

DISRUPTIVE TECHNOLOGIES IN THE CONTEXT OF EUROPEAN DEFENCE COOPERATION

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DOI: 10.55535/RMT.2022.4.11

The development of disruptive technologies represents one of the main themes of the contemporary security agenda not only from a national perspective but also at the level of multinational cooperation. In this regard, the European cooperation carried out under the institutional auspices of the Common Security and Defence Policy has gradually addressed the impact of disruptive technologies on the way of structuring the EU's response to contemporary security challenges. The approach to this subject has gradually evolved towards profiling a distinct typology at the level of which the specific character also derives from the particular parameters of the mode of interaction between the EU institutions. Equally, the specific nature of the European approach also concerns the way of financing the process of developing capabilities of this type, including in terms of complementing the national effort through opportunities offered by the EU budget. From this perspective, it can be concluded that the issue of disruptive technologies will become more and more visible on the European cooperation agenda, including in terms of the priorities advanced through the Strategic Compass as well as at the level of practical initiatives launched in the CSDP context, as is the case with PESCO and EDF.

Keywords: Strategic Compass; PESCO; European Defence Fund; Common Security and Defence Policy; Disruptive Technologies;

INTRODUCTION

This communication is underpinned by research on the direct sources regarding the European cooperation in the field of security and defence, which is required for identifying the guidelines and trends in this area. The methods used for this communication are centred on scientific documentation, supported by direct research and personal experience. At the same time, there were used content analysis, comparative study, case study, all of which being approached from an analytical perspective on the developments of this subject for the past decades.

The adaptation of European cooperation to the trends of the security environment has been a constant that has accompanied the process of developing the EU's profile in the field of security and defence. The conceptual premises of what can be called the "European approach" regarding the applicability of emerging and disruptive technologies in the context of defence have evolved especially in the last decade. The way of institutional-functional framing of this component at the level of the European Union has registered a distinct evolution, influenced both by the particular profile of the security and defence dimension, as well as by the intergovernmental nature of European cooperation in the field of defence. The first approaches regarding the implications of technologies in the field of defence can be found in the activities carried out by the European Commission regarding the development of research at the level of the European Union. Thus, through the communications adopted by this institution in the period 1996-1997, the emphasis was placed on the interaction of civil and military technologies, within an integrated approach that could be exploited industrially. In this regard, it is cited the American experience¹ related to the integration of military and civil research activities within companies (Implementing European Union Strategy on Defence-Related Industries, p. 19).

The European Commission's actions during this period have set the direction for future actions in the field of critical and, subsequently, disruptive technologies. From this perspective, it can be considered that the preferred approach in this field will wear the community coat, a situation that will be maintained in the next

¹ The European Commission approach was focused on the merger between Boeing and McDonnell Douglas, carried out on 1 August 1997.

two decades. The focus was placed on the research component in the field of security, simultaneously with the initiation of initial steps for their industrial exploitation. The landmarks of this approach were adopted at the level of the decision of the European Council held in Lisbon, on 23-24 March 2000, aiming at the creation of the European Research Area (ERA). The main objective of the approach was aimed at the voluntary integration of national research segments within a European matrix, structured according to efficiency and competitiveness coordinates (European Council, Lisbon, pp. 5-7).

The parameters of the decision of the heads of state and government gathered in the Portuguese capital were structured starting from the benchmarks advanced by the European Commission a few months earlier, through a communication on the creation of the ERA [COM(2000)6]. Within it, the potential of dual use and the applicability in the military field respectively indicated concrete options for capitalisation targeting the fields: aeronautics, advanced materials and information technologies. As in the case of the previous communications, the approach to this topic came against the background of the political-military developments aimed at establishing the EU's profile in the field of security and defence. This is the case of the Treaty of Amsterdam (signed on 2 October 1997), which introduced the possibility of creating a common defence policy at EU level, establishing, at the same time, the post of High Representative for Common Foreign and Security Policy. At the same time, the first elements of the EU's operational agenda were advanced by adopting the missions² it could fulfil (Treaty of Amsterdam, Art.J.7). Similarly, the decisions of the European Council of March 2000 responded to the progress made during the previous year in terms of developing the EU's capacity to carry out crisis management operations and structure the cooperative relationship with NATO. The decisions of the European Council of December 1999 are placed in the same context. Thus, the first EU Headline Goal is adopted, aimed at the creation, by 2003, of a Rapid Reaction Force of 50-60,000 soldiers.

