

# Review of the Preparatory Action on Defence Research (PADR) and European Defence Industrial Development Programme (EDIDP): lessons for the implementation of the European Defence Fund (EDF)



## STUDY

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### ABSTRACT

Of all European defence initiatives launched since 2016, the European Defence Fund (EDF) is without doubt one of the most promising, if not *the* most promising.

However, the EDF will not by itself solve all problems related to the fragmentation and therefore inefficiency of European defence procurement. Only the Member States can do so, working in good faith together with the Commission in deciding the EDF work programme and funding allocations. Doing this, it will be essential not to confuse the ends – the creation of a strong and competitive European Defence and Technological Industrial Base (EDTIB) – the ways – inclusiveness through wide cross-border cooperation and the will to pursue strategic autonomy – and the means – the defence research projects funded by the EDF.

Keeping the course between at times conflicting paths and ensuring the return on a meaningful but still modest investment (EUR 7.9 billion over seven years) will be the main EDF challenges in the years ahead.

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## Aim of the study and methodology

The terms of reference as laid out by the European Parliament for this study were as follows:

*'The experts should first analyse the implementation of both PADR and EDIDP in details. This requires consulting all relevant actors, with some access to the Commission services in particular, but also to relevant Member States' agencies, the EDA, the Council, EEAS, and other relevant actors/institutions/bodies such as NATO.'*

*'The link between the military and the industrial capability development dimensions will be at the heart of the study. But other dimensions (political, financial, industrial, organisational, cultural...) could also be considered as regards their strategic impact'*

*'In a second instance, the implications for the EDF should be analysed in details and recommendations made for the different EU institutions and bodies; a specific part concerning the role and actions by the European Parliament should be inserted.'*

*'PESCO: Information on the implementation of the Permanent Structured Cooperation so far is also important, as PESCO projects will be eligible with specific conditions for EDF financing. The ongoing PESCO review should therefore be taken into account (including what it does not say/cover).'*

*'Based on the PADR and EDIDP prior experience the experts should answer are the following questions: How can the European Defence Fund contribute to:*

- Operational effectiveness? (e.g., issues of inter-operability; training, ...)*
- Competitiveness?*
- Support SMEs and mid-caps, in a fair (i.e., geographical, cross border conditions), and sustainable manner?*
- Balance market openness, and strategic and industrial autonomy (e.g., security of supply chains, technical vulnerabilities, ownership of strategic companies...)?*
- EU Strategic Autonomy?*

*'How were the choices on the military capability domains to be covered be made and which role did PESCO play in that context?*

*'How did the Commission define and assess the value added of an EU level intervention in a particular capability domain or for a specific technology area?*

*'Based on the PADR and EDIDP prior experience, how could the EDF impact EU structures and functioning, at Commission, EEAS, EDA levels in particular; in terms of Comitology; as far as administrative practices are concerned in a new defence context (new culture; security of data/information aspects...).'*

*'In this context, a number of important issues may be listed which will warrant further research in coming years.'*

This study was carried out using documents from open sources and building on previous work done by the authors on the subject, especially three reports written for the European Parliament in March 2016 '[the future of EU defence research](#)', July 2017 '[Permanent Structured Cooperation: national perspectives and state of play](#)' and December 2018 '[EU defence: the White Book implementation process](#)'. The authors also carried out more than 70 interviews of the European Defence Fund stakeholders (see annex 2 – list of persons interviewed) and had access to a number of classified EU documents such as the EU High Impact Capability Goals, an unclassified version of which is published for the first time with the authorisation of the European Union Military Staff (see annex 6). The authors take full responsibility for the opinions expressed in this report.

## Executive summary

The European Defence Fund (EDF) is one of the most promising innovations among the range of initiatives that have emerged in the field of European defence since 2014.

