NATO Augments Its Technology Policy: Opportunities and Challenges for the Allies

Izabela Albrycht∗

Wojciech Lorenz

The development and implementation of emerging and disruptive technologies (EDT) by NATO should help the Alliance adapt to threats not only from Russia but also from China. The ability to carry out collective defence missions in the treaty Euro-Atlantic area will depend on NATO's technological advantage over authoritarian powers. The countries less technologically advanced and most dependent on military support from the Alliance, including Poland, have the most to gain from NATO's strengthened technology policy.

∗ Izabela Albrycht is a member of the NATO Advisory Group on New Technologies.

PISM STRATEGIC FILE

Development of so-called emerging and disruptive technologies is one of the most important challenges faced by NATO in the era of increasingly aggressive policies of Russia and China.[1] Both countries have a common goal of limiting U.S. influence and its ability to cooperate with allies in strengthening the international system based on international law and agreed norms (rules-based international order). Russia is trying to enforce a change in the European security system in order to ensure a sphere of influence, including Ukraine, and establish a buffer zone on the Alliance's Eastern Flank where NATO would have limited ability to conduct a collective defence mission.[2] Russia is rapidly modernising its military potential by introducing new types of weapons, including hypersonic and autonomous systems, and constantly expands its capabilities for offensive actions in cyberspace and outer space. In the event of an armed conflict with NATO, it could destroy critical infrastructure in Alliance countries that increasingly rely on information and telecommunication networks (ICT), and even disrupt the operation of the GPS system by attacking U.S. satellites. By taking advantage of its military-technological prowess in some areas, Russia could delay, hinder or prevent the Alliance from defending its allies.

> **Development of so-called emerging and disruptive technologies is one of the most important challenges faced by NATO in the era of increasingly aggressive policies of Russia and China.**

China is developing EDT as part of a coordinated civil-military fusion and is also trying to gain a military advantage over the U.S. The modern Chinese military potential and the ability to influence other countries may make it difficult for the U.S. to meet its security obligations in the Indo-Pacific region, and a possible conflict with China (especially over Taiwan) may weaken the U.S. capacity to respond to threats in Europe. Although China does not pose a direct military threat to NATO, it may limit the ability of the Alliance to provide support to the United States by taking hostile actions in space and cyberspace and by exerting influence through the control of critical infrastructure (including ICT networks) in Western countries. It can also use new technologies to increase the effectiveness of cyberattacks, disinformation, and propaganda in order to weaken the West's response to Chinese actions against individual states.

> **China is developing EDT as part of a coordinated civil-military fusion and is also trying to gain a military advantage over the U.S.**

Russia and China focus on the rapid development of technologies for both civilian and military purposes (so-called dual-use technologies) and tighten military and technological cooperation.[3] EDT allows them to significantly increase the effectiveness of activities in many areas (including logistics, information analysis, reconnaissance, command systems), making it easier to gain advantage in times of crisis and military conflict. EDT strengthens the ability of both powers to use military force and to influence societies and political processes in other countries. It also increases the effectiveness of hybrid activities that combine elements of non-military and military influence, for example, by using the information domain and cyberspace. Both powers are increasingly using modern technologies, especially artificial intelligence (AI), to tighten control over their societies and strengthen

---

[1] In NATO terminology, "disruptive technologies", i.e., those whose impact will be significantly felt in 5-10 years, include advanced big-data analytics and computing, artificial intelligence (AI), as well as autonomous systems, space and hypersonic technologies. The group of new and emerging technologies with groundbreaking impact in the 10-20 year timeframe includes quantum-enabled technologies, biotechnology, and human enhancements. Some technologies are interconnected (convergent) and interact with each other, which significantly increases their potential. This applies to such combinations as data-AI-autonomy, data-AI-biotechnology, data-AI-materials, data-quantum computing, space-quantum computing. See: "Emerging and disruptive technologies," www.nato.int; D.F. Reding, J. Eaton, "Science & Technology Trends 2020-2030, Exploring the S&T Edge," NATO STO, 2020.

[2] "Agreement on measures to ensure the security of The Russian Federation and Member States of the North Atlantic Treaty Organization," Ministry of Foreign Affairs of the Russian Federation, 17 December 2021, www.mid.ru.