A PRAGMATIC APPROACH

Under the influence of the progress related to the operationalisation of the Common Security and Defence Policy, derived from the implementation of the provisions of the Treaty of Amsterdam, the issue of developing the capabilities necessary to engage in operations would gain increased relevance. The role

² Known as *Petersberg tasks*, which included: humanitarian and rescue tasks; conflict prevention and peace-keeping tasks; tasks of combat forces in crisis management, including peace-making; joint disarmament operations; military advice and assistance tasks; post-conflict stabilisation tasks.

of ERA aimed at overcoming compartmentalisation in the field of research and, subsequently, strengthening the synergy between the civil and military segments [COM(2000)6, p. 9]. The implementation tool was represented by the Framework Programs, used in the context of European cooperation since 1984, through which funding resources were to be secured. For the reference period, Framework Programs 6 – FP6 (2000-2006) and 7 – FP7 (2007-2013) became applicable. In the latter, the topic of security was introduced, through which EU research entities could advance projects that capitalised on the potential for dual use through funding from the community budget. The financial envelope of the entire program targeted 50.521 billion Euros, of which the security component benefited from 1.35 billion Euros. Likewise, the thematic inventory of the other segments also included fields associated with emerging technologies such as nanotechnologies, advanced materials, new technological productions (FP7 in Brief, p. 17).

The objectives of the security component essentially aimed at three levels: developing technologies and knowledge to ensure the security of citizens in the face of the threats of terrorism, organised crime, national disasters and industrial accidents; ensuring the conditions for the efficient use of leading and emerging technologies; increasing the competitiveness of the European profile industry. Within this approach, the provision of infrastructure security, border security, as well as the creation of conditions for restoring the level of security and safety in the event of a crisis were considered.

In this context, more than 100 projects in the field of security have been advanced and have benefited from funding through FP7. The dual-use approach was particularly visible in terms of critical infrastructure protection (including the cyber protection component), intelligent surveillance, CBRN, communications security (Info Day, 2010). Subsequently, the inventory of areas addressed in the context of security would significantly expand at the level of the successor program, Horizon Europe 2020 (2013-2020) with a particular focus on the resilience capacity and interoperability between national systems. At the same time, a better connection to the developments recorded in the context of the Common Security and Defence Policy was considered, an approach that was translated at the level of the program within an additional theme aimed at preventing conflicts and achieving peace. In their entirety, the financing component for security amounted to 2.5 billion Euros with the potential of co-financing projects of up to 70% of the associated costs. Starting from these elements, the continuity of financing for the projects in the security area was ensured at the level of the new Multiannual Financial

Framework (2021-2027) through the new Framework Program “*Horizon Europe*” with a total budget of 95.5 billion Euros of which the “*Civil Security for Society*” component benefits from approximately 1.6 billion Euros.

CONCEPTUAL CLARIFICATIONS

Obviously, the emergence of FP7 represented the essential change in the development of research on the security dimension and, subsequently, the exploitation of the potential for dual use of technologies on the military component. During the duration of the afore mentioned framework programs, the European Defence Agency (EDA) role in promoting projects relevant to emerging and disruptive technologies was relatively modest, being oriented, rather, towards a role of coordinating the process of developing the capabilities needed to be deployed in operations. Responding to the provisions of the European Union Treaty, EDA’s activity was oriented towards stimulating cooperation between member states and creating a collaborative culture in the field of capability development. We can thus speak of a portfolio of projects developed under the auspices of the EDA that aimed at the “*classical*” side of capabilities, simultaneously with the development of the conceptual and strategic framework necessary for the management of the military & defence dimension of the European Union. If at the level of the European Commission, the first decade of the 21st century recorded practical initiatives for the generation and financing of some research projects, the activity of the EDA was aimed at completing the strategic normative deficit that existed on the defence area.

