 % aller Fahrgäste und fast 11 % der Güter transportiert. Die CO2-Bilanz der Hochgeschwindigkeitszüge ist in den Betriebszonen quasi null, da sie elektrisch angetrieben werden. Man sollte jedoch das bei der Stromerzeugung ausgestoßene CO2 berücksichtigen. Diese Quote variiert je nach der für die Erzeugung der Elektrizität an der HGV-Strecke verwendeten Primärenergie. Falls sie mit festen fossilen Brennstoffen (Kohle) wie in Polen oder Deutschland erzeugt wird, ist die CO2-Bilanz der HGV-Strecken natürlich weniger positiv. Die Weiterentwicklung erneuerbarer und/oder nuklearer Energien wird jedoch in Zukunft zu einer Reduzierung dieser Belastung führen.

Während die Umweltbelastung der Hochgeschwindigkeitsstrecken noch durch eine höhere Energieeffizienz in den Zügen und durch Optimierung von Fahrzeugkomponenten vermindert werden kann, bleibt die CO2-Bilanz des Schienenverkehrs im Vergleich zum Luft- und Straßenverkehr niedrig. Bei der Strecke Paris-Marseille betragen die CO2-Emissionen nur 2,7 g/Pkm (Gramm pro Personenkilometer) beim Hochgeschwindigkeitszug gegenüber 153,0 g/Pkm beim Flugzeug und 115,7 g/Pkm beim Auto. Unter dem Blickwinkel der Energieeffizienz ist der Hochgeschwindigkeitszug ebenfalls am leistungsfähigsten mit 12,1 Gramm Kraftstoff pro Personenkilometer gegenüber 17, 6 für die konventionellen Züge, 18,3 für den Bus, 29,9 für das Auto und 51,1 für das Flugzeug. Wenn das HGV-Streckennetz wie geplant ausgebaut wird, können pro Jahr rund 22 Millionen Tonnen CO2 bis 2023 und 34 Millionen Tonnen pro Jahr bei komplettem Ausbau des Netzes bis 2030 eingespart werden. Bereits jetzt sind Forschungen im Gange, um die Umweltbelastung der Hochgeschwindigkeitszüge durch Reduzierung ihrer Abhängigkeit von fossilen Energieträgern zu minimieren. Zahlreiche von den Forschungsrahmenprogrammen der EU finanzierte Vorhaben konzentrierten sich auch auf die Reduzierung der Lärmbelastung durch die Hochgeschwindigkeitsstrecken. Außerdem ist auf die europäische Kampagne Noemie zur umfassenden Beurteilung der Lärmbelastung durch den Hochgeschwindigkeitsverkehr hinzuweisen.

Die Europäische Kommission verabschiedete im Juli 2018 eine Mitteilung in Bezug auf Lärmschutzmaßnahmen am aktuellen Schienenfahrzeugbestand, die insbesondere Maßnahmen umfasst, um den Schienenlärm der Güterzüge um die Hälfte zu reduzieren. Folglich dürfte sich bis 2014 der vom Schienenfahrzeugbestand herrührende Lärm, von dem rund 16 Millionen Bürger betroffen sind, erheblich vermindern.

Die Abgaben und Umlagen im Verkehrsbereich müssen neu gedacht werden: Aus Umwelt- und Klimaschutzgründen, aus Sicht des Staatshaushaltes, aber auch aus Gründen der sozialen Gerechtigkeit. Eine Studie im Auftrag des UBA zeigt und analysiert gute Ansätze aus anderen Ländern, beispielsweise zur Reform der Dienstwagenbesteuerung, zu Mautsystemen und zur CO2-abhängigen Besteuerung von neuen Pkw.

Das derzeitige System aus Steuern, Abgaben, Umlagen, Entgelten und Subventionen im Verkehr in Deutschland ist reformbedürftig. Andernfalls ist weder das Klimaschutzziel 2030 noch die vollständige Dekarbonisierung des Verkehrs nachhaltig erreichbar.

CONTENTS

НАУКОВЕ ВИДАННЯ

ТЕЗИ ДОПОВІДЕЙ

Міжнародної наукової мультидисциплінарної конференції студентівта молодих учених *Новітні технології: покращення сьогодення та вплив на майбутнє*

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