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Technological Trends in Security Policies of NATO: Artificial Intelligence (AI)

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Abstract

NATO updates its defence policies in response to the changing international environment. The remarkable aspect of these policies is the defence measures supported by new technologies. With the 'Artificial Intelligence Strategy', NATO is set to boost its power and competitive potential against its international rivals. It also prepares the ground for a change in international security balances. However, this shift brings a critical challenge: the potential for technological advancement to impact defence strategies and threat perceptions on the global stage. This study aims to examine the impact of NATO's 'Artificial Intelligence Strategy' on international security and the place and importance of these policies in NATO's security policies. The present study is of considerable importance as it examines the changing character of NATO's defence policy in the context of technological developments from the perspective of artificial intelligence, an emerging field of technology. Document analysis and comparative content analysis methods were preferred to analyse the data contained in official documents on AI policy and strategy, and to compare the AI policies of international actors with NATO's AI policy. The main argument of the study is that NATO should take a more active approach to AI policy in order to enhance its defence and competitiveness. In this context, the study seeks answers to the following research questions: "What is the impact of NATO's 'Artificial Intelligence Strategy' on international security?" and "What is the role and importance of AI technologies in NATO's security policies?". In the study, firstly, the impact of AI technologies on international security policies is analysed. The discussion then shifts to an analysis of NATO's 'Artificial Intelligence Strategy'. Finally, the study concludes with an analysis of the impact of NATO's AI policies on international security, taking into account the opportunities and challenges presented by these policies.

Keywords: Technology, Artificial Intelligence, NATO, Security, International Security.

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1. INTRODUCTION

In contemporary geopolitical discourse, the international system faces multiple threats, one of which is the international security implications of technological development. The search for security in the context of the need to take measures against these problems is evolving and diversifying as new trends emerge. Artificial Intelligence (AI) applications, which represent the remarkable technological breakthrough of the 21st century, have the potential to create security issues or eliminate possible threats at the international level due to the unknowns they contain. Therefore, AI technologies could be considered as a significant technological advance whose application is promoted for peaceful reasons. In fact, states, intergovernmental organizations, international organizations, and regional or international technology companies are continuing their efforts to develop AI technologies and to establish criteria for the production and use of AI technologies.

AI technologies, which are predicted to transform the defense and security environment on a global scale, are already being used in healthcare systems, security policies, commercial activities, education, cyber security, and social life. However, this technology also poses a number of challenges. Some of these threats include the use of AI in non-peaceful and malicious acts, the development of AI weapons with the intent to cause harm and the emergence of an arms race based on such weapons, the damage to cyber systems with AI-powered tools, and the development of AI for political manipulation. This situation calls for the development of AI by ensuring its political security as well as its digital and physical security.

The North Atlantic Treaty Organization (NATO) has undergone a multifaceted transformation in its outlook and mission, particularly in response to new security concerns that emerged after the Cold War. In the 1990s, NATO began to take an active role in addressing international security challenges. At this point, NATO has been seeking to expand its technological power and prestige in the international arena by defining defense policies specific to AI since the second half of the 2000s. Thus, NATO believes that AI technologies will affect the organization's defense principles, crisis management methods, and mutual security understanding. In this regard, NATO has taken certain initiatives, especially after 2020, to internalize technological progress and disseminate safe technological defense practices.

This study aims to reveal the role and importance of NATO's AI Strategy in international security policies. In this context, this study will first provide general information on AI technologies and their impact on international security. Then, NATO's AI Strategy will be detailed. Finally, the significance of NATO's AI Strategy for international security policies will be discussed.

2. IMPLICATIONS OF AI TECHNOLOGIES FOR INTERNATIONAL SECURITY POLICIES

AI technologies include activities undertaken to transfer reasoning processes to machines. AI is the engineering science, theory, and practice that involves the development of artificial systems capable

of human behavior. Research in this field is interdisciplinary and draws from a variety of disciplines, including Computer Engineering, Statistics, Economics, Mathematics, Psychology, Neuroscience, Cybernetics, Philosophy, Linguistics and Logic (Tecuci, 2012, p. 168). AI technologies refer to the creation of computing machines and systems that can perform human-specific operations such as learning, reasoning, and decision-making, or the scientific analysis of intelligent behavior patterns and their transfer to machines. The design of machines with different levels of intelligence that can perform deep learning, understanding, reasoning, and interaction processes without the need for human support is another definition that explains AI technologies (Castro & New, 2016, pp. 2-3).