Drawing on the experience of two precursor programmes, the Preparatory Action on Defence Research (PADR) and the European Defence Industrial Development Programme (EDIDP), the EDF is more ambitious, better endowed (EUR 7.9 billion), longer term than its predecessor (it runs in parallel with the Multiannual Financial Framework 2021-2027), and it has the potential to spark a decisive upgrade of Europe's defence capabilities at the service of its strategic autonomy.

Whether it will realise this potential, however, will depend on a number of conditions.

First, Member States and the Commission, who will decide on the EDF work programme jointly, will have to thread a fine line between (a) promoting excellence in innovation, which is essential to 'foster the competitiveness, efficiency and innovation capacity of the European defence technological and industrial base', as per the Fund's mandate, and (b) fostering cross-border cooperation, which is vital to the legitimacy of the Fund, but also to tap into the yet unexplored potential for innovation of SMEs and Research and Technology Organisations (RTOs) located in EU countries with no Defence and Technological Industrial Base (DTIB) tradition. The challenge posed to the EDF will be to open national defence value chains organised in silos without breaking their valuable elements and lead the transition to a network of horizontal defence value chains organised between EU countries. This will require overcoming the resistance of Member States with strong DTIBs, who will be keen to protect their 'national champions' whilst pro-actively reaching out to newcomers, especially in the Research and Technology (R&T) domain, who are not familiar with the defence sphere. This outreach is particularly important as most ground-breaking research nowadays is carried out in the civilian field. If it does not tap into the potential for innovation of civilians' RTOs, the EDF will be unable to fulfil its mission.

Second, the EDF will only be successful if the Commission and Member States make efficient use of its resources. On the one hand, national capitals must eschew the temptation of using the Fund to substitute for investments in defence R&D that they would otherwise make themselves. On the other hand, the Commission must build the EDF work programme around projects that have strong 'buy-in' from the Member States. Otherwise, there is a risk that research be funded that will have no take-up in the form of development of armament systems (as happened for the Security research action within Horizon 2020). The EDF funding structure is designed to exert the maximum leverage effect on Member States' initiatives, foreseeing a co-funding rate of 20% to 80% for its R&D component – 80% for testing, qualification and certification, 20% for the construction of prototypes, which are the most expensive parts of R&D. Whether Member States will find this incentive sufficient remains to be seen, all the more so that indirect costs of defence R&D are high, and that no satisfactory solution has been found to their coverage by the EDF.

Third, the effectiveness of defence research (especially R&D) largely depends on its link with defence planning and the ability of that planning to anticipate future threats. In other words, the success of the Fund is largely linked to an improvement of the EU defence planning process, including, first, greater coherence among the many disjointed components of this planning and, second, greater coherence between the latter and national defence planning processes. In this regard, many hopes rest on the potential of the 2022 Strategic Compass to impart a clear sense of direction to Europe's defence and security priorities, and therefore to provide a basis to plan the capabilities needed to achieve those priorities.

Fourth, one must beware of complexity. It is necessary to create rules and safeguards to ensure the integrity of the process. However, there is a risk that bureaucratic requirements discourage the most innovative or ambitious. EU calls for proposals are cumbersome and the requirement that any consortium bidding for

EDF contracts include participants from at least three member states adds to the burden. An important factor in this regard is the duration of funding allocations made by the Fund. The EDF is legally bound to establish annual work programmes. Annual work programmes, however, do not provide the perspective needed to develop meaningful defence R&T and R&D projects, and they are heavy to manage, both for the Commission and for applicants. The Commission has given encouraging signs that multi-annual programming will be possible within the framework of the EDF. However, no guarantees exist as of yet. Factoring in this multi-annual perspective in EDF funding decisions will be essential to guarantee both the attractiveness and the effectiveness of the Fund.

