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PHILOSOPHY OF DIGITAL TECHNOLOGY DEVELOPMENT IN THE SPHERE OF MEDICINE IN "GLOBALIZATION 4.0" CONDITIONS

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Abstract. The relevance of this topic is determined by the processes of "globalization 4.0", taking place in a new industrial revolution, which brings about both positive and negative consequences in science, medicine, engineering, financial sphere, geopolitical, and cultural dimensions. Digital technologies based on software and social networks become more effective and integrated, causing transformation in all spheres of the global economy. **The purpose of the study** is to analyze the development of smart technologies in medicine in conditions of "Globalization 4.0". **The objective of the study** is social and philosophical analysis of the "globalization 4.0" phenomenon and the revolutions that preceded itin the context of these revolutions the problems of smart technologies in medicine are developing; the study of the interaction problems of society, man and innovations in the sphere of medicine as mutually determined phenomena of human existence that satisfy, enrich and complement each other. **The state of theme study that initiated problem solution:** the concept of "globalization 4.0" entered the scientific world due to the works of Klaus Schwab, a German economist, founder and president of the World Economic Forum in Davos, the author of the book "The Fourth Industrial Revolution". Various aspects of this phenomenon that influenced its formation were reflected in the articles and monographs of Ukrainian scholars - V. Voronkova, V. Lukianets, O. Kravchenko, L. Ozadovska, V. Liakh, V. Pazeniuk, C. Raida, and others, as well as a series of Western scholars such as Ken Robinson, Samuel Greengard, Aarathi Prasad, Martin Ford, Kevin Kelli and others. **Study methodology**. The study methodology includes analysis of new smart technologies phenomena in medicine in the context of "globalization 4.0" that is developing in front of our eyes and is built on the basis of an integrated approach in the context of interdisciplinary character. The article uses such methods of scientific knowledge as analysis and synthesis, measurement, transition from abstract to concrete, synergistic approach, due to which it was possible to analyze complex problems of smart technologies in medicine. **The scientific novelty of the study** – is the identification of interaction problems between man, society and medicine in the conditions of "globalization 4.0", which contribute to the formation of a new technological space. **Results of the study:** the positive and negative effects of "globalization 4.0" for the development of society, medicine and human beings are analyzed; the future scenarios in overcoming of dangerous diseases for humanity are revealed. **Conclusion** - the feature and fundamental difference of "globalization 4.0" is the synthesis of these technologies and their interaction in physical, digital and biological domains.

Key words: "globalization 4.0", Internet of things, artificial intelligence, robotics, creativity.

The problem statement in general terms and its connection with important scientific or practical tasks is in the fact that the consequences of the industrial revolution that unfold in the conditions of "globalization 4.0", discussed at the Davos Forum-2019,

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create both positive and negative consequences in science, engineering, medicine, finance, geopolitical and cultural dimensions. Digital technologies based on hardware and software networks become more advanced and integrated and cause the transformation of society and the global economy. The Internet is the most powerful and the most widespread means of communication in the history of mankind. It grows every day, like a living organism, in which millions of networks are appearing, new models and connectionsare formed rapidly and dynamically.

According to V. Liakh, "the undoubted consequence of the information flows intensification is the accelerated development not only of informational but also of human potential, increasing the educational level and awareness of citizens, and due to this - the formation of fully active segments of the population for whom the obtaining and the use of new information becomes a necessity and a habit" [5, p.33]. According to many scholars, achievements in the first two decades of the XX century are equal in their scale to the successes of the whole XIX century.

The pace of technological innovation in the last decades of the XXI century is impressive in its scale. Artificial intelligence, genetic engineering, nanotechnology, cybercrime, trade wars, nationalism, populism, the threat of a global economic crisis, international terrorism, "brexits", environmental crises and their consequences become an integral part of a modern person's life. Medicine is also changing radically. According to V.Voronkova, one of the most serious moments to be taken into account is, first of all, "the possible negative impact of the modern information tools and technologies on the health of people, especially children and adolescents" [4, p.29].