The paradigm of this approach was structured, in essence, by combining the intergovernmental nature of European cooperation in the field of defence with the economic and strategic implications that the technological advance had on the process of developing capabilities. On these coordinates, the adoption by the Steering Committee of the EDA, gathered on 19 November 2005 in the format of defence ministers, of the collective benchmarks in the field of research & technologies (R&T) that the member states could implement at national level is placed. They were aimed at strengthening the R&T profile at the level of defence spending, such as: 2% of total defence spending, respectively 20% of total R&T spending for the financing of collaborative projects. Also, the first elements associated with a conceptual agenda can be identified at the level of the European Defence Industrial and Technological Base Strategy (EDTIB), adopted at the level of the EDA

Steering Board on 14 May 2007. The main objective of this approach was to ensure the functional connection between the process of reform and modernisation of the armed forces and technological progress.

The profile of the initiative was aimed at strengthening the competitiveness of the way of generating capabilities at the European level, with an emphasis on the rapid exploitation of the latest technologies. Also, the EDTIB had to work in an integrated and complementary manner with civil technologies, including from the perspective of eliminating technological dependencies. The importance of capitalising on technological progress in the field of defence was thus profiled as one of the main features of the EDTIB. Obviously, at the time, the issue of disruptive technologies was not individualised, the approach generated by the EDTIB Strategy having, rather, an indicative character.

Subsequently, the first Capability Development Action Plan (CDP) was agreed (8 July 2008), intended to act as a guide for the orientation of European defence cooperation, under the institutional auspices of ESDP. The priorities advanced on this occasion included 12 domains/areas relevant to ensuring operational efficiency (CDP Background Note, p. 2). The emergence of the CDP must be placed in the intergovernmental context of European cooperation in the field of defence, representing a first attempt to coagulate a common vision at the level of the member states. The emphasis placed on the operational component, generated by the constant increase in the number of operational engagements, left its mark on the CDP profile, the aspects related to the implications of emerging or disruptive technologies not being very well outlined.

In connection with the adoption of the first CDP, the European Defence Agency promoted a Strategy on cooperation at the European level in the field of armaments. The importance of this document can be viewed from at least two perspectives. The first concerned the difficult financial conditions that the economic crisis of 2008-2010 had generated at the global level and that had contributed massively to the reduction of defence budgets. The second perspective was associated with the need to make the governance of capabilities more efficient, both by optimising expenses and capitalising on the potential of new technologies. Along these lines, the Armaments Strategy was intended to be a bridge between the priorities assumed at the political level through the CDP and the industrial segment.

A few months away, the EDA endorsed the EU Strategy on Defence Research and Technologies (EDRT) whose main rationale was to manage challenges

to the competitiveness of EDTIB. The solutions proposed by the new strategy aimed at expanding the cooperative model in the generation of projects in the context of European cooperation. The starting point in this endeavour was represented by an inventory including 22 key technologies that were to be promoted as priority for R&T investments. The means considered essentially were aimed at three levels:

- Strengthening the interaction between the technological-industrial base and the supporting capacity, by connecting all existing R&T infrastructure elements in Europe.
- Stimulating the technological advance, centred on the idea of bringing the civil R&T components closer to the defence one. The central objective was to identify emerging and disruptive technologies that would enable the technological advance for Europe (EDRT Strategy, p. 8).
- Improving the efficiency of R&T collaboration, through an extensive set of measures including those aimed at investments, improving the management of research projects, as well as accelerating the integration of new technologies into research programs.

