

Artificial Intelligence as a Cure-all in Addressing the Issues of Armenia's National Security¹

GAYANE HARUTYUNYAN

Public Administration Academy of the Republic of Armenia²,

Republic of Armenia

e-mail: harutyunyan.gayane@paara.am

Abstract

It is evident that artificial intelligence, which integrate actually all technologies of 4th industrial revolution will change all aspects of war laying the foundation for a new type of arms race. Therefore, the world will soon be watching a totally different war. In this context, it is obvious that in today's world the development of artificial intelligence has become for each country – and with great urgency for countries with a high probability of being drawn into new wars – no matter of national security, but also the struggle for survival in general, since it quickly penetrated the army and requires an appropriate response from the state's defense departments with an adequate speed.

The main purpose of this research is to discuss the resolution of the security issues facing Armenia from the perspective of the indigenous defense industry development adhering as guidelines the possible transformations in the nature of future wars caused by the development of artificial intelligence, the increase in demand for new "smart" weapons, and accordingly offering new solutions for defense industry development. Taking into account the interdisciplinary character of the work, a wide range of scientific analyzes were carried out for studying the nature of modern wars, forecasting the future wars, revealing the main trends of the contemporary weapons' world market, exploring the military use of digital technologies – in particular the application of artificial intelligence for military purposes, as well as for studying the opportunities of digital transformation in Armenia, for assessment of the technological ecosystem and the potential for the defense industry development on a new technological basis. As a result of research work, a reasonable vision of development of the artificial intelligence-based defense industry in Armenia was proposed with a clear and detailed recommendations for achieve it.

Points for Practitioners

The cross-cutting theme in the current research on the military use of AI is that the armed forces of countries will continue to perform the same functions, generally maintaining the logic of military operations, but they will simply be implemented by new weapons modernized with AI within concept corresponding to new opportunities. However, it should be noted that this logic of building new security and defense systems may not be commensurate with the breakthrough changes that can actually occur as a result of the penetration of AI into the military domain. Moreover, in predicting possible changes it will often be difficult to determine where science fiction ends, and reality begins due to the presence of "elements of unusualness". In any case, in order to move forward in considerations about the military use of AI, it will be necessary to go beyond the previously accepted conventionalities and look towards the future. In the current conditions it is almost pointless to focus on the organization of military production in the last stages of the technological cycle (maturity and decline). The new technological age constantly demands innovations and new solutions, and it first of all refers to the cognitivization of the military sphere.

In fact, there are many preconditions for the launch of "Armenian" AI in the military sphere. Perhaps, in order to direct the existing opportunities in the field to improve the national security of state, it is necessary to develop a systematized

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² *Vice Rector for Scientific Affairs and External Relations, PhD (in Economics), Associate Professor. Public Administration Academy of the Republic of Armenia, Yerevan, Republic of Armenia.*

and coordinated economic policy in all concerning areas – human capital development, improvement of ecosystem for digital transformation of economy, implementation of new financing approaches, development of venture entrepreneurship, introduction of public-private partnership mechanisms, more efficient distribution of government expenditures, etc. – which will ensure the development of defense industry based on high-tech due to the synergistic effect.

Keywords: artificial intelligence, defense industry, digital technologies, national security, nature of future warfare.

Introduction

The convergence of the improvement of weapons and military equipment with the trends of the rapid development of modern digital technologies, as well as the new “smart” arms race that has already become a reality, not only between superpowers, but also between relatively small states and regional actors, suggests that in the near future new means of influencing the enemy may appear, which will surpass the existing models in their characteristics, changing the synergistic effectiveness of the previous concepts of warfare.

At the same time, it is obvious that the advances recorded in recent years, especially in the field of deep machine learning together with the unprecedented increase in the volume of available data necessary for analysis and self-learning, have created significant prerequisites for the widespread use of artificial intelligence in military area, as well as for the expanding its applicability in other areas, which may have noticeable consequences in the future not only on economic developments and the peculiarities of human society's working activities, but also on the *global strategic balance*. In this context, it is obvious that in today's world the development of artificial intelligence has become for each country – and with great urgency for countries with a high probability of being drawn into new wars – not only a matter of national security, but also the struggle for survival in general, since it quickly penetrated the military realm and requires an appropriate response from the state's defense departments with an adequate speed.