[3] S. Bendett, E.B. Kania, "China, Russia Deepen Technological Ties," *Defense One*, 4 October 2019, www.defenseone.com.

authoritarian rule, as well as to obtain digital data and technological dependence of third countries, thus strengthening their political and economic position.[4]

The Allied Policy of EDT Development—Goals and Instruments

Russia's aggressive policy in Europe and the growing importance and influence of China forced a change in the priorities of the Alliance, which for almost two decades focused on combating terrorism and the mission in Afghanistan. The revolutionary importance of some EDTs and their rapid development by China and Russia created the risk that both powers could gain an advantage over the U.S. and other technologically advanced NATO countries, including in the area of AI or hypersonic weapons. Although the Allies used NATO mechanisms to develop technological cooperation in the past, this did not sufficiently contribute to the modernisation of the military potential of the member states required for common operations. As a result, there was a serious risk that the Alliance might lose its advantage over a potential adversary, and thus its ability to deter and carry out a collective defence mission.[5]

After the annexation of Crimea by Russia in 2014, the allies recognised Russia as a military threat and began to strengthen their defence and deterrence policy. They also recognised that China poses a challenge to NATO in some security dimensions. In 2019, the Alliance approved the first secret military strategy in more than 50 years and a strategy for developing the necessary military and technological potential in connection with the changing nature of conflicts (NATO Warfighting Capstone Concept). In the middle of 2022, NATO is to adopt a new strategic concept that is likely to give priority to the collective defence mission, but at the same time it will emphasise the need to strengthen security through the ability to conduct crisis-response missions and cooperation with partners (so-called cooperative security).

The new strategy is also to put a much bigger emphasis on new technologies. Their rapid development and implementation will be crucial for gaining an advantage in all operational domains: air, sea, land, cyber, and space, which will allow the Alliance to, for example, strengthen resilience to threats below the threshold of military conflict. At the same time, some technologies, such as AI or hypersonic weapons, will help strengthen the ability to defend and gain an advantage over opponents in the event of a possible military confrontation.[6] Since NATO bases its defence strategy on the ability to deploy troops to a threatened country, it will depend on the technological advantage whether Allies will be able to send such support against the enemy's defensive and offensive systems (that is, versus anti-access/area denial, or A2/AD, systems). Coordinated technology development is therefore essential to strengthen NATO's defence and deterrence capability in line with the Alliance's new priorities. It will also increase the ability to conduct crisis-response missions and open up new opportunities for cooperation with partners, including on

> **NATO will be able to influence wider international security, as well as strengthen its usefulness for member states during an era of increased great power competition.**

the ethical and responsible development and use of technology. In this way, NATO will be able to influence wider international security, as well as strengthen its usefulness for member states during an era of increased great power competition.

---

[4] I. Albrycht, M. Rekowski, K. Mikulski (ed.), "Geopolityka Nowych Technologii Cyfrowych," Instytut Kościuszki, 2020, www.ik.org.pl.

[5] In its strategic documents, NATO underlines three main missions of the Alliance: collective defence, crisis management, and cooperative security. They are implemented mainly through cooperation with the Alliance's partners.

[6] M.A. Piotrowski, "The Potential for a Hypersonic Arms Race between the U.S., China, and Russia," *PISM Bulletin* (1780), 8 March 2019.

NATO's policy of EDT development also will play a significant role in strengthening transatlantic ties. It should create pressure and an incentive to increase expenditure on research and development (R&D), levelling disproportion in this area, for example, between Europe and the U.S.[7] Thanks to the involvement of all or most of the Allies in the development of technology, the risk that the U.S. and NATO will lose their technological advantage over China and Russia will be reduced. EDT also will significantly strengthen the self-defence ability of European states, which will contribute to a more even distribution of responsibility between the U.S. and Europe for common security. As a result, Europe's dependence on U.S. support will decrease, which also is in line with the EU's digital sovereignty and strategic autonomy concepts, and at the same time the importance of the Alliance for the United States will increase.

While strengthening its deterrence and defence policy, NATO also began to implement a policy to stimulate the coordinated development of EDT.[8] The Alliance prioritised seven technologies: AI, advanced big-data analysis, autonomous technologies, technologies supported by quantum information, biotechnology and human improvement, hypersonic, and space technologies. In February 2021, the Allies approved the Coherent Implementation Strategy on Emerging and Disruptive Technologies. Work is also underway on separate strategies and policies for designated technology areas. In October 2021, the first of these strategies for AI was approved.