Obviously, the dual nature of disruptive technologies required a comprehensive approach to how to implement the objectives of the R&T Strategy. Keeping this process within the institutional perimeter of intergovernmental cooperation could not bring the expected results considering that the civilian dimension of this type of technology was under the management of the European Commission. Based on these considerations, on 8 May 2009, the EDA Steering Committee adopted the decision to deepen the dialogue and cooperation with the specialised structures of the Commission in order to synchronise the steps carried out by these entities in the field of R&T, so as to ensure the complementarity and efficiency of the way of use of resources. On this occasion, the foundations were laid for an institutional cooperation within the European Security and Defence Cooperation Framework that represented the unification level between the activities of the EDA and those of the European Commission, the latter aiming almost exclusively at FP 7. Later, the European Council of 19 -20 December 2013 advanced a new cooperation agenda between the two entities with the aim of strengthening civil and defence research, including the main technologies and those related to energy efficiency (European Council, December 2013).

PRACTICAL DEVELOPMENTS WITHIN THE NEW STRATEGIC PARADIGM

Under these auspices, starting from 2013, a regular process of deepening the synergy between projects was initiated in the fields of: advanced materials, nanotechnologies, advanced production and processing. Within this mechanism, the preferred modality concerned the presentation by consortia created on the basis of calls for projects. This process will also lead to much more visible results in terms of the development of defence research through the launch by the European Commission of the Preparatory Action in the field of defence research (PADR 2017-2020), with a budget of 90 million Euros. Within this approach, for which EDA was designated as the implementing agent, the field of disruptive technologies has seen significant developments in several project calls. A set of 5 projects integrated in the call PADR-FDDT – EMERGING 03-2019 benefited from 7.5 million Euros funding for the use of disruptive technologies, especially artificial intelligence, in terms of: autonomous positioning, navigation, cost efficiency for deep strikes, strengthening individual combat ability. Projects developed in the context of the call PADR-EMS-03-2019, totalling 10 million Euros, aimed at the development of a multifunctional radio frequency system including radar, communications and electronic warfare functions were added. In the same context, we can also find the projects developed in the context of PADR – US 03-2019 aiming at the development of standards for autonomous military systems, totalling 1.5 million Euros (Council Decision financing PADR, p.7-10).

The substantive change was registered in the 2016-2018 interval, manifesting itself on several levels, the most important of which is the one related to the adoption, on 28 June 2016, of the Global Security Strategy (EUGS). As in the case of other areas of European security and defence cooperation, the document developed under the coordination of the High Representative, determined significant developments regarding the interaction between emerging technologies and the EU's profile in the field of security and defence. The global character of external action was placed in connection with technological progress. In this regard, the main premise advanced by the EUGS was that member states cannot effectively develop their defence capabilities in the absence of viable industrial and technological tools. The key in which they were promoted emphasised the importance of the capacity for autonomous action as well as the development of the ability to cooperate between member states, supported by adequate funding. In essence, three main directions with relevance to the subject of this communication were targeted.

First of all, it was about the funding of research at the European level, a level at which the progress made until the adoption of the EUGS was required to be capitalised on in the context of cooperation between the member states. Secondly, the aim was to develop the potential of capitalising on the applicability of technological progress to the military field, a direction of action already addressed indirectly through the programs managed by the European Commission. Thirdly, the EUGS indicated that the achievement of tangible progress could not be anticipated in the absence of a European industrial component with relevant potential (EUGS, p. 21).

Within this context, the topic of cyber security has been singled out as a priority for capitalising on technological progress. The objective of protecting the member states and the Union against cyber threats entailed strengthening the technological capabilities from the perspective of threat management, protection of critical infrastructure as well as reduction of cyber-crime. Obviously, this objective could be achieved by capitalising on existing projects, being easy to identify the elements of continuity in terms of infrastructure protection. Thus, the EUGS can be seen as having an intrinsic value of political revalidation of the directions initiated through the framework programs as well as a way to investigate new possibilities of using innovation and communication systems capable of ensuring data integrity, storage and certification of the associated digital products or related services (Ib., p. 22).