The main purpose of this research is to discuss the resolution of the security issues facing Armenia from the perspective of the indigenous defense industry development adhering as guidelines the possible transformations in the nature of future wars caused by the development of artificial intelligence, the increase in demand for new “smart” weapons, and accordingly offering new solutions for defense industry development. Taking into account the interdisciplinary character of the work, a wide range of scientific analyzes were carried out for studying the nature of modern wars, forecasting the future wars, revealing the main trends of the contemporary weapons' world market, exploring the military use of digital technologies – in particular the application of artificial intelligence for military purposes, as well as for studying the opportunities of digital transformation in Armenia, for assessment of the technological ecosystem and the potential for the defense industry development on a new technological basis. As a result of research work, a reasonable vision of development of the artificial intelligence-based defense industry in Armenia was proposed with a clear and detailed recommendations for achieve it.

Current State of Knowledge

As a wide-spectrum multiplier of military capabilities, artificial intelligence, in fact, in the modern world acts as a as a kind of substance of military power – such as electricity or radio communication (Ghazeyan, 2022) – capable to significantly change the strategic balance both in different regions and around the world. Managing the application of artificial intelligence in the military domain will be crucial in the global world in terms of reducing the risks of future military conflicts, and, according to some theorists, increasing them (Kasapoğlu and Kirdemir, 2019).

In addition, the competition between different countries for the enhancement of data-driven technologies and their ownership will lead to noticeable “geotechnological reconstructions” (Mearsheimer, 2021), which will have a serious impact on the national defense strategies of different states. Under such conditions, small states, as well as actors with

large or small geopolitical weight in different regions, cannot remain aloof from the mentioned developments and seek to arm their military-political “arsenal” with weapons equipped with artificial intelligence technologies, or to accumulate the necessary potential for indigenous design and production.

There is a lot of research, studies and analyzes highlighting the importance of artificial intelligence as a cure-all for the security issues. For instance, Bächle and Bareis (Bächle and Bareis, 2022) argue that AI and the “smart” weapons designed on its basis have the importance of “strategic deterrence” in the superpowers’ grand strategies (USA, China, Russia). Each state strives to position itself as a full-fledged participant in the global technological race, trying to compete for economic, military and geopolitical advantages in the realm of AI development. Today, these approaches already are part of the broader national identity narratives of the superpowers, interrelated with more specific ideas of military “self-assurance” and pride, which in the long run serve the purpose of deterring the political adversary.

Araya and King (Araya and King, 2022) remark that the artificial intelligence – as a dual purpose technology, has succeeded in driving convergence with the progressive pace of development of physical, digital and biological technologies, which is, in fact, the initial stage of the predicted new “enormous technological revolution”, while adding that in modern conditions the problem of maintaining an advanced and promising military potential for each state is directly related to the possibilities of AI “weaponization”.

Of course, there are also other opinions (Litton, 2020) that do not consider AI more than ordinary “hype” and that it cannot be considered as a security cure-all. However, we shall notice, that when making such a statement, the authors most often refer not to the absence of suchlike AI potential, but to the insufficient as yet development, and in some cases to “still an rudimentary state.” There is also considerable controversy that AI cannot make decisions more effectively than humans, but it is clear that military personnel using AI-powered weapons and military equipment have a huge advantage on the battlefield than those who rely solely on the human mind in their decision-making (Johnson, 2019).

However, the fetishization of AI as a multiplier of military power capable of fundamentally changing all previously existing concepts and rules of warfare, can be found rather in the strategic documents of the superpowers, as well as in various statements of the military-political leadership. For example, the use of autonomous systems in the military domain was the pivotal factor of the Pentagon's “Third Offset Strategy”, which, in fact, was supposed to allow the United States to maintain its technological superiority over geopolitical adversaries (Saylor, 2020). And in 2019, during an open discussion about AI, the President of the Russian Federation announced that if any country can acquire a monopoly in the field of AI, then it will become the ruler of the world³. The world market of AI-powered smart weapons is currently described by an interesting trend that could previously only be observed during the implementation of nuclear programs by various superpowers, when even the hint that a particular state has the potential to produce such weapons increased the military and political weight of that state. It should also be noted that the United States and China avowedly declare that the interests of AI development are of a geopolitical nature⁴, and the global competition in this area will unfold according to the logic of both “soft” and “hard” power.