The analysis of the study publications from which the problem solution is initiated and the author bases on: the concept of "globalization 4.0" entered the scientific world due to the works of Klaus Schwab, a German economist, founder and president of the World Economic Forum in Davos, the author of the book "Fourth Industrial Revolution". Various and the most current aspects of this phenomenon were reflected in the articles and monographs of Ukrainian scholars - V.Voronkova, V.Lukianets, O.Kravchenko, L.Ozadovska, V.Liakh, V.Pazeniuk, C.Raida and others, as well as works of the western scholars such as E. Guides, D. Geld, W. Mac-Gry, D. Goldblatt, D. Perraton, C. Robinson, S. Greengard, A. Prasad, M. Ford, K. Kelly, M. Featherstone, C. Lesch, R. Robertson, J. Stiglitz and others. "The process of globalization gives impetus to new social discourses and stimulates reflection", it is noted in the work of "Global Modernities" [2, p.11].

The following trends of modern developmentin the scientific social and philosophical literature are distinguished: firstly, the ability of technology and people to interact via "Internet of things"; secondly, the outspread of the artificial intelligence,

which bears complete information about the real world; and thirdly, the labour automation, due to which the work of people is replaced by robot work. Samuel Greengard, an American writer and journalist considers that back in the 1990s, researchers offered the theories of how people and machines create a completely new form of communication and interaction through various devices. In the "Internet of Things" book he tries to form his own vision of this concept's appearing, which arose as a result of the "industrial Internet". The author emphasizes that "Internet of Things" revolutionizes health and telemedicine by promoting a healthy lifestyle. It will make 24-hour medical monitoring possible, 3D-printing will create medical devices and organs for transplantation. Tiny devices will use proper doses of drugs at the right place, which will reduce side effects and increase action effectiveness [1, p. 153-154]. D. Rose points out that "one should expect more from tools, devices and games that make up a huge part of our life"[10, p. 11]. Such systems, along with increasingly sophisticated fitness bracelets, nourishment and sleep monitors, will allow you to monitor better your health and a healthy lifestyle. According to US Centers for Disease Control and Prevention, by the year 2050, the second type of diabetes can affect every third American.

Today, the cause of every fourth death in the United States is cardiac malformation. Most of these deaths can be prevented by diet and exercise [1, p. 153-154].

Identification of the aspects of the general problem to which this article is devoted and which have not received thorough consideration so far.

We focus on the issues which are quite innovative, since they only break into our lives. Humanity is moving forward, the present dynamically transforms into the past, and the future becomes the present. According to Ken Robinson, a world-renowned leader in the field of creativity, innovation and human resources: "There is always something new in human life and changes are becoming faster and faster every day. The reason, in particular, is that, in at least one aspect, we humans are different from other living creatures on the Earth. We have a powerful imagination and unlimited creativity. We can move into the past and look at it from different points of view. We can review the past and interpret it differently. We can take a fresh look at present with eyes of other people. And we can foresee many variants of the development of the future and, by applying creative skills, bring them into reality. We can not predict the future, but we are able to help to shape it" [9, p.32].

Philosophers and scientists predict the future of civilization, discussing topics of demography, nature conservation, climate changes, medicine, genetics, transhumanism, artificial intelligence, quantum computers, the Internet, power industry. Thus, V. Lukianets, O.Kravchenko, L.Ozadovska who are the authors of the monograph "The Scientific Worldview at the Turn of the Century", point out that having

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generated radical new ideas about the universe, man, the planetary social environment, the ethical and ontological attitude to other types of existence, the latest scientific and technological revolutions take the centuries-old process of human's world acquisition to the next convolution. And this convolutionis related to the creation and application of powerful technologies of the third millennium – nanoengineering, molecular biology, nanogenomic, nanomedic, neurochip technologies, virtual reality, artificial intelligence [6, p.3].