It also indicates the need to develop cyber elements at the level of CFSP operations and missions. Similarly, the Global Strategy brought additional elements of orientation regarding the greater applicability of technologies at the level of defence and security capabilities, emphasising the importance of investments in areas such as: ISTAR, remotely guided aerial systems, satellite communications, autonomous access to space and permanent ground observation. Also subsumed under the effort to ensure the resilience of the EU and member states, it indicates the importance of investments in related digital capabilities aimed at protecting data and communications infrastructure, including by considering opportunities for cooperation in research, training and procurement. From this perspective, the importance of the member states fulfilling the benchmarks adopted at the EU level in 2007 was reiterated.

Practically, the EUGS validates itself as a turning point in the evolution of CFSP, from the perspective of the package of initiatives that were generated starting from the guidelines and directions of action advanced by it. The focus was placed on stimulating cooperation between member states, embodied in a series of typologies aimed at strengthening the link between the process of developing

capabilities, technological progress and European industry. Within this approach, there were also concrete proposals aimed at a better alignment of European efforts in the field of R&T, by harmonising the programs carried out in different formats. Also, the systematic capitalisation on the results of cooperative research programs at the level of defence capabilities development process was also considered. This approach was also aimed at strengthening the interaction with the field of innovation, having direct effects on the potential of disruptive technologies for the consolidation of EDTIB (Implementation Plan on Security and Defence, p. 23). Thus, it can be noted the adaptation of the way of approaching the issue of critical-disruptive technologies, their management passing into the perimeter of the synergy between the EDA and the structures of the European Commission. One can even talk about a division of labour in this paradigm, according to which the role of the member states and political coordination were more concentrated in the area of responsibility of the EU Council and the member states.

The EUGS guidelines were also reflected in the substantive review of priorities in the field of defence capabilities. The instrumentalization of this option became visible through the revision of the Capability Development Plan (CDP). The analytical process used to manage the comprehensive nature and level of ambition advanced by the EUGS also included a substantial component, dedicated to the assessment of strategic trends in the development of technologies. The evaluations carried out under the coordination of the EDA revealed the convergence of opinions regarding the impact of disruptive technologies at the societal level, from the perspective of increasing computing power, expanding the fields of use of artificial intelligence and the human-machine interface. The same situation was found with regard to the new production techniques and the materials used whose impact was becoming visible at the level of civil and military products (Exploring Europe's Capability Requirements for 2035 and beyond, pp. 13-14).

At the same time, the potential of these technologies in the military field was validated, however, the adverse effects of technological progress that could cause disruptions in the decision-making process at the political and military level were emphasised. There was also taken into account the risk that with the global growth of technologies, these types of tools/capabilities would become much more readily available to the adversary. Thus, the paradigm in which the implications of technological progress were viewed was established both from the perspective of the multidisciplinary impact on society, and from the perspective of doctrinal potentials in the conduct of war. The main line of thought was that of operational

interconnectivity on all manifestation components (air, land, sea), simultaneously with the blurring of the conventional-asymmetric border. At the same time, the location of the operations was anticipated to transform, alongside the classic geographical assumptions, being emphasised the importance of ensuring control in space and in the cyber environment.

The temporal perspective associated with the analysis process carried out in support of the CDP aimed to identify the trends that could emerge on the horizon of 2035. In this context, the concept of *“innovation in the field of defence”* was advanced, whereby technological progress was adapted to military applications, unlike previous approaches where it influenced technological development in the civilian sector. The second aspect aimed at the so-called *“democratisation of emerging technologies”* in which the accessibility of state and non-state actors to dual-use products is becoming wider, offering much cheaper solutions compared to the classic approach. Moreover, the relative uncertainty associated with the technological development does not allow ranking the way in which emerging technologies will evolve or more precisely which of them will gain dominance. Based on these considerations, the technologies identified in the EDA assessment as being able to influence the profile of defence capabilities are aimed at: artificial intelligence; sensors; human interface technologies; autonomous systems; nanotechnologies; synthetic media; virtual and augmented reality; smart materials and composites; satellites; advanced manufacturing products; electronic warfare and countermeasures; precision energy weaponry; communication systems; energy generation and storage.