On the nature of future wars

The widespread use of AI will also lead to incredible transformations of weapons. Already today, UAV, space reconnaissance, laser and supersonic weapons have become a regular components of modern wars. However, the transition from the information age to the “age of intelligence” (Bai, 2020), accompanied by quantum computing, emergence of technologies influencing the parameters of time and space, production of novel materials, discovery of new energy sources, as well as the realities of the interpenetration of human abilities and digital technologies, allows us to

³ Source: [Путин взялся за искусственный интеллект. Что обсуждали на первом совещании - BBC News Русская служба](#)

⁴ DoD Digital Modernization Strategy. DoD Information Resource Management (IRM) Strategic Plan FY 19-23, p 14.

predict that the world will soon witness a completely different kind of war. Driven by unprecedented development of artificial intelligence over the last few years, it has become much more similar to human intelligence than one might assume within framework of technological optimism pervading the most successful AI designers. It is even hard to admit that AI can surpass human capabilities in the areas of image and speech recognition, translation, human emotions assessment, disease diagnosis and even written in verse or composing music.

Previously, we have already explored the contemporary trends and examples of the use of “narrow” artificial intelligence in the military sphere in our publications, and as the main areas of AI military application, we presented intelligence, logistics systems, operations in cyberspace, command and control of the armed forces, autonomous and semi-autonomous vehicles, war games and military drill simulation (Harutyunyan, 2020a). Within the framework of this research, we will try to present some forecasts of what development weapons systems equipped with artificial intelligence may have and what kind of new wars it can lead to.

The cross-cutting theme in the current research on the military use of AI is that the armed forces of countries will continue to perform the same functions, generally maintaining the logic of military operations, but they will simply be implemented by new weapons modernized with AI within concept corresponding to new opportunities (Spiegeleire et al., 2017). However, it should be noted that this logic of building new security and defense systems may not be commensurate with the breakthrough changes that can actually occur as a result of the penetration of AI into the military domain. Moreover, in predicting possible changes it will often be difficult to determine where science fiction ends and reality begins due to the presence of “elements of unusualness”. In any case, in order to move forward in considerations about the military use of AI, it will be necessary to go beyond the previously accepted conventionalities and look towards the future.

In the framework of this approach, we will present new types of war and their possible development, taking as a starting point the “hyper-networked vision of future war” published by the “The National Interest” in June 2020 (Osborn, 2020). The latter describes one episode of the fighting as follows. The drone detects the aggressive activity of the enemy hiding behind the mountain range and transmits this information to a small column of forward operating reconnaissance and robotic weapons systems. These robots then traverse the rugged terrain, maneuver through hostile territory and get in favorable position for counterattack. Soldiers, operating in the role of command and control, receive navigational and targeting data from “networked” robots and forward intelligence for approaching manned and unmanned armored vehicles and air attack platforms. Thus, well-informed and equipped with additional means forces are able to immediately open accurate fire in the direction of enemy combat units, preventing an attack. This is a simplified model of network interaction of air and ground robotic systems in the future wars, based on the operation of unmanned vehicles equipped with artificial intelligence. Currently, in the United States at Carnegie Mellon University works are underway to improve the algorithms developed for increasing the efficiency of such interaction. Note that models of “intelligent” interaction between only aerial drones (for example, the UAV Swarm tactics) have long been developed and are used in the armed forces of different countries. Particularly impressive is the drone swarm launched by Pentagon in 2016 (consisting of 103 mini-drones weighing 290-gram, launched mid-air by a trio of F/A-18 Super Hornet aircraft) that exhibited swarm-specific behavioral patterns such as adaptability to unknown environment, self-organization, self-recovery and collective behavior (Mehta, 2017). The interaction between unmanned air and ground vehicles provides increased opportunities for adaptation to various scenarios of combat operations, envisages more flexible transformations of various units and greater viability on the battlefield.