AI technologies are currently used in transportation, agriculture, education, energy, the environment, consumption and production processes, disaster response or emergency prevention, public safety, and the regulation of social life (Castro & New, 2016, pp. 8-35). In today's world, AI technologies provide direct support in a wide range of areas, including drones, autonomous cars, medical devices, home appliances, search engines, smart assistants, spam filtering, image recognition, and applications that facilitate communication in emergencies, as well as traffic control, logistics, targeted online advertising, development of various art forms, proofs of mathematical theories, and judicial processes. It also includes robots with enhanced senses and abilities, and AI-enabled tools that can perform cognitive tasks in accounting, marketing, and human resources (United Nations Office for Counter-Terrorism [UNCCT], 2021, p. 16; Gallese Nobile, 2023, p. 36). Moreover, it is predicted that the digital age developments brought about by Industry 4.0 innovations, such as the Internet of Things (IoT), cyber systems, smart technology applications, virtual reality applications, and Industry 5.0 innovations, including unmanned technologies, will bring new opportunities and unprecedented technological advances to humanity (Erdem & Özbek, 2021a, p. 49).

The term "Artificial Intelligence (AI)" originally became popular in 1956, when John McCarthy, a member of the United States National Academy of Sciences, coined it during a seminar at Dartmouth University. Alan Mathison Turing is widely regarded as the theoretical father of AI. The theory of AI is based on the idea that "computers can also have the ability to reason like humans". AI systems can speed up the process of reviewing documents, facilitating legal proceedings, or analyzing contracts. By working faster than humans, they can reduce the need for manual work in business areas. It can shorten decision-making processes with detailed and comprehensive data analysis. On the other hand, AI systems also have significant drawbacks. For example, some professions may no longer be needed as AI replaces humans. The algorithms that run these systems can be misused to create erroneous data sequences. In addition, cybersecurity issues such as privacy breaches, data leaks, or hacking may threaten the use of AI systems. Another issue in this context is the uncertainty of who will be legally liable for any damage caused by these systems. The reliability of the systems should also be tested in existential issues, such as the restriction of the freedom of life or death (Rezaev & Tregubova, 2023, pp. 568-569). It is necessary to prevent human rights violations, ensure the transparency of algorithms,

investigate the reasons for the working principles of algorithms, and transparently present information about the artificial and natural essence of algorithms to people who communicate with AI (Filipova, 2023, p. 19). In addition, proportionality, non-harm, fair decision-making, non-discrimination, development of safe usability of algorithms, sustainability, privacy, accountability, transparency, and explainability should also be considered in the safety of AI (Begishev et al., 2023, p. 2066).

In the context of AI and security, another area that is benefiting from these technologies, which have been expanding since the second half of the 1950s, is the defense industry. This trend is based on the idea that AI can reduce war costs and casualties by requiring fewer military personnel, work efficiently in difficult geographical conditions and missions that fall under the threat of weapons of mass destruction, and make more rational decisions than humans due to their lack of physical and mental limitations (Etzioni, 2018, pp. 253-254). Indeed, there has been progress in the development of AI in defense systems that contribute to the security of states and supranational political and military structures. However, some argue that the integration of AI into these systems raises some concerns. For instance, one of the main concerns in the international arena is the ability of systems equipped with this technology to act autonomously and learn on their own, leading to unpredictable outcomes, the escalation of hot conflicts, and a possible arms race. In this context, such systems could fall into the hands of non-state armed groups, spread around the world, be cheap and easy to obtain, turn into a type of weapon of mass destruction, and be programmed to be used for illegal activities and crimes against humanity (Lethal Autonomous Weapons Systems [LAWS], 2021).

In 2019, the Russian Federation (RF) adopted the national strategy document "On the Development of Artificial Intelligence in the Russian Federation," which provides a roadmap for the development of AI technologies until 2030. Among the decisions made in this strategy document is the promotion of research focused on the development of AI, facilitating access to the necessary infrastructure and data, or supporting initiatives on technical and scientific issues (Filipova & Koroteev, 2023, p. 363). Romya Bilgin (2021) notes that this technology has considerable potential in the fight against terrorism. The People's Republic of China (PRC), RF, the United States (US), India, Japan, Canada and Germany have made significant investments in AI technology. The European Union (EU) also follows the rivalry between the US and the PRC. In this regard, it can be mentioned that it is crucial to develop AI technologies within the framework of certain procedures and legal regulations. NATO Secretary General Jens Stoltenberg has stated that the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) should be reformed to include autonomous weapons and other armed systems supported by AI (The North Atlantic Treaty Organization [NATO], 2021c) and expressed the need to establish international standards for armed systems using AI as follows (European Union Observer [EUOBSERVER], 2021): "Autonomous systems, drones and facial recognition linked into weapons systems changes completely the nature of warfare just like the industrial revolution did. […] We need some systems established for weapon control and ethical warfare."