The reflection of the conclusions of the analysis process carried out in the context of the CDP review was to be found in the adoption, at the level of the EDA Steering Committee, of a new set of 11 priorities for the development of capabilities that included: support capabilities for cyber incident response operations; spatial information and communication services; information superiority; ground combat capabilities; medical and logistical support; naval manoeuvrability; submarine control; air superiority; air mobility; integration of air capabilities in the aviation sector; multidisciplinary capabilities to meet the EU level of ambition. In connection with this dimension, EDA has promoted a set of benchmarks for identifying emerging and disruptive technologies aimed at their impact on the conduct of war. Thus, six technologies with a major impact were identified regarding: artificial intelligence, data analysis, robotic and autonomous systems, hypersonic and space weaponry, advanced materials, quantum technologies (European Defence Matters, p. 6).

At the level of each of these, the issue of emerging technologies was found as an integral part of the foundation of the generation process. At the same time, the CDP priorities will be used to guide the processes carried out at the level of the initiatives developed in the context of the implementation of the Treaty of Lisbon, as is the case of the Permanent Structured Cooperation (PESCO), launched in December 2017 through the voluntary participation of 25 member states in order to develop integration of the process of generating capabilities as well as strengthening the operational capacity of the EU (PESCO Notification, 2017). The way of operationalising these objectives is achieved by generating collaborative projects on different components of capabilities that respond to the priorities in the CDP. Following the successive rounds of expansion of PESCO activities, the number of projects developed by the participating states has reached 60.

In the same context, the Coordinated Annual Review on Defence (CARD) was initiated at the end of 2016 with the aim of inventorying the existing capabilities at the European level and identifying the cooperation options that the member states want to undertake in order to overcome the deficiencies. Practically, this initiative represents a platform for interaction between member states carried out within regular intervals (cycles). The recommendations formulated following the development of the first CARD cycle (2019-2020) indicated the existence of six categories of fields that the member states are interested in considering at the level of national capability development processes (the future European tank, the system of the future soldier, ships patrolling, combating autonomous aerial systems, space defence applications, military mobility). Moreover, the recommendations of the first CARD cycle also target R&T aspects that have been identified as having substantial potential interest from member states for the development of joint projects. They include artificial intelligence, cyber defence, new sensor technologies, emerging materials and energy propulsion systems, robotics, autonomous systems (CARD Report, p. 7).

EUROPEAN DEFENCE ACTION PLAN

By far the most important initiative launched in the process of implementing the EU Global Strategy and, subsequently, the review of the Capability Development Plan, was represented by the European Defence Action Plan (EDAP). It was launched by the European Commission in November 2016, being structured on three complementary components and targeting the entire capability development cycle, with an emphasis on the R&T dimension and industrial purpose. Specifically,

the EDAP included the launch of a European Defence Fund (EDF), simultaneously with the development of investments in the capability generation chain and the consolidation of the single market in the field of defence.

Of this package, the major relevance for the theme of this communication concerns the creation of the EDF, which will include a consistent dimension in terms of financing cooperation projects based on emerging technologies. Basically, by launching the EDF, the aim was to promote a much more ambitious approach regarding the efficiency of European cooperation in the field of defence, by increasing the financing possibilities of cooperative projects developed with the participation of the member states. Structurally, the EDF was designed in two components/windows, capabilities and research, with a budget of about 8 billion Euros (5.6 billion – capabilities, 2.3 billion – research). From the perspective of being part of the EU's new multiannual financial cycle (2021-2027), the entry into operation of the new initiative was set for 1 January 2021. To facilitate this process, a transition period (2019-2020) was established in which the procedures and the operating mechanism that will govern the operation of the EDF will be set up.

In this regard, on 18 July 2018, the decision was adopted to launch the European Defence Industrial Development Program (EDIDP) with the following main objectives: to develop the competitiveness, efficiency and innovation capacity of the defence industry at the European level; to support cross-border cooperation between EU member states; to streamline the way to capitalise on research results in the field of defence to support the competitiveness of the defence industry (EDIDP Regulation, pp. 1-2). In this respect, the EDIDP represented a premiere, being the first program through which cooperation projects developed by member states in the field of defence could be directly financed. The financial envelope associated with this new instrument was 500 million Euros for the period 2019-2020.