However, the design of new weapons and new military tactics based on AI is an iterative process with incredible innovations possible at every next stage. For example, various research laboratories are currently working on the use of advances in biomimetics for military purposes to provide the ability to disguise self for ground robotic systems, moving

over rough terrain and maintain viability in various terrain conditions. In this regard, research by the Department of chemical biology at Northeastern University (USA) is especially interesting. This research is aimed to proposing camouflage technologies that imitate octopuses, cephalopods and chameleons – for example, disappearance, adapting color to the environment etc. (Northfield, 2018). To create such biorobots or similar “future soldiers” there will be a great demand for new construction materials in the near future – light in weight, but with great durability, strength and flexibility. Moreover, biological systems found in wildlife, the shape and structure of which determined by constancy of their self-healing, adaptation to the natural environment, the ability to independently change their structure and self-improvement, will also serve as the basis for obtaining similar materials (Wegst et al., 2014). Already today, there are great scientific achievements in the production of self-healing materials, polymers, composite materials, which have also found their application in modern military products (Yuan et al. 2008).

One of the most important parameters of “new generation” weapons, which will be the main guarantee of their “intelligence” and independence, will be the ability to accumulate energy, and why not – to generate its own energy. It turns out that in the coming years, countries that will be able to develop and produce cheap, compact but relatively high-performance energy sources or new types of batteries can also achieve significant success in the production of military technologies. And again, the US defense-industrial companies have achieved great success in this area, using hydrodynamic energy for military jellyfish robot to ensure the autonomy of operations for several months⁵. The use of small and harmless for human sources of nuclear energy to ensure the independence of robotic weapons could be a major scientific breakthrough (Ефимов, 2013).

However, despite the fact that science can achieve incredible success in increasing the autonomy of weapons, striking power and in improving endurance of new types of weapons, human will continue to play a central role in modern and future wars. This is why the wars of the future are often described as the “war of the centaurs⁶” (Layton, 2018), meaning that they will become a platform for effective cooperation between man and machine. In this regard, one of the important tasks in practice will be to determine the optimal ratio of human and artificial intelligence, which will allow to use the best qualities of each in a the best possible way. In other words, the emergence of new technologies will noticeably change the strategic and tactical approaches in warfare, determining them farther by the organization of human-machine combat units and an objective assessment of their capabilities.

The outlook for Armenia's defense industry development based on artificial intelligence

The most effective way to have a strong military security system is to develop a local defense industry. The solution to this task can certainly be quite difficult for small countries if it did not take into account the opportunities provided by the new technological age. In particular, small countries with developed human capital, which have competitive advantages in the fields of information technology (especially in software), radio electronics and precision engineering, have a real chance to become a country determining the nature of war in the cyclical development chain “technological progress-changing nature of wars” by their own development of weapons (Harutyunyan, 2020b). Especially those countries that incur large defense expenditures contingent on their strategic needs, can reallocate these expenditures to the development of the high-tech sector, contributing to the development of both economic growth and new technology-based defense industry.

It should be noted that in the current conditions it is almost pointless to focus on the organization of military production in the last stages of the technological cycle (maturity and decline). The new technological age constantly demands innovations and new solutions, and it first of all refers to the cognitization of the military sphere. From this point of

⁵ Spencer Ackerman. Video: This Massive Jellyfish Is Really an Aquatic Spy Robot.
<https://www.wired.com/2013/03/robot-jellyfish/>

⁶ Centaur is a creature from Greek mythology with the upper body of a human and the lower body and legs of a horse.

view, the development of defense industry in Armenia should be discussed only in the context of the development of opportunities to produce technologically new products. Certainly, the question arises, does Armenia have such potential and can it take adequate steps to turn the challenges of the new technological era into opportunities and a cornerstone for development? For many years, the IT sector, particularly software, has been considered a comparative advantage of Armenia, which also had a vision of solving a number of problems facing the country due to the economic blockade. It seems that the time has come to use that advantage perfectly for the benefit of the country's security, at the same time providing positive externalities for all sectors of the economy. But is the specialization in IT sufficient for the development of the AI sector? Obviously, there is a need for a technologically advanced ecosystem, new approaches to financing and venture entrepreneurship, a close relationship between science and production domains.