NATO is also creating instruments to enable the implementation of the overall strategy. The basic tool is to be the NATO equivalent of the American agency DARPA. It will be the civil-military transatlantic Defence Innovation Accelerator for the North Atlantic (DIANA).[9] DIANA will have two headquarters, one in North America and one in Europe. Its task is to support cooperation between academic centres, the public and private sectors, and the armed services of the Allies, and to coordinate activities necessary for the development and implementation of EDT. It will also stimulate the development of innovative companies (including small and medium-sized enterprises, or SMEs, and startups) that will develop groundbreaking solutions with applications for security and defence. DIANA will be based on the existing accelerators in some NATO members, which should constantly coordinate and support the development of innovative solutions from a pool of around 20 startups. DIANA will have testing centres, making use of existing government, academic, or private laboratories. On the basis of information from the allies, it will also create a central database of trustworthy sources of capital as well as proven startups and investors (the so-called Trusted Capital Market). In this way, in the perspective of several years, an extensive network (ecosystem) of innovation should be created.

The allies also decided to establish the NATO Innovation Fund (NIF) worth $1 billion for a period of 15 years, to which only some member states decided to contribute.[10] Its task will be to invest in startups working on disruptive dual-use technologies, the development of which is associated with a high risk of failure and requires a longer time (deep tech). NIF will also act as a trusted advisor for startups to obtain additional support from trusted sources of capital, especially private (venture capital), but also funds for innovation available within the European Union.

---

[7] In 2020, R&D expenditure in the EU averaged 2.3% of GDP, while in the U.S. it was 3%. See: "R&D Expenditure," Eurostat, December 2021, www.ec.europa.eu.

[8] Since 2019, NATO has also been conducting its Strategic Reflection process, which is to adapt the Alliance to new challenges and threats. Part of this process (also called "NATO2030") was the establishment of the EDT Advisory Group.

[9] Defense Advanced Research Projects Agency (DARPA) was established in 1958 after the launch of the Soviet Sputnik 1 in 1957. In response to the "Sputnik moment", the U.S. decided to strengthen cooperation between academia, industry, and government administration. Since then, DARPA has been developing and implementing research and development projects in the field of technology and science. It is believed that its actions led to the creation of, among others, the personal computer, the internet, GPS, drones, meteorological satellites, and recently, the Moderna vaccine against COVID-19.

[10] In October 2021, 17 allies, including Poland, signed a letter of intent declaring their interest in joining the NIF and starting conceptual work on the fund's financing and administration model.

> **NATO will be able to concentrate the efforts of its members on the development of innovative technologies of key importance for the security of the Alliance.**

By using these instruments, NATO will be able to concentrate the efforts of its members on the development of innovative technologies of key importance for the security of the Alliance. It can also accelerate the implementation of innovation for defence applications, including by assisting in purchasing processes (rapid procurement process). At the same time, it will facilitate the creation of national accelerators and startups in member states that will focus on technology development in line with the Alliance's goals. It will also contribute to bridging the innovation gap between allies and help maintain a technological advantage over rivals. The use of companies and institutions operating on the basis of NATO standards should, on the other hand, reduce the risk of innovative technologies being taken over by rivals of the Alliance.

NATO Cooperation with the EU

The European Union, with 21 out of 27 members also members of NATO, will be the most important partner of the Alliance in the development and implementation of new technologies. Both organisations announced that they will cooperate in combating hybrid and cyberspace threats, among others, and will develop modern defence potential in a coordinated way so as not to duplicate, but to supplement their activities.[11] A significant number of both EU and NATO members do not want the EU to duplicate the Alliance's ability to conduct a collective defence mission, but would like to strengthen its capacity to shape security through crisis-response missions, the development of modern

> **The European Union, with 21 out of 27 members also members of NATO, will be the most important partner of the Alliance in the development and implementation of new technologies.**

capabilities, countering hybrid threats, and cooperation with EU partners, especially those who share its values. In March 2022, EU leaders are expected to approve the Strategic Compass, the EU's strategy to adjust foreign and security policy to the challenges of increasing competition between superpowers. As indicated by the draft document disclosed in November 2021, one of the EU's goals will be to increase investments in new technologies so that the armed forces of the member states are able to carry out the most demanding tasks (and thus also be able to fight a high-intensity war with another power).[12] The EU wants to accelerate the development of military capabilities on which European countries have so far relied on U.S. support. In this way, the Union can strengthen its autonomous crisis-response capacity and at the same time support the development of the defence potential of the Member States, which can also be used for the purposes of NATO missions.

The development of technologies for defence purposes is supported by the PESCO mechanism, which enables defence cooperation among the most determined countries, and by the European Defence Fund (EDF) worth €8 billion for the years 2021-2027. The EU also has announced the creation of its own accelerator—the Defence Innovation Hub—as part of the European Defence Agency (EDA), which supports cooperation between the Member States in developing military capabilities.