In the end, the success of the EDF will be measured by its capacity to generate armaments that Member States would have been unable to develop on their own and that will 'contribute to [the] strategic autonomy and freedom of action' of the Union, as mandated by the Fund regulation. This is essential for the EDF to gain 'military ownership'. At the same time, if the large 'Prime' contractors of the so-called big four (France, Germany, Italy and Spain) are not able to open their value and supply chains, there will be no 'political ownership' shared by all Member States, and therefore no interest in defending an autonomous European DITB. Between these two paths, 'political ownership' and 'military ownership', the Commission will have to stay the course to reach 'competitiveness', as per its mandate according to Article 173 TFEU.

Collaboration between the Commission, which proposes work programmes and funding allocations, and Member States, who endorse Commission proposals by qualified majority, will be essential to ensure the success of the Fund. By choosing the 'double comitology' system as the EDF decision-making principle, its designers have aimed to combine the implementation capacity of the Member States – without which nothing is possible in the field of defence – with the Commission's capacity to steer change in the common European interest in a field that has traditionally been privy to the Member States. It will be the duty of the European Parliament to scrutinise the effectiveness of this collaboration, ensuring that decisions made do contribute to 'the excellence, efficiency and innovative capacity of the industrial and technological base throughout the Union' as required by the Fund Regulation.

# 1 Introduction

*'When there is a will, there's a way'.*

Old British saying

*'The key element in action is first the will of the person undertaking it, and secondly the will of those who might oppose the action.'*

Général André Beauffre  
Stratégie de l'action 1966

In December 2020, an interinstitutional agreement was reached to create a **European Defence Fund (EDF)** endowed with a **EUR 7.953 billion budget (2021-2027)**. The aim of the EDF is to 'foster the competitiveness, efficiency and innovation capacity of the European defence technological and industrial base throughout the Union', with the intent to '[contribute] to the Union strategic autonomy and its freedom of action' <sup>(1)</sup>. The EDF draws on the experience of two precursor programmes, the Preparatory Action on Defence Research (PADR) and the European Defence Industrial Development Programme (EDIDP). However, it is more ambitious, both in its aims and its resource endowment, and has the potential to spark a decisive upgrade of Europe's defence capabilities at the service of the Common Foreign and Security policy. This is, if the Commission and the Member States use it strategically rather than to pursue narrow or immediate interests.

This study aims to expound the potential of the EDF in building a better foundation for European defence through the fostering of defence Research and Technology (R&T) and Research and Development (R&D); illuminate some of the dilemmas EU stakeholders will have to face as they make decisions on projects to be funded; and elucidate the conditions that need to apply for the EDF to realise its full potential, in the context of the broader European defence planning process from which it must draw its orientations. As a preliminary, the lessons learned from PADR and EDIDP are examined. The EDIDP experience in particular brings up useful insights into some of the concrete challenges involved in making an instrument to foster common R&D fruitful.

This report assumes a degree of familiarity of readers with the landscape of Europe's collaborative efforts in defence as well with the specificities of defence R&D. Readers who may lack familiarity with those elements are invited to read the preliminary remarks in section 2. More informed readers may move directly to section 3.