Continuing this discussion, Klaus Schwab, a German economist, founder and president of the World Economic Forum in Davos, the author of "The Fourth Industrial Revolution", argues in favor of the fourth industrial revolution. He emphasizes that modern civilization is at the root of the fourth industrial revolution, which is due to the following factors: firstly, the pace of development, secondly, breadth and intensity and thirdly, systemic influences. The first factor involves exponential growth, the emergence and improvement of new technologies. The second factor reveals the breadth and intensity of processes that reflect the digital revolution content. The third factor points to systemic impacts and their internal and external transformations. The author analyses the previous revolutions that preceded the fourth industrial revolution. The launching mechanisms of the first industrial revolution (from the 1760 s. to the 1840 s.), which contributed to the development of mechanical production, was the construction of railways and the invention of the steam engine. The second industrial revolution, which began in the late XIX and continued until the beginning of the XX century, is characterized by extensive manufacturing, due to the spread of electricity and the introduction of a conveyor. The third industrial revolution, the computer or digital revolution (1960's) was a catalyst for the developmentof semiconductors, the use of large mainframe computers in the sixties of the past century, the use of personal computers in the seventies and eighties and the Internet usage in the nineties. Its main features were the worldwide mobile Internet, miniature manufacture devices (which constantly become cheaper), artificial intelligence [15]. The author emphasizes that we entered the fourth industrial revolution – "globalization 4.0".

The aim of the article is to identify the development of smart technologies in medicine in the context of "globalization 4.0".

Aim statement of the article:

-analysis of the "globalization 4.0" phenomenon and the preceding revolutions;

- study of interaction problems of society, man and innovations in the sphere of medicine as mutually determined phenomena of human existence that saturate, enrich and complement each other;

- identification of peculiarities of "globalization 4.0", unfolding in the conditions of the fourth industrial revolution, and its distinctions from the previous ones, which is the

synthesis of these technologies and their interaction in the physical, digital and biological domains.

Study methodology. Methodology is understood as the set of methods of implementing the cognitive activity of "globalization 4.0" phenomenon, which is formulated on the basis of an integrated approach in the context of interdisciplinary discourse. The methodology of the development of digital technologies in the sphere of medicine in "globalization 4.0" reflects the need for selection, application of scientific methods in the complex of systemic and synergetic approaches. The article also uses such philosophical methods of scientific knowledge as: historical and logical, analysis and synthesis, measurement, transition from abstract to specific, and vice versa.

The main material of the study with the justification of the obtained scientific results.

The fourth industrial revolution creates a "smart world" which combines digital production technologies with the biological world. In the latter, the integration of a large number of different scientific disciplines and discoveries in the virtual and physical systems of the local level of production, which flexibly interact at the global level, creating unique technologies and artificial intelligence. Aarathi Prasad, a writer, a scientist and molecular geneticist, in the article "Genomics and Genetic Engineering" predicts that in the next twenty years, scientists will learn to read the genome quickly and influence the internal mechanisms of the DNA itself. This way, it will radically change the computer interfaces and affect the internal mechanisms of the DNA itself. The development of genome sequencing methods led to an experiment in West Africa, in which 148 genomes of the Ebola virus were identified with one portable sequencer. In future, such simple miniature devices in the field will determine the diagnosis within several hours and help doctors fight against viral infections, such as coronaviruses, dengue fever, Ebola viruses, Chikungunya and Zika viruses [7, p. 69-70].