Stoltenberg believes that combining new technologies such as AI, facial recognition, or autonomous systems with weapons would create critical problems for arms control and international security. Speaking at NATO's 17th Annual Conference on Arms Control, Disarmament and Weapons of Mass Destruction Non-Proliferation on September 6, 2021, Stoltenberg advocated the establishment of new rules and procedures for these technologies. In addition, Stoltenberg stated that it is essential to explore how autonomous systems and AI technologies may affect armaments (NATO, 2021h).

Regarding the controlled use of AI, UN Secretary-General António Guterres made the following statement:

> *If we are to harness the benefits of artificial intelligence and address the risks, we must all work together- governments, industry, academia and civil society- to develop the frameworks and systems that enable responsible innovation. […] We must seize the moment, in partnership, to deliver on the promise of technological advances and harness them for the common good* (United Nations System Chief Executives Board [UNSCEB], 2022).

The threats posed by AI have the potential to expose individuals, institutions, organizations or states to a wide range of new risks within the framework of responsible use, as emphasized by Stoltenberg and Guterres. The possibility that fundamental human values, such as individual rights and freedoms, privacy, gender equality and non-discrimination, may be intentionally or unintentionally violated by unjust and disproportionate AI applications is also seen as a concern. Cyber threats, physical threats, and political threats could be categorized as misuse of AI technologies in this context (UNCCT, 2021, pp. 21-22; Johnson, 2019, p. 150). Thus, the physical security, digital security, and political security dimensions of AI systems are the main security issues that arise in the development of AI technologies. In this sense, the physical security of AI refers to ensuring hardware security by maintaining human control over autonomous weapons systems. It also includes disarmament, arms control, and efforts to protect civilians from these weapons, as well as measures to prevent states from becoming aggressive with these weapons, developing possible security dilemmas. Digital security, on the other hand, refers to the software protection of AI systems and the elimination of threats from cyber-attacks. In this context, AI is also preferred as a barrier against cyber-attacks and supports firewalls. Political security, on the other hand, is about taking measures against the use of these systems for propaganda, manipulation, the development of new persuasion techniques, or the promotion of discriminatory audiovisual tools. These measures include developing ethical procedures and legal regulations against attempts such as gathering information against opposition parties, polarizing the social structure, increasing the power of authoritarian regimes by discrediting democratic regimes, and establishing control over societies (Erdem & Özbek, 2021b, pp. 165-171). In order to address different levels of risk, it is suggested that a basic distinction between AI applications be made. The first of these distinctions is AI technologies used in the enterprise domain. Applications in this area include technologies related to financial systems and human resource management, and are known to have a low impact from potential technical failures. The other distinction includes AI applications in the

operational domain. Technologies in this domain include deployed systems, vehicles that can operate without human control, and software used in military operations. In contrast, applications in the institutional domain are those where the effects of a potential failure or malfunction are expected to have serious consequences. AI technologies used for mission support constitute the final grouping. These technologies fall between the other two domains in terms of the consequences of possible failures and include applications related to logistics and intelligence activities in general (Hunter Christie, 2020).

3. NATO'S ARTIFICIAL INTELLIGENCE STRATEGY

With the technological transformation of the 21st century, it is clear that digital technologies, especially AI technologies, have been internalized in many aspects of social life and are increasingly favored in supporting defense systems, both in terms of software and hardware, and in developing new strategies in this context (Slijper et.al., 2019, pp. 9-31). In the post-Cold War era, NATO's position in the world order was challenged and international security challenges were perceived as threats to the security of NATO members, necessitating the expansion of NATO's defense mission. Since the 2000s, NATO's efforts to adapt to changes in the international arena have intensified. The challenges that may pose a threat to global security today are being put on NATO's agenda, with NATO is seeking solutions to these problems (Kavuncu, 2022, p. 205). According to the new conditions of the post-Cold War world, NATO has sought a new function and role and as a result of the need for restructuring, it has initiated a major change process both instrumentally and in terms of its understanding its duties and responsibilities (Kavuncu, 2013, p. 303). As part of this change, NATO has implemented new strategies that focus on technological developments in order to diversify NATO's defense tools in the collective security of member states. The NATO Warfighting Capstone Concept (NWCC) is a foundational document in this regard. In the text, NATO emphasizes the use of AI and other technological breakthroughs to diversify defense tools in response to evolving security requirements. On the other hand, the NWCC assesses the acquisition of new technologies by non-state armed groups as a security concern for members (Tammen, 2021). However, in defining new defense strategies against potential threats, NATO has begun to prioritize new strategic areas such as AI, data and information processing, autonomy, quantum technologies, hypersonic technologies, and space, and in this context, particularly in the 2000s, it has begun to encourage the development of technologies that can be useful for both civilian and military purposes in order to strengthen the defense advantages of member states (NATO, 2021a). NATO's "First Artificial Intelligence Strategy Document" was adopted on October 21, 2021, with the approval of NATO Defense Ministers, which, despite its content, was deemed appropriate to be addressed separately from the Warfighting Capstone Concept. This document is a framework text that includes the establishment of a defense policy integrated with ethics, international law, responsible use and NATO's security values. The strategy focuses on establishing an infrastructure for the responsible use of AI, ensuring NATO's leadership in defense and security and enhancing capabilities in these areas with the support of AI technologies, leading to the establishment of security procedures for responsible use and

accountability, and ensuring the security of member nations by identifying potential threats from AI (NATO, 2021d).