In order to structure the project proposals, in the two years of operation, approximately 20 calls for projects were launched in a wide range of fields such as: air capabilities, CBRN, cyber, defence technologies supported by artificial intelligence, innovative solutions in the field of defence, monitoring space, underwater control, air superiority etc. The share of projects related to emerging and disruptive technologies increased significantly between the two stages of the EDIDP, a trend also reflected in the evolution of the number of entities on the territory of the EU member states that benefited from support through the EDIDP. Thus, for the first year of operation, a number of 223 entities were connected to the projects that benefited from financing through EDIDP, their number almost

doubling for the second year (420). Based on the themes advanced through the calls, 42 projects were selected for funding, most of them having components associated with emerging/disruptive technologies. A special place was occupied by the use of algorithms specific to Artificial Intelligence in the field of identifying explosive devices, an approach that was used within one of the projects that obtained funding.

However, considering the complexity of advanced projects as well as the interaction of various types of technologies in the solutions thus promoted, it is difficult to precisely establish the share of the disruptive component at the level of EDIDP projects. The profile of the entities that were involved in their development offers, instead, a series of indications regarding the significant presence of those whose activity is in the field of disruptive technologies. Thus, one can estimate the innovative character of the EDIDP in which the share of aspects related to new technologies and innovation represented a component of 40-50% of the funding granted. An additional indicator is the fact that from all the entities participating in the consortia that promoted eligible projects, the largest share is represented by new entities, connected to the new trends in the field of research and development.

Starting from the experience gained through the two EDIDP cycles, on 1 January 2021, the European Defence Fund began to operate. The aspects related to the functionality of the EDF remained largely unchanged, the agreed elements for the operation of the EDIDP being taken over in the transition process. The same situation can be found with regard to the eligibility criteria of the entities participating in the project competitions on the two windows, namely the obligation to form consortia with the participation of at least three entities from at least three member states (EDF Regulation, p. 151). Basically, it is worth mentioning the added value of the EDF, much more visible in terms of research funding, the new instrument intending to work in complementarity with other approaches and programs developed in different institutional contexts, as is the case with the type of framework programs. From this perspective, the EDF's role was to finance research efforts with a certain level of maturity and with increased relevance to the field of defence, which could target the development of new products, as well as upgrade programs for existing products on the market.

A distinct note of flexibility aimed at approaching the field of disruptive technologies. At the level of the regulatory framework of the operation of the EDF, this dimension was appreciated as extremely important from the immediate and long-term perspective for the development of relevant defence capabilities in the context of an increasingly fluid security environment. Thus, the support through

the EDF of projects with significant potential for the development of the applicability of disruptive technologies in the context of defence represented a major funding priority. On these coordinates, the characteristics of the industrial-technological segments that had this issue in their portfolio, the vast majority of them belonging to the civil segment, were considered. In order to capitalise on their experience, in the structuring of the operating mechanism of the EDF, the development of a substantial dialogue with the respective entities was considered, including from the perspective of using this instrument in the acquisition stages prior to commercial circulation. Basically, the EDF wanted to be a connecting element for supporting activities developed in a European context during the cycle between research and product development, an approach in which disruptive technologies represented a distinct benchmark for the allocation of financial resources. A direct expression of the interest in capitalising on the financial opportunities created by the EDF was also the fact that in the conceptual foundation of the new instrument a European perspective on disruptive technologies was also promoted.