Another of the most successful experiments is the use of semiconductors in the DNA analysis. Chris Tumazu from the Imperial College of London has developed a special chip that can be embedded in a USB flash drive and within a few minutes one can get the result of the analysis using any computer. This semiconductor technology does not focus on all of the three billion chemical bases of the human genome, but the one percent that distinguishes one person from another and defines its "biological IP address". Such USB chips are able to see specific mutations in genes and determine human predisposition to a specific illness or individual response to a particular drug. "Algorithms search for information about similar situations in the database in the past and bring it to the doctors' attention to diagnose and prescribe the treatment in the current situation", - Christopher Steiner notesin "Automate This: How Algorithms Took over Our Markets, Our Jobs, and the World" [11, p.194]. According to Tumazu, "doctors will not see the hospital chart but they will

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have a look at the patient's future" [7, p.71]. Jennifer Doudna and Emmanuelle Charpentier invented the most powerful genetic engineering technique, called CRISPR, and was specifically designed for DNA manipulating. This technique allows to find out the function of specific genes by activating them or, conversely, by stopping, and it gives the possibility to "edit" a specific part of a DNA. In theory, this means that we can eliminate the "wrong" gene responsible for a specific illness and replace it by a "healthy" one. However, this technology is not limited to genes editing. In future, it will help us to figure out what exactly those 98% parts of the DNA that do not take part in protein coding do, and to master not only the alphabet of a genome, but also its grammar and punctuation. We will be able to "turn on" and "turn off" genes at our discretion.

Scientists are already learning to control the activity of genes in time and space with the help of light and to "unwind" manipulations with them back and forth. These experiments are on the verge of another discipline called optogenetics.

Scientists hope within the next ten or twenty years to find out the nature of many neurodegenerative diseases that the medicine is still not able to treat - this is Parkinson's disease, epilepsy, Alzheimer's disease, stroke, deafness. In addition, so-called CRISPR-tablets are being developed, they are DNA sequences, which give antibiotic-resistant bacteria an instruction on self-destruction.

CRISPR technologies have many other practical applications - from vital (preventing diseases of bees) to non-serious (breeding of dogs, pygmy pigs, carps of different colours). In the next few decades, due to this technology, there will be created biological systems which will convert cells into biofuel plants, or breeds of farm animals resistant to infections will be raised [7, p.72].

Martin Ford, a futurist from the Massachusetts Institute of Technology, founder of a software company in the Silicon Valley, models a near future where cars will replace people and they "will live their own lives" as it is shown in the book "Rise of the Robots: Technology and the Threat of a Jobless Future". Analyzing the development of artificial intelligence in the medical sphere, the author points out that one of the most important advantages of artificial intelligence will be the avoidance of potentially fatal mistakes in diagnosing and treating. The system of artificial intelligence with access to detailed patient medical record, as well as information about medications, in particular with some specific medicines having toxicity and side effects, it can potentially avoid errors, even in extremely complex situations when numerous medicines interact. It will be able to act as an interactive consultant for doctors and nurses, providing an instant check on the safety and effectiveness of the medication even before its appointment, as well as in situations when the staff of the hospital is tired or distracted this system will undoubtedly contribute to avoidance

of meaningless deaths, unnecessary expenses and discomfort. Martin Ford points out: "The Watson system is the most ambitious and well-known program of artificial intelligence in the health sector, but besides it, there are other examples of successful use of digital technologies in medicine. In 2009, researchers from the Mayo Clinic in Rochester, Minnesota, created a neural network for diagnosing cases of endocarditis, that is, inflammation of the inner layer of the heart. .. Doctors from the Mayo Clinic taught the neural network to diagnose" [14, p. 198]. One of the most important advantages of artificial intelligence in medicine will be avoiding of potentially fatal mistakes both in diagnosing and treating.

Martin Ford is trying to warn that, if the machines can demonstrate their ability to diagnose accurately and offer effective treatment, then the doctor may have no need to control every contact with each patient directly. The author suggests that in the near future there will be an opportunity to create a new class of medical professionals who will be able to examine the patient by giving the gathered information to a standardized diagnostic and treatment system.

Speaking about radiologists, the researcher says that the technology of image processing and their recognition is progressing rapidly, and soon artificial intelligence can take away their traditional role.