<sup>1</sup> Article 3 of Provisional EDF Regulation 14285/20

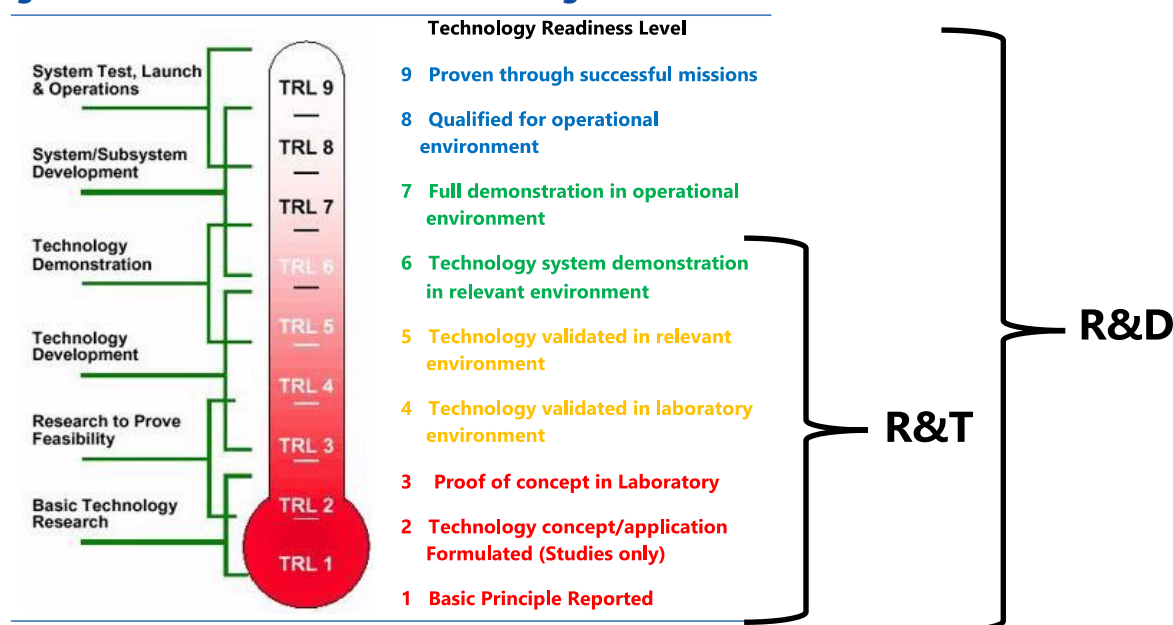
## 2 Defence research in context

Efforts to build a common European defence technological and industrial base (EDTIB), have progressed in fits and starts since 2009. As of 2014, however, the shockwaves sent by Russia's invasion of Ukraine, the irruption of ISIS as a worldwide threat, followed in quick succession by terrorist attacks on European soil, the election in the United States of an administration hostile to any kind of alliance, Brexit, increasingly vicious cyber-attacks and manipulations of European democratic systems, etc. made it clear to all that Europe had to step up its efforts to defend its citizens, territory and infrastructure and therefore invest in its defence capacity <sup>(2)</sup>, which meant stepping up its efforts in defence research <sup>(3)</sup>. Europe was all the more strongly challenged to do so that a less and less reliable United States was making great strides with the so-called 'third offset initiative', a major defence research programme initiated under the Obama administration. It is under this stream of work that the EDF was born.

### Definitions

This report uses the definitions employed by the European Defence Agency (EDA) to differentiate defence Research and Development (R&D) and defence Research and Technology (R&T) <sup>(4)</sup>. The two concepts have to be understood along a scale of nine technological readiness levels (TRLs), with the first three (TRL 1 to TRL 3) being essentially 'fundamental science', characterised by very little differentiation between civilian and defence research and the first six (TRL 1 to TRL 6) constituting R&T, which is usually carried out by Research and Technological Organisations (RTOs). All nine levels together constitute R&D. As of TRL7, research gradually shifts to development (at least of prototypes) and becomes the realm of defence industries or national arsenals.

**Figure 1: Defence research and technological readiness levels**



Source: European Defence Agency definitions used for R&T and R&D expenditure

<sup>2</sup> See Annex 3 – main milestones in European defence since 2009

<sup>3</sup> For a more detailed study see the collection of experts' papers in: 'The emergence of EU Defense policy – From Innovation to Militarization' - Nikolas Karampekios, Iraklis Oikonomou & Elias G. Caryannis Editors Springer 2018

<sup>4</sup> <https://eda.europa.eu/publications-and-data/latest-publications/research-technology>

## **There is a large gap between defence industry and defence**

Even the most innovative and effective military equipment cannot offset poor tactics on the ground. Nor can billions of euros compensate a military strategy that is flawed or unsuited to the threats.

The effectiveness of military defence depends on a plurality of factors that are usually summarised by the acronym DOTMLPF, which stands for doctrine, organisation, training, materiel, leadership and education, personnel, and facilities, and even more on the coherence between all of those elements. And history repeatedly provides examples of military powers being defeated by enemies who are far inferior in number of troops, equipment, organisation, training and materiel.