Needless to say, the technological ecosystem in Armenia has improved significantly over the past few years, for instance, the growth was noted at 27%⁷. The world leaders in the field of information technology consider Armenia as a country with significant potential, which is led to the presence of offices of many well-known international companies in the country – Microsoft, IBM, Synopsys, National Instruments, Oracle, VMWare, Cisco, Mentor Graphics, Teamviewer, D-Link, PicsArt etc. Moreover, these companies work quite effectively. For example, the 100 engineers at VMWare's Yerevan office earn 30% of the company's total revenue, and three researchers from the same office registered 50% of the company's total patents (Юшкевич, 2019). The technological environment has been positively influenced by the government investment policy, which exempts start-ups from taxes, provides income tax incentives for employees in the sector (10% instead of 23% in other sectors), as well as by provision of ample opportunities for venture funding through various investment funds.

We will try to describe the features of the activities of well-known companies operating in the field of artificial intelligence in Armenia in order to outline the vision of using their capabilities in the military domain.

Microsoft Innovation Center Armenia is a part of Microsoft Corporation's global network of innovation expansion and development in IT, the main purpose of which is to organize training programs and coding bootcamps, aimed at development of qualified workforce for IT sector as well as providing specialized support to startups in the development of innovative IT solutions and products in various spheres. Currently, the Center, in cooperation with Black Sea Project Promotion Facility, has launched a new program, the main objective of which is to develop Big Data-driven technological solutions customized to address specific business needs for SME in the sectors of telecommunications, financial and banking system, transportation, retail and e-commerce, etc.

Known and not secret that the demand for qualified specialists in the field of Big Data analysis and Data Science is quite high in the defense industry as well. All types of military equipment, unmanned aerial vehicles, mobile defense complexes are now equipped with sensitive devices and sensors, from which a huge amount of information is transmitted regarding the ongoing military operations or their possible preparation. It is obvious that for qualitative analysis and systematization of such information using artificial intelligence will allow defense departments to reduce the number of operators to control drones. To effectively achieve this goal, qualified data scientists are needed. Big data technologies are also widely used in cyberwarfare, which is currently accompanied by extensive disinformation and propaganda. The analysis of information from various media, social networks, blogs using artificial intelligence can very quickly present useful recommendations for developing counteraction policies.

Data Science also plays an important role in the operational processing and exchange of information about the state of military equipment and weapons (for example, the Teradata platform used in the United States is designed to quickly

⁷ «Անալիտիկոն» №10 (130), հոկտեմբեր, 2019, Ինովացիոն Հայաստան, էջ 25: [The Analyticon, 10 (130), October, 2019, Innovative Armenia, p. 25] (In Armenian)

investigate and respond to problems with Apache helicopters). Intended use of the Microsoft Innovation Center's capabilities for the application of Data Science and Big Data technologies in the military domain can significantly increase the level of situational awareness and command and control efficiency during military operations.

According to 2019 data, **IBM** is the market share leader in AI software platforms for the fifth consecutive year and is one of the five largest companies in the world in terms of the number of artificial intelligence patents. In Armenia, this company is company operates through the ***Innovative Solutions and Technologies Center***, which implements educational programs in new specialties (artificial intelligence, cybersecurity, business management, cloud technologies) necessary for the digital transformation of society, provides research incubators equipped with the IBM latest equipment and software for innovation, cloud servers, network storage, consulting, support and funding for promising start-ups. The potential of the IBM Center for Innovative Solutions and Technologies can be used both for training qualified specialists with the view of AI application in the military domain, and for interdisciplinary research related to the digitalization of the defense industry and military command and control system.

Cisco Systems is known worldwide as the largest multinational organization that produces network technologies, equipment and software necessary for them. In Armenia, it carries out its general activity through Cisco networking academy, where students acquire modern specialties in the field of information technology design, development and technical support in order to implement high-tech orders for local, regional and international organizations. The latest network technologies play a key role in the smooth operation of the Internet of Things. The latter is widely used in the military domain for intelligence purposes, and is most effective in the case of collected information operational processing by artificial intelligence. The already mentioned "drone swarms" operate with the logic of the Internet of Things and the direct involvement of artificial intelligence. Even a partial presence of such a large company in Armenia creates preconditions for qualified specialists' capacity-building in network technologies with their subsequent direction for the implementation of special operations with innovative military technologies, capable of quickly resolving the outcome of the conflict.