Analyzing the work of the pharmaceutical department at San Francisco Medical Center, which produces about 10,000 individual doses of medications daily, the scientist describes in detail the process itself: "A huge automatic system manipulates thousands of names of various medications, and at the same time it does everything from storage and replenishment of pharmaceuticals wholesale to the packaging and delivery of certain pills. The robotic hand continuously takes the pills from the containers and scatters them into small plastic bags. Each dose is placed to a separate bag and is marked with a bar code indicating the medication and the patient for whom the medication is prescribed. After that, the machine puts a daily set of medicines in the order they should be taken and packages them together ... This system virtually eliminates the possibility of human behaviour due to the fact that it almost completely eliminates a human being from the production cycle" [14, p. 204].

In some US hospitals robots help to deliver medicines, laboratory tests, food, clean linen for patients, which simplifies the work of healthcare workers. Due to this, D. Rose points out: "Imagine a global system of connected healthcare items. Each diabetic can carry a sensor and a signaling system that will collect data about his lifestyle, addiction to drinking and smoking, blood sugar levels, weight, blood pressure, insulin injections and drug use. Everyone will perceive this system as a magic one, because colourful spheres, mobile applications and flowering plants will remind, warn about the dangers and will approve adherence to the drug regimen and blood level control". He continues that it "is only the beginning and the gathered data will

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inform doctors and medical institutions about the trends and dangers associated with diabetic patients and their need for medical care [10, p. 310].

The most important branch of the robotics developmentin medicine is the care for elderly people. This branch is just evolving: there are relatively few companies focused on designing care assistant robots for elderly people. A hybrid auxiliary limb was created in Japan, which is attached to a suit equipped with sensors. The suit due to the accumulator power helps to make mechanical movements.

In the scientific world, discussions about the creation of DNA computers are being conducted, scientists consider this to be potential, as it becomes more and more difficult to produce miniature components for smartphones and tablets. Some molecules can perform the role of information carriers in DNA computers, and others, such as proteins, can perform the role of processors. DNA computers can process information simultaneously, and it drastically speeds up the work. These experimental calculations were performed using unsupported DNA or RNA in special test tubes or on glass plates covered with gold grooves, as on printed circuit boards. A set of DNA molecules was spread on this surface, and they performed calculations, behaving in one way or another. DNA molecules were used in cells for very thin materials synthesized by man. They can be used like biocomputers if they are used in a cell, they can find a damaged organ etc. However, we are facing exciting perspectives in biology and biomedicine.

In future, with the help of DNA computers, new, perfect DNA devices will be created that will work as biosensors, perform diagnostics, will be used in nanotechnology production, and help control biological processes in human cells. Due to DNA computers, "smart medicines" will be created, they will work at a specific point, they will collect and analyze a lot of physiological data, perform logical procedures and regulate the activity of genes and medications. In addition to contributing to human health and well-being, researches at the intersection of biological and computer technologies will help to understand the world of nature and the emergence of life on the planet through further development of creativity. Richard Florida states that: "Creativity involves distinctive mental skills and patterns of behavior that should be cultivated both individually and at the social level. Creative ethos penetrates everywhere - into our workplaces, values and our communities, it transforms our vision both of ourselves and our economic and social actors, and thus forms the core of our identities" [13, p. 37]. It requires an environment that could support creativity through a range of social, economic and cultural incentives, which is also important for the development of artificial intelligence, which is designed to perform a large number of diverse functions, A. Shevchenko notes in the

"Digital Era. Speaking Simply about Digital Technologies" [16, p. 439].

Conclusion and further studies.

The peculiarity and fundamental difference of globalization 4.0, which is developing in the conditions of the fourth industrial revolution, is the synthesis of technologies and their interaction in physical, digital and biological domains. According to Klaus Schwab, the following factors may limit the potential and effectiveness of the information revolution.

First, the current level of governance and awareness of current changes in all areas, which is extremely low compared to the need to reconsider economic, social and political systems in order to respond to the challenges of the fourth industrial revolution. As a result, the national and global organizational structures that are needed to regulate the spread of innovation and mitigate disruptions are, at best, inadequate, and at worst they are completely missing. As Everett M. Rogers notes, "Many important technologies have emerged due to military needs, such as nuclear power, jets, and the Internet. Some technologies are influenced by government regulations on compliance with safety, health and environmental requirements, as well as antimonopoly legislation" [8, p.173].