Therefore, if the creation of the EDF is very good news for the European defence, Europeans should guard themselves against 'technological illusion in military thought' <sup>(5)</sup>. It should be remembered that the 11 September 2001 attacks were carried out using civilian objects and their preparation cost did not exceed a few hundred thousand dollars. Nowadays, a cyber war that paralyses corporations and public bodies, or an information war that tries to alter the course of an election by manipulating social networks is more likely than a Russian tanks rush in the *Suwalki* gap, as EU Governments increasingly experience.

Rightly, defence research is regarded as critical because it might offer the military the possibility to offset the weakness of numbers by the strength of intelligence and therefore it is considered by some armament engineers as the 'apple of the eyes' of the defence industry.

However, it is only part and parcel of a whole, not an isolated element, nor a goal in itself. The ultimate goal of the European Union is to be able to defend itself, protect its citizens, guard its borders and stand for its values, in other words, to fight with allies every time this is possible and alone if necessary.

## **Defence research is only a small part of defence industry**

A large gap separates the research in the labs from the full operational capabilities it is meant to lead to. Transitioning from the former to the later requires a well-organised and thought-through defence planning process, as well as a great deal of patience and funding.

The span of time from the launch of an R&D programme and the full operability of an armament system can be very long, up to 20-25 years. Considering the high level of technicity of some systems, particularly at the end of the spectrum, extremely long delays can occur as extra steps are needed in research or testing. As an example, the American combat aircraft F-35 programme was launched in 1996 and its Full Operational Capability (FOC) was only declared in 2018, 24 years later. It took 18 years for the Eurofighter and 17 years for the Rafale to reach FOC. The European Tiger combat helicopter took 25 years to develop and the American MV-22 Osprey 24 years. Extra steps and time generally mean cost increases that can be significant.

Even without cost overruns, it is important to remember that defence research is but a small part of the total cost of a piece of armament. As a rule of thumb, for one euro spent on development, three must be spent on acquisition and five more on the overall possession costs of an armament system (see section 3.2.3. for further details). This also means that the money the EDF will invest in R&D programmes will be only a small fraction of the total costs that Member States will need to commit to the armament systems developed with EDF seed funding.

In terms of timelines, some of the programmes that will be launched within the EDF 2021-2027 may only translate into military capability at the end of the next EDF 2028-2034 – assuming there is one. A way to

<sup>5</sup> Sophie Lefeez – 'L'illusion technologique dans la pensée militaire' – Editions Nuvis – collection la pensée stratégique June 2017



accelerate the delivery of military capabilities would be for the EDF to support R&D programmes that have already reached a certain stage of maturity.

Another specificity to bear in mind is that defence research should be oriented by defence planning or, as commonly stated, 'capability driven' <sup>(6)</sup>. As will be argued throughout this report, defence research is not a goal in itself: it is undertaken to fulfil specific capability requirements corresponding to the military level of ambition of the strategic actor commissioning the research. Therefore, the link between defence planning and defence research is of the utmost importance.

To complicate the picture, there is no linear path from R&T to R&D and then to procurement. A lot of R&T studies will stop at their level because they have shown that the technology pursued led to a dead-end. On the other hand, some development will start with already mature technologies. In the real world, the link between R&T and R&D looks more like the DNA double helix than a two-step process in which R&T would come first and R&D second.

In this context, it is also important to consider that the link between civilian and defence research has become more and more complex over the last few decades<sup>7</sup>. The days when defence research paved the way for major civilian innovations like radars, jet aircrafts or the internet are over. Today, most innovations take place in the civilian field, whether quantum, cyber or even artificial intelligence. Hence the importance of ensuring as much as possible that synergies between these two types of research are enabled to exploit technological breakthroughs. This is all the more important as cyber espionage has increased and the risk of proliferation has become more acute.