Stoltenberg summarized the content of this Strategy as follows:

> *Allies have agreed [with] our first Artificial Intelligence Strategy. It will set standards for responsible use of artificial intelligence in accordance with international law, outline how we will accelerate the adoption of artificial intelligence in what we do, set out how we will protect this technology and address the threats posed by the use of artificial intelligence by adversaries* (Szucs, 2021; Tsukanov, 2021).

This Strategy aims to establish a common policy based on collective defense, crisis management and security cooperation (Lockman & Hunter Christie, 2021; Soare, 2021). In this regard, basic standards based on the framework for the development of controlled and secure AI technologies have been established for the use of AI in defense and security (NATO, 2021e). The Strategy sets out the principles of responsible use in the development of AI technologies to ensure that each member state's international obligations and national priorities, as well as NATO's international orientation in general, are consistent with international legal norms. The first of these principles is lawfulness, which includes developing AI technologies in accordance with human rights and the rules of national and international law. The second principle in this context is responsibility and accountability, which includes maintaining human responsibility and accountability for harm that may result from AI applications. Another principle is explainability and traceability, which states that NATO's work in developing AI technologies should be traceable transparently through the necessary mechanisms. Again, the principle of reliability is crucial in this context, as it encompasses the testability of the safety and security of the systems in use. Another agreed point is the principle of governability, which will allow the definition of ethical and legal norms in human-machine interaction, the functionalization of early detection and prevention capabilities against the undesirable consequences of such systems, the deactivation of systems when desired, and their development under human control. The last agreed principle is bias mitigation, which includes measures to overcome prejudices against these technologies (NATO, 2021d).

Given the growing importance of AI technologies to international security, all NATO members intend to implement these principles in their areas of development. It was also agreed that members would enhance and share their expertise through NATO's AI test centers, that each member would take the necessary steps to eliminate prejudices against AI technologies, and that NATO would conduct benefit and harm assessments of relevant technologies. As part of this strategy, NATO members are to protect AI applications from sabotage and manipulation through cyberdefense techniques, analyze potential threats by supporting AI applications with special security procedures, eliminate mistrust of military uses, and cooperate to prevent a vulnerability that could affect the expected potential of intelligent systems to be used for malicious purposes by a state or non-state armed group outside the NATO region (NATO, 2021d).

Sub-organizations within NATO also play a key role in the development of AI. The NATO Science and Technology Organization (STO) seeks to foster an environment for gathering information on issues such as the use of force, AI technologies, and the provision of cyber defense. NATO Allied Command Transformation (ACT), meanwhile, organizes activities to identify the benefits and potential harm of this technology. The NATO Communications and Information Agency (NCI Agency) organizes symposia and conferences on data analysis, data visualization and the development of machine learning tools. The NATO Industrial Advisory Group (NIAG) addresses the impact of AI technologies on data use and machine autonomy. The NATO Science for Peace and Security (SPS) Program focuses on how the potential of AI can be used to combat non-state armed groups (Tonin, 2019, p. 12).

Stoltenberg, on the other hand, stated the following at a press conference on October 20, 2021:

> *NATO continues to adapt to a more complex and more competitive world. We must keep our technological edge. Future conflicts will be fought not just with bullets and bombs, but also with bytes and big data. We see authoritarian regimes racing to develop new technologies, from artificial intelligence to autonomous systems. So, we are taking further steps to future-proof our Alliance* (NATO, 2021f).

Speaking at the NATO Industry Forum (NIF) held in Italy on November 18, 2021, Stoltenberg expressed the importance of AI technologies for NATO in the following words:

> *Looking ahead, our partnership with the defense and tech industry-across Europe and North America- will be even more critical. Because our ability to innovate is seriously being challenged. More countries around the world are racing to develop new technologies from artificial intelligence to hypersonic gliders. And we have actually seen some testing, both by Russia and China demonstrated that they are investing heavily in these technologies. And other countries are often competing to dominate these new technologies. NATO Allies are front-runners in this race still. But other players are catching up fast. They do not always share our values. Or play by the same rules. And they are challenging NATO's technological dominance* (NATO, 2021b).