Obviously, this approach came to fill a framework void at the EU level as well as to provide additional elements of orientation in the analysis of the cooperation projects that will be the subject of the competition under the auspices of EDF. From this perspective, “*disruptive technologies*” were those types of technologies, new or enhanced, that bring radical change, including conceptual and practical paradigm shift in defence by replacing existing technologies or optimising obsolete technologies. Different nuances are distinguished in relation to the benchmarks of the approach used in defining disruptive technologies on the other side of the Atlantic, especially in terms of the emphasis placed on their role in the development of new types of industries. However, one cannot speak of the absence of practicality in the prioritisation of disruptive technologies at the European level, the EDF even bringing more substance and cohesion to European cooperation through the distinct allocation of financial resources for projects targeting disruptive technologies. Thus, it was established that a percentage of 4-8% of the total EDF budget should be allocated to the financing of projects in the field of disruptive technologies (EDF Regulation, p. 162). A simple mathematical exercise shows us an exponential increase in allocated resources that can exceed 630 million Euros, multiplying substantially at the level of economic growth.

Within the project calls for EDF 2021, a distinct window has been created for disruptive technologies with a funding potential of up to 60 million Euros in the first year of operation of the new instrument. Projects approved for implementation

include: quantum technologies for defence; applications for optical sensors; new materials and defence technologies for additive manufacturing. The disruptive technologies component is added to the other areas addressed at the EDIDP level maintained at the EDF level to ensure the continuity of cooperation programs whose implementation requires an interval of more than two years. Thus, the accumulation of financial resources allocated to innovative and disruptive technological fields has increased significantly reaching, in reality, the level of 25-30% of the total financial envelope of 1.2 billion Euros, which corresponds to the first year of the EDF [EUROPEAN DEFENCE FUND (EDF) CALLS 2021, pp. 2-3].

CONCLUSIONS

As it can be seen, the issue of disruptive technologies has been a theme constantly addressed in different forms associated with emerging, critical or dual-use technologies at the level of the European agenda. The progress made can be viewed from two temporal perspectives. The first covers the period up to the launch of the EU’s first objectives in the field of security and defence, in which concrete achievements cannot be considered substantial, given the limitation to the field of civil security. The relevance of this period resides, however, in the creation of that institutional and procedural *acquis* that will be used in the subsequent period as well. Also, the importance of the first years is also distinguished from the perspective of keeping the subject of technologies of this type on the European agenda, being created, at the same time, the first elements of connection with the operational agenda of the EU in the field of crisis management.

With the adoption of the EU Headline Goals (1999, 2003), the approach to technological progress in the European context entered another stage in which the priorities and directions of action applicable in the military and defence area were established much more clearly. The progress recorded is among the most notable, not only from the perspective of the development of the conceptual framework but also by expanding the financing possibilities of projects associated with innovative technologies. Practically, their connection with the field of defence was consistently substantiated, establishing this direction of action as being able to generate significant opportunities in economic and industrial terms. It is also during this period, as it follows from the previously presented elements, that the diversification of institutional approaches was recorded, from the perspective of the actors involved as well as in terms of the subjects managed at the level of research programs.

The launch of the European Defence Fund opens a new stage having as the main characteristic the maturation of the European approach in the field of innovative technologies, with a particular focus on disruptive ones. The premise that the EDF advances at the level of European cooperation for defence is that of a robust financing that will develop in the immediate period ahead, which will allow the consolidation of the industrial profile of this dimension of cooperation. At the same time, the emphasis placed on the development of research of this type represents a politically validated course of action at the EU level as one of the main directions for the development of defence capabilities in the European context. The Strategic Compass adopted on 21 March 2022 by the Council of the European Union provides additional guidelines, indicating the importance of deepening cooperation in this field and capitalising on the opportunities for the applicability of technological progress in the field of defence.

This evolution, which is very clearly emerging as the future course of action, offers major opportunities for the member states, participation in the project competitions run under the auspices of EDF being already a direction for action that the entities in the EU space have begun to capitalise on, starting from the experience of participation in the EDIDP 2019-2020. The attractiveness of the resources allocated to the field of defence is also a certainty that is strengthened every year by increasing the financial volume that the EU mobilises to support cooperation between member states. Also, the consolidation of the weight of projects in the field of disruptive technologies represents a trend that can be capitalised on by a wide range of entities, with not necessarily robust potential and visibility, but whose dynamics can make a difference in the competition of projects for projects of this type.

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