### **Collaborative defence research is the weakest link of the European Defence Technological and Industrial Base (EDTIB)**

Not only do the vast majority of EU Member States spend nothing or very little on defence research, but the few who do, do so on their own. It is therefore particularly appropriate for the EU to start by strengthening this link in the chain.

Compared to strategic rivals <sup>(8)</sup>, and even more compared to the US, EU Member States allocate only limited budgets to defence research, whether in R&T or in R&D.

This shortfall is even more salient if one considers that Member States often conduct similar types of research in parallel, which means that the value for money of their aggregated expenditure is even lower than it would seem in comparison with competitors.

<sup>6</sup> Even if there are exceptions, e.g., sometime defence research can be conducted to maintain competences or acquire technologies, the use of which is not yet precisely known for capability development.

<sup>7</sup> See ARES/IRIS policy papers n° 60 '[The revolution of defence innovation models: rationales and consequences](#)' July 2020 Valérie Merindol & David W. Versailles ; n° 61 '[National expectations regarding the European Defence Fund: The Greek Perspective](#)' July 2020 Yvonne-Stefania Efstathiou ; n° 62 '[Defence innovation: new models and procurement implications: The Spanish Case](#)' September 2020 Carlos Martí Sempere ; n° 63 '[Defence innovation: new models and procurement implications: The French Case](#)' September 2020 Jean-Pierre Devaux & Gaspard Schnitzler ; n° 64 '[Defence innovation: new models and procurement implications: The Italian Case](#)' October 2020 Alessandro Marrone & Andrea Gilli ; n° 65 '[Defence innovation: new models and procurement implications: The Finnish Case](#)' March 2021 Charly Saloni-Pasternak.

<sup>8</sup> It is extremely difficult to gather figures about Russia's and China's defence R&D, not to mention R&T. A rough estimate would be as follows: Russia's defence expenditure represented USD 61.6 billion in 2019 (source – *The Military balance February 2020* – Francis and Taylor – Routledge – Chapter two: comparative defence statistics), or EUR 56.62 billion at NATO parity rates. Assuming Russia spends the same proportion of its defence budget on R&D as the US (14 %), its R&D budget would be around EUR 7.9 billion in 2019. China's defence expenditure is estimated at USD 181.1 billion (*ibid.*), or EUR 166.5 billion. If 14% is used for R&D, its R&D budget was at around EUR 23.3 billion in 2019.



**Table 1: Comparison of Defence Research expenditure**

in billion Euro per year		R&D	R&T
U.S.	2020	96,8	14,8
from which DARPA		3,4	3,1
China	2019	18,4 < < 20,2	?
Russia	2019	7,4 < < 9,2	?
EDA 26 participating Members States	2019	6,9	1,6
U.K.	2018	2,4	0,5

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data on line - for EDA and UK, EDA website; for Russia and China: Renaud Bellais, Une économie armement in LouisGautier et Hervé Drévilion (dir.), *Mondes en guerre IV. Guerre sans frontières*, éditions ées, Paris, 2021, page 458.

Defence research in the EU is concentrated in a handful of European countries (see annex 4 Member States' defence budgetary efforts - tables 8 to 12). According to the figures published by the EDA in January 2021, which are based on harmonised parameters, with EUR 4.9 billion and EUR 1.3 billion respectively, France and Germany together accounted for almost 90 % of the EUR 6.9 billion spent by the 26 EDA members on R&D in 2019. Then came Poland (EUR 260 million), the Netherlands (EUR 190 million), Spain (EUR 124 million), Italy (EUR 66 million) Sweden (EUR 66 million) Finland (EUR 48 million), Romania (EUR 46 million) and Estonia (EUR 16 million). In all others EDA members, Government-funded Defence R&D is almost non-existent.