NATO Deputy Secretary General Mircea Geoană expressed his concerns about emerging technologies, including AI technologies, at the 25th anniversary event of the Youth Atlantic Treaty Association (YATA) on November 26, 2021. In his speech, Geoană emphasized that technological advances are triggering changes in human life, society, economic order, social contract, defense or security, which creates a sense of fear (NATO, 2021g). During his opening speech at the Cybersec Global 2022 event on January 25, 2022, Geoană made statements similar to those he expressed at the YATA event. Geoană mentioned that AI technologies and autonomous systems, among other technological advances, could become a threat to security (NATO, 2022c). On May 24, 2022, at the Davos Summit, also known as the World Economic Forum (WEF), Stoltenberg reiterated that NATO's technological superiority in the international arena is a necessity to ensure the security of its members in the face of the addition of AI and autonomous systems to modern weapons systems (NATO, 2022a).

On April 7, 2022, NATO members approved the Charter of the Defense Innovation Accelerator for the North Atlantic (DIANA). DIANA involves the development of the best and most advanced technologies for security, in partnership with the private sector and academia, with the aim of achieving NATO's technological superiority. DIANA proposes to solve defense and security challenges through the use of technology, with the main focus being on AI, big data processing, quantum technologies, autonomous systems, biotechnology, space technologies, and new advanced materials technologies (NATO, 2022e). On May 26, 2022, in his opening speech at the Defense Disrupted 2022 conference, Geoană again raised the issue of maintaining NATO's technological superiority. Geoană stressed the importance of developing defense-oriented activities with innovative techniques in the face of the initiatives of the RF and the PRC, emphasizing that the RF's investments in hypersonic missile systems and cybersecurity networks, as well as the PRC's goal of becoming the world leader in AI technologies, challenge the West's technological superiority. Geoană stated that in order to strengthen NATO's technological defense capabilities, members should work together to develop new generation technologies (NATO, 2022d).

In the context of the priorities expressed by the Secretary General and Deputy Secretary General, it is clear that AI, autonomous weapons and quantum technologies are changing the way NATO operates. For this reason, it is possible to speak of supporting an approach that combines the public and private sectors, as well as academia and civil society, to strengthen NATO's industrial infrastructure and maintain its technological superiority in the development of new technologies (NATO, 2021a).

NATO launched a program called Hacking for CNAD on May 13, 2022, to accelerate the establishment of member states' scientific infrastructure in AI technologies and to expand the connection of these technologies with university students and academia. In this program, teams of university students from member states presented concrete ideas using innovative methods and techniques to solve problems posed by technological developments. AI technologies were one component of the Hacking for CNAD initiative. Indeed, in order to improve NATO's security capabilities, the teams addressed real-world problems, such as how to make information sharing between members more secure in the face of a potential cyber threat during operations, and how to use AI technologies to ensure the safety of ships by facilitating the detection of possible damage, in the solution proposals they presented to NATO member experts (NATO, 2022b). The "Vilnius Summit Communiqué" issued on July 11, 2023, emphasized that measures for NATO's security would take in response to AI and other technological breakthroughs within the framework of the "Artificial Intelligence Strategy" (NATO, 2023a).

In the context of current initiatives undertaken by NATO, it is noteworthy that the organization is making efforts to develop AI technologies in a manner consistent with responsible use. In 2022, the Data and Artificial Intelligence Review Board (DARB) was established within NATO. The purpose of the Board is to coordinate the development and use of responsible AI technologies/applications among NATO members. In this context, DARB functions as a forum for NATO members and prioritizes the

following: first, guiding the development of NATO 'Responsible AI (RAI)' applications supported by secure systems; and second, providing guidance to NATO members on the development of these applications (NATO, 2022f). In accordance with these objectives, on February 7, 2023, DARB conceptualized the development of a responsible AI certification standard to oversee NATO members in order to develop manageable, traceable and reliable AI technologies that comply with both international law and NATO norms and values (NATO, 2023c). The updated NATO Strategy of July 10, 2024, incorporates novel developments pertaining to this subject. Notably, the updated Strategy incorporates a novel categorization of threats, including AI-supported disinformation, information operations, and gender-based violence for the first time. The necessity for NATO to implement security measures to counter these threats was also emphasised in the Strategy (NATO, 2024). The Data Strategy for the Alliance (DaSA), which was approved in February 2025, includes NATO's use of data as a permanent strategic asset by 2030. It is therefore hypothesized that the data obtained will provide a sustainable battlefield advantage. In accordance with the objectives delineated in the DaSA, NATO is expected to implement a centralized management programme by 2030, with the aim of ensuring the utilization of quality data (NATO, 2025).