Secondly, there is also no coherent, positive and singular concept at the global level that could identify the opportunities and challenges of the fourth industrial revolution and which is of fundamental importance for the involvement of different layers and communities in the process, as well as in order to prevent the negative reaction of society.

Thirdly, the history of technology is full of optimistic, if not utopian, views on a happier, healthier and more promising future. Each new wave of technologies causes a lot of changes: some of them are positive, others are negative, and many are quite unpredictable. It is impossible to predict in which realm the shift will take place, and how new phenomena will interact with other technologies, social systems and factors. When in the 1990s of the XX century the Internet began to form, the biggest concern was the gap between those who could use it and those who could not. The digital gap focuses on potential economic and social inequalities.

At the basic level, this means that those who have access to the data, information and knowledge will have the advantage. And those who do not have digital tools, including the Internet, will lose the opportunity to get education, work, proper medical care, and so on. "Z Generation is growing at the peak of the industrial revolution 4.0, it can not be surprised by digital currency or new technologies such as blockchain. Z Generation is keeping up with the changes and the representatives of this generation are becoming more entrepreneurs than employees. Z Generation does not see borders, its representatives grow up becoming global citizens, without being attached to a country or any assets" [16, p.7].

Further studies – further study will be connected with the implementation of innovations - new

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types of artificial intelligence and medicine, robotics and "the rise of robots", superior to imagination, destroying stereotypes and competing the human brain.

Innovations have come and stand on our doorstep, they will change our world at an unprecedented speed, and this will affect every sphere and sector. These issues will be the subject of further scientific study.

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РОЗВИТОК ЦИФРОВИХ ТЕХНОЛОГІЙ У СФЕРІ МЕДИЦИНИ В УМОВАХ «ГЛОБАЛІЗАЦІЇ 4.0» : СОЦІАЛЬНО-ФІЛОСОФСЬКІ ВИМІРИ

Анотація. Актуальність даної теми зумовлена процесами глобалізації 4.0, що відбувається в умовах нової промислової революції, що створює як позитивні, так і

негативні наслідки у науці, медицині, інженерії, фінансовій сфері, геополітичному, культурному вимірах. Цифрові технології, засновані на програмному забезпеченні та соціальних мережах, стають більш ефективними та інтегрованими, викликаючи трансформацію у всіх сферах суспільства глобальної економіки. **Мета дослідження –** проаналізувати розвиток смарт-технологій в медицині в умовах «глобалізації 4.0». **Завдання дослідження -** соціально-філософський аналіз феномена «глобалізація 4.0» та революцій, що їй передували, в контексті яких розвисаються проблеми смарт-технологій в медицині; вивчення проблем взаємодії суспільства, людини та інновацій в сфері медицини як взаємодетермінованих феноменів людського існування, які насичують, збагачують і доповнюють одне одного. **Аналіз останніх досліджень і публікацій, в яких започатковано розв'язання даної проблеми:** концепція «глобалізації 4.0» увійшла у науковий світ завдяки працям Клауса Шваба, німецького економіста, засновника та президента Всесвітнього економічного форуму у Давосі, автора книги «Четверта промислова революція». Різні аспекти даного феномена, які вплинули на її формування відобразилися у статтях та монографіях українських вчених - В. Воронкової, В. Лук'янець, О. Кравченко, Л. Озадовської, В. Ляха, В. Пазенюка, К. Райди та ін., а також плеяди західних науковців - Кена Робінсона, Самуеля Грінгарда, Ааратхі Прасада, Мартіна Форда, Кевіна Келлі та ін. **Методологія дослідження.** Методологія дослідження включає аналіз нових феноменів смарт-технологій в медицині в умовах глобалізації 4.0, що розвисається на наших очах, і побудована на основі інтегрованого підходу в контексті міждисциплінарного характеру. У статті використовуються такі методи наукового знання, як аналіз і синтез, вимірювання, перехід від абстрактного до конкретного, синергетичний підхід, завдяки якому можливо було проаналізувати складні проблеми смарт-технологій в медицині. **Наукова новизна дослідження** – виявлення проблем взаємодії людини, суспільства і медицини в умовах глобалізації 4.0, що сприяють формуванню нового технологічного простору. **Результати дослідження:** проаналізовано позитивні та негативні наслідки глобалізації 4.0 для розвитку суспільства, медицини та людини; розкрито майбутні сценарії у подоланні небезпечних хвороб для людства. **Висновок** - особливістю і фундаментальною відмінністю глобалізації 4.0 є синтез цих технологій та їх взаємодія у фізичних, цифрових і біологічних доменах.