Concerning R&T the situation is roughly the same with Germany (EUR 623 million) and France (EUR 620 million) representing 75 % of the EU-26 EUR 1.6 billion, followed by the Netherlands (EUR 72 million), Sweden (EUR 66 million), Poland (EUR 59 million) Spain (EUR 56 million) Italy (EUR 53 million), Romania (EUR 46 million), Finland (EUR 33 million) and Estonia (EUR 16 million) <sup>(9)</sup>. Most importantly, according to EDA data, collaborative defence R&T <sup>(10)</sup> barely amounts to EUR 141 million (including EUR 114 million led by France) and thus does not really exist. This low level can be explained by multiple factors, among which the absence of a defence industry in many countries is a key element.

<sup>9</sup> France's and Germany's R&T covers different technological scopes; Sweden and Dutch R&T are strongly linked to US R&T.

<sup>10</sup> No data exists measuring 'collaborative R&D' among EDA members.

### 3 Presentation, assessments and findings

This section describes the two EDF precursors' programmes, PADR and EDIDP, their results insofar as well as feedbacks, positive and negative, from successful and unsuccessful applicants. It gives a brief description of the EDF, its governance and the complex web of its objectives. Finally, it presents EDF's links with other EU initiatives in the field of defence.

#### 3.1 PADR and EDIDP

**Figure 2: PADR and EDIDP, paving the way towards the European Defence Fund**



Source: European Commission: 'News from the European Defence Fund' 24 February 2021  
'Forschung für ein souveränes Europa'

##### 3.1.1 PADR

PADR ran over a three-year period (2017-2019). It targeted R&T and had a budget of EUR 90 million funded from the broader 'Horizon 2020' programme budget. Its management was delegated to the EDA based on the positive experience of an initial pilot project. The last projects funded were announced in April 2020 <sup>(1)</sup>. PADR is no longer active as a funding instrument, but the projects it funded are still ongoing.

PADR's EUR 90 million budget was broken down into three annual calls for proposals, each of them organised around three themes:

- |                       |   |
|-----------------------|---|
| 2017 (EUR 25 million) | (1) enhanced situational awareness in a naval environment   |
|                       | (2) force protection and soldier systems  |
|                       | (3) strategic technology foresight  |
| 2018 (EUR 40 million) | (1) high-performance (re)configurable system-on-a-chip or system-in-package components for defence applications |
|                       | (2) high power directed energy system   |
|                       | (3) strategic technology foresight  |

<sup>11</sup> European Defence Agency, [Preparatory Action on Defence Research: Projects selected following 2019 calls](#), EDA website, April 7<sup>th</sup>, 2021, website consulted on March 6<sup>th</sup>, 2021.

2019 (25 million)

- (1) electromagnetic spectrum dominance
- (2) emerging game-changers
- (3) unmanned systems

In addition, in 2018 and more residually in 2019, funds were allocated to the 2017 project line on 'enhanced situational awareness in a naval environment' (OCEAN 2020).

The overall logic of the programme is best illustrated by the matrix below ranging these projects in strategic clusters (context of applications) and areas of action (types of funded activities).

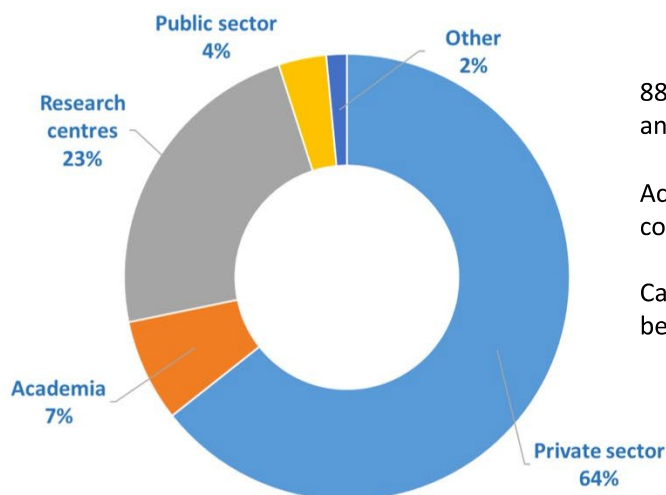
**Figure 3: PADR – structure of the work programme**