4. ASSESSING NATO'S ARTIFICIAL INTELLIGENCE POLICIES IN THE CONTEXT OF INTERNATIONAL SECURITY: OPPORTUNITIES AND CHALLENGES

As one of the most important developments of the 21st century, technological devices and electronic applications are increasingly penetrating social, political, economic and military spheres. These technologies are expected to reshape both NATO's relations with its rivals and the global balance of power (Sperling, 2022, p. 60). On the other hand, in the historical process, NATO is recognized as one of the prominent international organizations in the field of defense. This is generally attributed to the "burden-sharing" and "interoperability" capabilities that allow alliance members to work in harmony. Improving NATO's defense capabilities against these technologies, including AI, depends on the coordination and cohesion of alliance members (Dufour, 2018, p. 1).

The impact of emerging technologies on NATO's threat perception and security is manifested in a change in the balance between offense and defense and the nature of warfare. Other factors that shape NATO's understanding of defense are the shift in the balance between offense and defense in favor of one of the parties, or the increase or decrease in the differences between the superpowers due to these technologies (Sperling, 2022, p. 66). In this regard, NATO’s AI Strategy encourages member states to incorporate AI into defense planning, prioritising interoperability and technological harmonisation. Increasing the ability to develop the technology within the framework of this strategy, renewing defense systems, and taking measures against the threats posed by AI constitute important security measures (NATO, 2021d). Rather than merely identifying threats, NATO now seeks to neutralise them through the use of predictive modelling, joint cyber exercises, and AI-driven threat

assessments. In addition, the standardization of conditions of use will be ensured in order to benefit positively from technological devices/applications (Lucarelli, et.al., 2021, p. 11). The successful implementation of NATO's AI strategy is contingent upon the willingness of members to pool resources, share innovations, and coordinate development efforts within the framework of NATO. Success is linked to the effectiveness of adopting principles to regulate responsible use, developing reciprocal relationships with traditional/contemporary industry actors, and obtaining practical information from members' technology policies (Fata, 2022).

Evaluating NATO's initiatives from a different perspective, Gilli discusses the reflections of these policies on the international arena. According to Gilli (2019), within the framework of AI policies, NATO's values have been harmonized with the dynamic structure of the security environment and have contributed to international security. NATO's AI policies have also served as a forum for cooperation between the US and the EU in updating their understanding of defense and developing these technologies (Lawrence & Cordey, 2020, p. 67). NATO's character as a transatlantic forum is crucial in establishing procedures against the threat of dual use of technological developments by non-state actors (Larsen, 2022, p. 20). Indeed, the use of AI in cyber attacks can increase the impact of these attacks. In this context, NATO is promoting the development of AI-based security measures against possible attacks (Davies, 2022). For example, in the "Cyber Coalition 2022" exercise held between November 28 and December 2, 2022, NATO conducted cyber operation experiments for the conditions of using AI systems against cyber threats (The Allied Command Transformation [ACT], 2022). Moreover, the ethical principles, already outlined in NATO's Strategy, form the normative basis for the implementation of its AI policy. Many NATO members have supported the efforts of the United Nations (UN) Group of Government Experts (GGE) to establish universal standards and prevent potential threats from Lethal Autonomous Weapon Systems (LAWS) (Hunter Christie, 2020).

With the emergence of new technologies in the military sphere, nuclear deterrence may be replaced by a science and technology-based workforce. Today, the US, PRC, and RF are competing in AI technologies, machine learning, and quantum computing. In this competition, many attempts are being made to integrate new technologies with defense applications (Khan et.al., 2021, p. 20). The US and its allies blame the PRC and the RF for the threats they face in the digital environment. While the US and its allies allegedly claim that they are affected by the RF's cyber-attacks, it is claimed that the PRC poses 5G and AI-supported hybrid threats (Hannah, 2021). On the other hand, rapid technological advances and the resulting global power shift have caused strategic losses for both the US and the EU. Therefore, the US and the EU are developing legislation to protect each other's commercial privacy, control dual-use technologies, and monitor foreign investments. In NATO, DIANA promotes the secure use of technological innovations and the NATO Innovation Fund provides financial resources for technological development (Hunter Christie, 2022, p. 18). With NATO's Science and Technology Organization (STO), projects are being prepared to increase data sharing and capability development