---

[11] "Relations with the European Union," NATO, 21 June 2021, www.nato.int.
[12] "A Strategic Compass for Security and Defence—For a European Union that protects its citizens, values and interests and contributes to international peace and security," EEAS (2021) 1169, Brussels, 9 November 2021.

At the same time, the EU's goal is not only to strengthen security but also to stimulate economic development and strengthen Europe's technological sovereignty. Therefore, the development of dual-use technologies within the EU will take place on a much larger scale and to a much greater extent than within NATO. The EU intends to create its own, extensive ecosystem of innovation. Its priority is the development of what it calls Key Enabling Technologies, to which the European Commission included advanced production, advanced materials, life-science technologies (including biotechnology and bioinformatics), micro/nanoelectronics and photonics, AI, security and connectivity, and advanced technologies with The Internet of Things (IoT), industrial data, robotics, 3D printing, and blockchain (technology that enables sending and storing information about internet transactions). The Union intends to become the leader of a new wave of innovation around startups developing advanced, niche technologies (deep tech). To this end, in March 2021, the European Innovation Council (EIC) was established. It will identify high-risk innovation and support its development and implementation.[13] The EIC has a budget of €10 billion for the years 2021-2027, its own accelerator, and two instruments enabling research funding (EIC Pathfinder) and the implementation of innovative solutions (EIC Transition). The EU is also discussing the creation of a €100 billion fund that would allow Europe to gain the status of a true technological superpower capable of competing with China and the U.S.[14]

> **The Union intends to become the leader of a new wave of innovation around startups developing advanced, niche technologies (deep tech).**

In the area of EDT development, a natural synergy effect may emerge between the EU and NATO, as most members belong to both organisations and they have similar goals in enhancing common security. Both organisations will set the standards for the development and implementation of EDT, strengthening the international system based not only on legal norms but also on democratic principles with the necessary transparency and control. They will stimulate the development of dual-use technologies, support cooperation between the civil and military sectors and facilitate the implementation of cutting-edge solutions for defence purposes. At the same time, there will also be differences of interest between NATO and the EU, which may limit the scope of possible cooperation. The ambitions to strengthen the EU's technological sovereignty vis-à-vis the U.S. create the risk that some states will be reluctant to share innovations with the Alliance or will argue that new capabilities developed with the EU support can be used only for EU missions. Due to much greater possibilities of financing projects, the EU may also compete with NATO instruments. Startups working, for example, on the use of AI for military purposes, will operate under EU or NATO accelerators, which may lead to inefficient use of resources. Therefore, it will be in the interest of both organisations to coordinate as much as possible activities related to the development of technologies for the purposes of common security.

> **It will be in the interest of both organisations to coordinate as much as possible activities related to the development of technologies for the purposes of common security.**

Opportunities and Challenges for the Allies

Common EDT development policy within NATO is a great opportunity, but also a challenge for NATO members. It will be easier for the allies to achieve the goals regarding the development of modern capabilities, which are distributed among NATO members through defence planning (NATO Defence Planning Process, or NDPP). In this way, they will strengthen their own defence potential, as well as

---

[13] European Innovation Council, https://eic.ec.europa.eu/index_en.

[14] N. Drozdziak, "Startups Want EU to Set Up $118 billion Sovereign Tech Fund," Bloomberg, 29 March 2021, www.bloomberg.com.

the ability of the entire Alliance to respond to the most serious threats that individual countries cannot deal with on their own. The Allies working together will also be able to develop the necessary technologies faster and cheaper than if they worked separately.

While EDT development policy can facilitate the realisation of the vital interests of the allies, its implementation will require considerable effort. It will be necessary to make systemic changes (including legislative and organisational), and to provide the necessary human resources and financing. Member States will have to align their national innovation policies with those of the Alliance and develop their own innovation ecosystems within the wider NATO system. Institutional systems will need to be improved to ensure coordination between the public, private, and military sectors and academia.

The first step should be to identify the available resources and develop strategies that will allow the activities of the various institutions to be coordinated. It will also be necessary to review the legislation and update it if necessary. The Allies should establish national platforms to coordinate and develop multi-sectoral cooperation with the focus on the development of EDTs relevant to security and defence. In subsequent stages, however, they should create accelerators that will coordinate the work of existing startups or support the creation of new ones. Due to differences in the perception of threats, geographic location, or their potential, allies will probably try to develop technologies that are most important for their security. As a result, they may specialise in various technological areas, develop some technologies faster, while neglecting others. Therefore, the efforts of states at the national level should also be coordinated to ensure the achievement of the main goals of the Alliance.