Ключові слова: глобалізація - 4.0, Інтернет речей, глобалізація, штучний інтелект, робототехніка, генетика.

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РОЗВИТИЕ ЦИФРОВЫХ ТЕХНОЛОГИЙ В СФЕРЕ МЕДИЦИНЫ В УСЛОВИЯХ «ГЛОБАЛИЗАЦИИ 4.0» : СОЦИАЛЬНО-ФИЛОСОФСКИЕ ИЗМЕРЕНИЯ

Аннотация. Актуальность данной темы обусловлена процессами глобализации 4.0, которая происходит в условиях новой промышленной революции, создает как положительные, так и отрицательные последствия в науке, медицине, инженерии, финансовой сфере, геополитическом, культурном измерениях. Цифровые технологии, основанные на программном обеспечении и социальных сетях, становятся более эффективными и интегрированными, вызывая трансформацию во всех сферах общества глобальной экономики. **Цель исследования** - проанализировать развитие смарт-технологий в медицине в условиях «глобализации 4.0». **Задача исследования** - социально-философский анализ феномена «глобализация 4.0» и революций, которые ей

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предшествовали, в контексте которых развиваются проблемы смарт-технологий в медицине; изучение проблем взаимодействия общества, человека и инноваций в сфере медицины как взаимодетерминованных феноменов человеческого существования, которые насыщают, обогащают и дополняют друг друга. Анализ последних исследований и публикаций, в которых начато решение данной проблемы: концепция «глобализации 4.0» вошла в научный мир благодаря трудам Клауса Шваба, немецкого экономиста, основателя и президента Всемирного экономического форума в Давосе, автора книги «Четвертая промышленная революция». Различные аспекты данного феномена, которые повлияли на ее формирование и отразились в статьях и монографиях украинских ученых - В. Воронковой, В. Лукьянец, А. Кравченко, Л. Озадовская, В. Ляха, В. Пазенюк, К. Райд и др., а также плеяды западных ученых - Кена Робинсона, Самуэля Грингарда, Ааратхи Прасада, Мартина Форда, Кевина Келли и др. Методология исследования. **Методология** исследования включает анализ новых феноменов смарт-технологий в медицине в условиях глобализации 4.0, развивается на наших глазах, и построена на основе интегрированного подхода в контексте междисциплинарного характера. В статье используются такие методы научного знания, как анализ и синтез, измерения, переход от абстрактного к конкретному, синергетический подход, благодаря которому можно было проанализировать сложные проблемы смарт-технологий в медицине. **Научная новизна исследования** - выявление проблем взаимодействия человека, общества и медицины в условиях глобализации 4.0, способствуют формированию нового технологического пространства. **Результаты исследования:** проанализированы положительные и отрицательные последствия глобализации 4.0 для развития общества, медицины и человека; раскрыто будущие сценарии в преодолении опасных болезней для человечества. **Вывод** - особенностью и фундаментальным отличием глобализации 4.0 является синтез этих технологий и их взаимодействие в физических, цифровых и биологических доменах.

Ключевые слова: глобализация - 4.0, Интернет вещей, глобализация, искусственный интеллект, робототехника, генетика.

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