activities in various centers of excellence (Sweijs & Osinga, 2019, p. 111), with NATO's AI policy leading to the dissemination of technical knowledge, as it aims to use AI-enabled technologies in a more efficient, predictable, and transparent manner. These policies provide a collaborative environment for NATO members to protect NATO defense systems, prevent cyberspace-based threats, and ensure superiority in potential conflicts (Fata, 2022). NATO is also forging international partnerships against the threats posed by technological developments. For example, in January 2023, NATO and Japan agreed to cooperate on cyber defense, counter hybrid threats, and contribute to international security against potential technological threats (NATO, 2023b). It is necessary for states to pursue industrial, scientific, and technological specialization for the safe use and production of technologies. Weapons supported by new technologies should also be tested against the defense systems of enemy forces. Considering these requirements, it is assumed that NATO members can balance potential threats with the defense systems they have developed throughout the historical process (Gilli & Gilli, 2019, p. 3). However, differences in the adoption of new technologies among NATO members may hinder cooperation. Moreover, the main concern is that AI may create a technology gap in NATO, weaken the cohesion of NATO members, and undermine NATO's technological superiority by investing in this technology. In addition, there may be differences in the use of technology between the United States and NATO members. For example, NATO's understanding of security based on nuclear and conventional deterrence has begun to change as cyber-attacks and hybrid threats have become part of the alliance's understanding (Sperling, 2022, pp. 60-61). Interoperability can also be affected by the process by which members with limited military capabilities acquire and use new technologies (Etl, 2022, p. 499). In addition, vulnerable systems may provide information and tools to forces that pose a threat to NATO, potentially leading to mistrust among NATO members. Decision-making may become more difficult as a result of the negative impact on NATO's mechanisms. In this regard, it is important that NATO move toward policies that improve decision-making and interoperability (Lin-Greenberg, 2020, p. 57).

NATO members with developing economies may prefer to focus their defense spending on upgrading their existing conventional forces and defensive tools rather than on AI. A related issue is that there are differences in force posture and operational capabilities between members with and without AI within the Alliance. The fact that members without this technology cannot take responsibility for military operations to the same extent as members with it can hinder coordination (Lin-Greenberg, 2020, p. 63). The high rate of malfunction or accident of AI-enabled military systems in the early stages of development may also slow coordinated efforts. The progress of these technologies may be hampered by operational, organizational, and cultural barriers. Another risk is that international organizations may procure such technologies from private companies. This could lead to export restrictions and deficiencies in military robustness (Maas et.al., 2022, p. 8). Therefore, it is essential to develop or update standards and ethical guidelines for the sharing and use of AI in multilateral security organizations such

as NATO (Burton & Soare, 2019, p. 17). NATO's AI policies seem to be escalating the power struggle in the international arena. In this context, the competition between NATO members and the PRC has extended to the fields of AI, robotics, and biotechnology. Another important dimension of the issue is external dependence on technology procurement. There is concern that Western countries could become economically and politically dependent on the PRC due to the PRC's technology investments and activities in Western countries (Olsen, 2020, p. 70).

The RF's use of AI-enabled systems to gain information superiority or to interfere with an adversary's communications, command, and control systems may deepen the rivalry between NATO and the RF. In such a rivalry, NATO may need to improve its cyber defense techniques (Bendett et al., 2021, p. 4). In light of NATO's disclosures, it is has been suggested that the PRC and the RF conducted military exercises involving hybrid warfare techniques (Dalgaard-Nielsen, 2022, pp. 168-169). The PRC, on the other hand, has stated that NATO does not abide by international rules in its use of cyberspace. For example, in July 2023, PRC Foreign Ministry Spokesman Wang Wenbin urged NATO to follow UN practices in its cyberspace activities and work with the international community to ensure security in this domain (Embassy of the People's Republic of China in the Republic of Mozambique, 2023). The Center for European Policy Analysis (CEPA), a US think-tank, has recommended that NATO use certain standards and enlist the support of the private sector to produce AI technologies to counter competitors such as the PRC, RF, and North Korea. CEPA's proposals are intended to enhance NATO's defense capabilities in the areas of collective defense, crisis management, and cooperative security (Wodecki, 2022). However, the harmonization of AI policies has been limited due to disagreements among NATO members on the military domain of AI, including military-strategic concerns, such as how NATO should respond to an attack by AI-enabled military systems, which of these systems are appropriate to develop or use, and under what conditions NATO members should agree to use these systems (Sweijs & Osinga, 2019, p. 113). In addition, the fulfillment of military needs may be postponed because the economies of NATO members are largely based on the civilian sector. Another challenge is the differences between the US and European states regarding defense investments and civilian technological progress (Hunter Christie, 2022, pp. 15-16). EU-NATO cooperation in the digitalization of defense includes the establishment of industrial standards and ethical principles for the legal use of AI. Therefore, the establishment of a data governance structure for military applications is recommended (Soare, 2020, p. 7). However, unlike the US, European NATO member states, with the exception of France, prioritize the geo-economic field in AI, leaving military applications secondary. The shortcomings of European states in digital defense also make this rivalry a geopolitical security issue. Disagreements among NATO members could also reach a level that could disrupt information and technology sharing. The fact that NATO's budget is insufficient to support the development of AI, as well as the international backlash against the use of AI in the military domain, affects how NATO members view this technology (Etl, 2022, p. 496). In addition, NATO is divided in its assessment of the