Synopsys Armenia is engaged in research and engineering operations in the field of electronic computer-aided design, integrated circuit design and software. In Armenia the company operates through its state-of-the-art research and production center, which is Synopsys' largest division operating outside the United States. The company is currently the world's largest provider of IP solutions for artificial intelligence, cloud computing and the Internet of things. Moreover, it offers such solutions for all types of AI-based projects. Synopsys Armenia is also one of the few companies operating in Armenia that has been using the capabilities of artificial intelligence in the manufacturing process for several years to test manufactured chips, identify defects and quickly fix them. The company's capabilities can be used to transform the idea of a "drone swarm" into reality in Armenia. By the way, even the executive director of the company alluded to this during the DIGITAL UAV Forum, held in Yerevan back in December 2019.

For more than 40 years, **National Instruments** has been developing high-performance automated systems for testing and measuring of various purposes. The company provides engineering firms with an open platform, extensive ecosystem based on modular hardware and software developed by the company, facilitating design work, resulting in significantly increased productivity and significantly reduced time to introducing new products to market. The company's products are used in many different industries – from the testing of next-generation gaming systems and the production of modern medical equipment to the aerospace industry and wireless communication technologies. The Armenian office of the company is currently implementing several large-scale projects in the field of developing prototypes of 5G communication systems, testing various functions of autonomous vehicles, applying IIoT (Industrial Internet of Things) and testing microcircuits designed for these areas. From the perspective of defense industry development, it is especially important to develop solutions related to autonomous vehicles, to exploit AI software algorithms and neural networks for

them, as well as create virtual platforms for testing autonomous vehicles, which can be implemented with the potential of the Armenian office of the company.

Oracle is the fourth largest software company in the world, and the world's largest provider of server equipment. The company specializes in the production of database management systems, which are widely used both in the public administration and in business projects. In Armenia, it operates through the local company LiveLook, that has been acquired back in 2014. The main area of specialization in Armenia is the development of cloud visual collaboration technologies, and the offer of innovative technologies for joint use of the screen (virtual workspace). Such technologies, as well as innovative solutions for the management of large-scale databases controlled by artificial intelligence, can be indispensable for use in the military sector. Such technologies, as well as innovative solutions for large-scale databases managing operated on the basis of artificial intelligence, can be indispensable for application in the military sphere.

In fact, Armenia has a well-established business culture in the AI sector and the potential for development not commensurable with capabilities of small country. Suffice it to note that the website of **YerevaNN** AI Research Lab page is Google's most popular deep learning resource. AI laboratories are established also at National Polytechnic University of Armenia, at American University of Armenia (with PicsArt) by Catalyst Foundation and other organizations. Many successful AI startups have been launched, which are winners of prestigious international awards.

In fact, there are many preconditions for the launch of “Armenian” artificial intelligence in the military sphere. One of the main tasks, perhaps, is to create an effective platform for cooperation with the Ministry of Defense, the priority of which should be the formation of an adequate “knowledge” base for artificial intelligence self-learning. *At the same time, in order to direct the existing opportunities in the field to improve the military security of state, it is necessary to develop a systematized and coordinated economic policy in all above mentioned areas (human capital development, improvement of ecosystem for digital transformation of economy, implementation of new financing approaches, development of venture entrepreneurship, introduction of public-private partnership mechanisms, review of the structure of military expenditures and more efficient allocation of government expenditures, etc.), which will ensure the development of defense industry based on high-tech due to the synergistic effect.*

In our opinion – and this can be proved by referring to the law of the Republic of Armenia “About Defense” and Military Doctrine of Armenia – since the ceasefire of 1994, Armenia has been guided by one basic principle: to deprive the enemy of the opportunity to win, that is, the main goal in a possible war was not victory, but “not to allow the victory of the enemy”. This can be concluded also by analyzing the types of weapons acquired by Armenia. The transition to a new “intellectual” era should be a tipping point, when Armenia will finally abandon the idea of “depriving the enemy of victory” and will be oriented towards “creating opportunities for its own victory”.