The policy of stimulating innovation should be supported by financial incentives in order to overcome existing barriers related to, for example, the aversion of private companies to risk or cooperation with the public and military sectors.

The policy of stimulating innovation should be supported by financial incentives in order to overcome existing barriers related to, for example, the aversion of private companies to risk or cooperation with the public and military sectors. It will be necessary to ensure the flow of knowledge and experience by creating regular platforms for international cooperation. Further discussion on an ethical framework for the use of technology that NATO began with the adoption of the AI strategy will be crucial. Systemic changes and the development of innovation based on established standards should lead to the development of a similar culture of innovation in all member states, facilitating cooperation also within the entire NATO (and EU) system.

As member states will support Alliance policy with their capabilities, clear disproportions can emerge from the very beginning of its implementation. Some of the allies, especially the U.S., France, the UK, Germany, and Italy, conduct active innovation policy and may contribute to the Alliance's ecosystem with, for example, their accelerators or necessary infrastructure, such as testing centres. Other countries will have to build their own systems almost from scratch and currently have much less to offer. Therefore, the Alliance should strive to provide equal opportunities for participation in the innovation system for all members while at the same time not losing sight of the crucial objective, which is to innovate in a radical way and at a faster pace than its adversaries. Representation of the member states in the structures supporting the development of the allied policy should be fair, proportionate, and complete. The effect of the policy may be the strengthening of the competences of all countries and the elimination of innovation gaps within the Alliance. Member states should be given the opportunity to develop their specialisations under the EDT, as well as to strengthen their position in the transatlantic and global innovation markets.

Conclusions and Recommendations for Poland (and Other Allies)

The development of EDT within NATO opens up opportunities for Poland and other allies to strengthen the individual and allied ability to defend against aggressive actions, especially by Russia, but also by China. Like every member of the Alliance, Poland must ensure its ability to defend itself proportionate to its own potential. As a medium-sized country, it is unable to balance Russia's military potential, so it is in its vital interest to strengthen NATO's technological edge over Russia (which cooperates with China in this regard), as this determines the Alliance's ability to conduct the collective defence mission. Poland in NATO could specialise in creating solutions that are needed to strengthen defence and deterrence capabilities on the Eastern Flank of the Alliance. The priority should be the use of cryptographic technologies, AI, and advanced big-data analysis, autonomous systems to weaken the effectiveness of Russian A2/AD systems and cyberattacks, as well as strengthening national and allied operational capabilities. By supporting the allied EDT development policy, Poland may also influence wider international security and contribute to strengthening NATO's political cohesion and transatlantic ties. The planned and coordinated development of EDT gives Poland an opportunity to strengthen its position in the global value chain (the complex system of production and sale of products and services). This will have an impact on both new opportunities for economic development and strengthening Poland's political and economic position. It is recommended that:

> **Poland in NATO could specialise in creating solutions that are needed to strengthen defence and deterrence capabilities on the Eastern Flank of the Alliance.**

- Poland join activities aimed at creating its own innovation ecosystem within the wider NATO and EU system as soon as possible. It will be in the Polish interest to strengthen the allied policy of EDT development, including by making it a priority in NATO's new strategic concept. Poland should also support the closest possible coordination of activities between NATO and the EU.

- The first challenge will be to ensure political and practical oversight of innovation policy for security purposes at the national level and within the wider NATO and EU system. For this purpose, it is necessary to appoint a representative of the Ministry of Defence or the government for EDT, as well as the creation of tech ambassadors, such as diplomats or experts, who will maintain permanent contacts with DIANA centres and the EU innovation hub.

- The National Security Strategy adopted in 2020 indicates the necessity to develop EDT and contains many specific recommendations. Poland should, however, adopt a separate technological strategy. The decision on this could be made by the Committee for National Security and Defence. At the next stage, a working group should be established to develop assumptions for the development of the strategy. Such group should be composed of representatives of relevant ministries, the innovation council, the digitisation council, representatives of business and research centres, and representatives of Poland in relevant bodies of NATO (Advisory Group on Emerging and Disruptive Technologies) and the European Commission (European Innovation Council Board).

- The working group should also develop an implementation plan for the strategy and set out directions for actions to be taken before the strategy becomes effective. Priority actions should include an overview of the technological capabilities in the defence industry and the commercial sector. This will allow the creation of a database of trusted companies and startups that could engage in the development of innovation in line with the Alliance's goals. It will be necessary to develop criteria on the basis of which the decision about the status of

a trusted partner will be made. The aim of the working group could also be to develop assumptions for the creation of the first Polish civil-military accelerator.