threats that may be posed by AI (Soare, 2020, p. 8). Soare (2020, p. 8) also asserts that the US prioritizes the PRC and RF in its threat perceptions. European NATO members, on the other hand, do not consider the PRC a threat because of its activities in the European region. In this respect, the differences among NATO members affect the functions of AI policies. However, considering the investments, training seminars, institutionalizations, projects, scientific studies and security activities within NATO, the willingness and necessity of NATO members to diversify the search for security can be better understood. This situation has made it necessary for NATO to redefine the tools of deterrence within the framework of the requirements of the international conjuncture and the dynamics of international security. The fact that NATO, like many other national/international initiatives, has instrumentalized this technology in the field of security shows that the use of cyberspace tools for security is inevitable in today's world. As a result, it is believed that AI has the potential to more rapidly and effectively shape the power competition, threat perception, and understanding of security among both regional and global powers, particularly the US, EU, NATO, PRC, RF, Japan, and India.

5. CONCLUSION

According to various sources, many innovations such as digital and IT technologies, increasingly diversified actors in cyberspace, virtual reality applications, robotics or the Internet of Things (IoT) will directly or indirectly change the vital processes of people. In today's conditions, where almost every area of life is characterized by its technological dimension, many regulations are being made, investments are being encouraged and steps are being taken to establish general legal rules at national and international levels for the use of AI technologies and machine learning in social processes. In addition to the security of systems and software using AI, the possibility of AI technologies being used for malicious purposes in the political sphere is a major concern for international security. As in other areas, AI-enabled systems designed and envisaged for defense purposes have become an issue where initiatives have been launched to control them with respect to some of the risks they pose, even as they contribute to international security. While states and international organizations investing in this field are making efforts to assume responsibility and eliminate possible risks within the framework of general rules of law, overarching principles that can be decisive in the development of said technology have been proposed by the UN at the global level (The Convention on Certain Conventional Weapons [CCW], 2019, pp. 3-13). In cooperation with the UN in these efforts, NATO has also adopted its first "Artificial Intelligence Strategy" document. This Strategy aims to harness the potential of AI at a high level in the field of defense, to take measures against a possible threat from outside the NATO region that could arise from this technology, and to protect the security of member states as well as NATO's technological superiority. Within the framework of these objectives, the principles of legality of AI systems, issues concerning transferring responsibility to machines, ensuring accountability, making such systems reliable, traceable, explainable, manageable by humans, and reducing prejudices against AI have been adopted. In addition, these principles will be supported by the work done by NATO sub-

organizations. It is envisaged that NATO members will be expected to implement these principles in their national activities, provide the necessary environment for one member to exchange information with another member, facilitate the identification of threats that may arise from the technology in question, and take the necessary measures. NATO has started to take initiatives to develop technology-oriented defense methods and tools, especially in since the 2020s, in order to maintain its strength and prestige in the international security environment. For example, 17 NATO members have agreed to invest approximately one billion dollars in the development of new technologies (Szucs, 2021). This is a prime example of NATO taking the initiative to develop AI as well as other technologies.

In parallel with the diversification of security problems caused by technological developments, the specialization of international security policies within the framework of the content of each problem shows that the importance attributed to AI will increase day by day. Many states and international organizations have begun to consider that the values of power and security in the international system of the 21st century have changed with technological advances. Investments, incentives, security policies and many efforts to harmonize technology with the social structure are the main initiatives in this context. Within the framework of these initiatives, it is possible to mention that the competition over this technology will deepen and international security policies will be reshaped in terms of possible threats and security measures. Among these policies, NATO's "Artificial Intelligence Strategy" is seen as crucial in terms of contributing to the diversification of arguments on the international security agenda in the areas of collective defense, crisis management, and enhancing security in cooperation with member states. Moreover, this Strategy is a significant example that reflects the changing and transforming nature of international threats in terms of diversifying NATO's understanding of security as hybrid threats. In addition to the competition between the US, the PRC and the RF in the field of AI, AI applications and tools are becoming more widespread in the international arena in both security and defense fields. Moreover, it is predicted that the states and groups of states that produce this technology will have an advantage in gaining power in the international arena. At this point, NATO's strategy on AI is also significant in that it clearly reveals the position of the Atlantic group states in the technology competition, their technology-oriented deterrence, power or prestige-seeking, and their competence and goals in the field of AI. As a result, the analysis in this study concludes that NATO needs to continue to implement a proactive policy to gain this power, prestige, and security in AI technologies in the international arena.

This study does not require Ethics Committee approval.

The authors declare that the study was conducted in accordance with research and publication ethics.

The authors confirm that no part of the study was generated, either wholly or in part, using Artificial Intelligence (AI) tools.

The authors declare that there are no financial conflicts of interest involving any institution, organization, or individual associated with this article. Additionally, there are no conflicts of interest among the authors.

The authors declare that they contributed equally to all processes of the study.

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