Although Armenia is steadfastly moving forward towards the agenda of establishing long-term peace in the region, the acquisition of offensive weapons by neighboring Azerbaijan, as well as routinely conducting massive wargames on the border with Armenia that look like a rehearsal for a real invasion, force Armenia to keep in sight the threat of a possible resumption of war in the near future. The discrepancy between military budgets and levers of geopolitical influence of Armenia and Azerbaijan as the conflicting parties should force Armenian specialists to seek and create exceptional opportunities for superiority over the enemy. There is one more important issue: Armenia already has a problem with the recruitment of military personnel. The analysis of demographic indicators suggests that this problem will become even more urgent in the future. Therefore, the robotization of the front line can also be a solution to this urgent problem for Armenia. And the last circumstance: Azerbaijan with its 45.3 billion “Oil Fund” and with support of Turkey, in all likelihood will be able to quickly replenish its arsenal with modern types of weapons. Armenia has no other choice but to organize its own production of modern weapons. Wherein, it is important to not duplicate the innovations of other

countries, but to create perspicuous “national features” in the “intellectual” segment of the world arms market, seriously claiming to compete with other countries. We have that potential.

Recommendations (Instead of a Summary)

As a summary, we will present the recommendations, the implementation of which, in our opinion, derives from the need to urgently addressing the security issues of Armenia, in accordance with the requirements of modern warfare.

- The priority is to develop a National strategy for the artificial intelligence development. Many countries of the world, realizing that AI has and will have a significant impact not only on the security system, but also on public administration, economy, education and healthcare, have adopted policy documents for the development of this area, directing all the levers of public administration for implementation of this goal.
- It is more than evident that the production and application of artificial intelligence for military purposes requires the presence of successful entrepreneurs with willingness to take risk and passion for innovation, adequate financial resources, as well as brilliant software specialists. However, success is also largely attributable to the presence of well-versed in military matters personnel who are able to make accurate operational-tactical and strategic decisions in any situation, since the algorithms of automated systems can only be programmed on the basis of formalizing their knowledge. Simply put, we can't have good military robotic systems if we don't know what actions a good soldier will perform in one or another situation or in the conditions of uncertainty. From this point of view, the development of military science in Armenia, as well as the development of military education, which takes into account the operational and tactical features of military conflicts in the region, is of special importance. In addition, the design and production of new generation “smart” weapons requires interdisciplinary cooperation between entrepreneurs, software engineer and military professionals.
- There is a great potential in Armenia for the development of digital simulation strategy games and the creation of virtual military training grounds. At the same time, there is a great need to create virtual warzones of the future, develop appropriate tactics and strategies, substantiate the effectiveness of intelligent automation on their basis, preparing preconditions for their practical application in the future.
- Considering the morale and psychological stability of military personnel to be particularly important both during military operations and during combat duty, we deem necessary and possible to produce “smart” military uniforms in Armenia, which will be equipped with special sensors, equipment, and artificial intelligence elements, allowing to quickly assess changes in the military personnel’s moral and psychological state and respond quickly (for example, through a patriotic military song or in some other way) to restore the previous state.
- The adoption of AI can play an important role in improving the logistics of the military economy and the optimal organization of the transport system. Efficient transportation of food, weapons and ammunition, as well as army units is the key to successful military operations. The implementation of a “smart” transport and logistics system will significantly save costs and human effort. At the same time, this will allow government agencies to easily track breaches and address them quickly. This will also allow to solve the problem of optimal decentralization of strategic facilities, military warehouse bases and arsenals. Therefore, the development of the architecture of the “smart” military-industrial complex and its digital control model is a priority task.
- As is known, for machine learning, it is first required to build a knowledge and information base, to identify dependencies and patterns in them for solving a particular problem. Taking into account the high demand of defense department for automated systems for making optimal decisions in situations associated with a large uncertainty factor, it is necessary first of all to start building such a base for defense considerations. Only the presence of such a base can guarantee the accuracy of target detection by systems equipped with artificial intelligence, predict the behavior of the

enemy and make the right decision on further actions. Similar systems can be designed by analogy of DARPA's TRACE system (Target Recognition and Adaptation in Difficult Environments), which relies on radar images and synthetic aperture studies and uses machine learning techniques to detect, locate and identify targets.

- The demand for autonomous vehicle (for example, UAV) will remain quite high now and in the future, however, we note that their production simply for the purpose of collecting information is a waste of money and time. Meanwhile, one of the most important directions for ensuring their multi-functionality is again related to machine learning and AI. For example, arming drones with AI components can provide an opportunity to significantly increase the level of situational awareness. Armenia has the potential to produce drones carrying combat duty in the border area, which will be able to identify potential threats and transmit information to response groups. Thanks to this, it will be possible to increase the efficiency of the military personnel's work in conditions of both war and peace.

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