		Strategic clusters			
		C4ISR	Effects	Force Protection and soldier systems	Unmanned Platforms
Areas of Actions	Defence Research Demonstrator Project				Situational awareness (naval) 2017
	Critical Defence Technologies	System-on-a chip 2018	High-power laser effector 2018		
		Multifunctional RF system 2019			
	Future and Emerging Disruptive technologies	Disruptive 2019		Technologies	
	Standardisation and Interoperability			Protection, Soldier Systems 2017	Standards for unmanned systems 2019
		Strategic Technology Foresight			

Source: European Commission: 'News from the European Defence Fund' 24 February 2021  
'Forschung für ein souveränes Europa'

**The attractiveness of PADR has been important** as no less than 127 proposals involving 887 entities from 26 Member States and Norway – the only third country allowed to take part – were received by the EDA. In the end, **PADR funded 18 projects with a large geographical footprint**. Indeed, 202 entities from 22 Member States and Norway benefited from PADR funding. Consortia were to be composed of at least three legal entities from three different countries. However, **most of the consortia selected largely overplayed the 'cross border criterion'**. Indeed, the median number of participants per consortium was eight, with a maximum of 42 for OCEAN 2020. Selected consortia were mostly composed of firms, out of which 22% are SMEs. RTOs represented almost one quarter of successful applicants, which reflects their importance in defence research.

**Figure 4: PADR – Outcome of all PADR calls**



889 entities from 26 Member States and Norway submitted 127 proposals

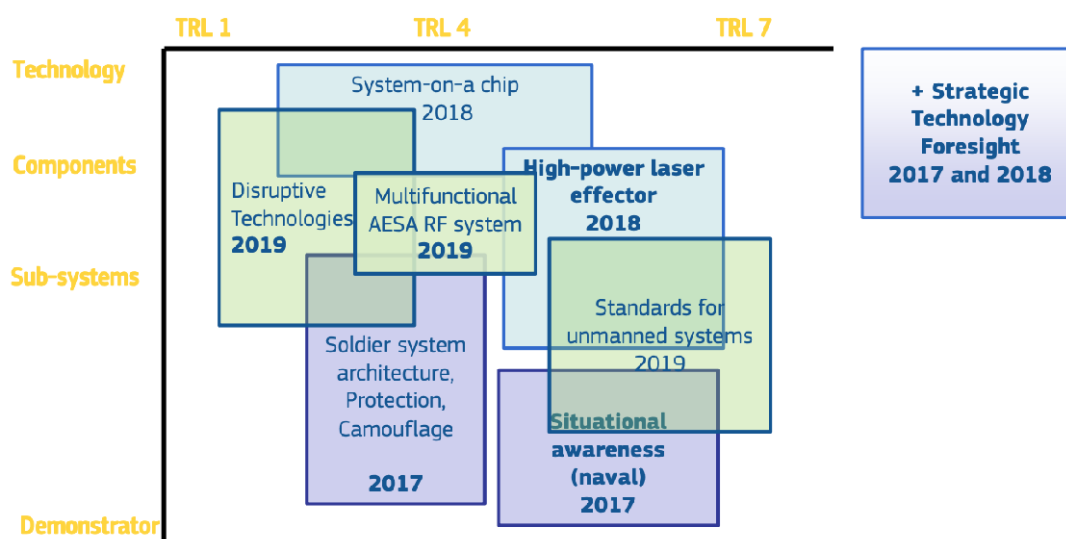
Active Participation from SMEs in 15 consortia

Calls attracted applicants not active before in defence research

Source: European Commission: 'News from the European Defence Fund' 24 February 2021  
'Forschung für ein souveränes Europa'

Regarding **the size of funded projects, it varied significantly from EUR 940 000 for PYTHIA to EUR 35.4 million euros for OCEAN 2020 over three calls**, i.e., approximately 40% of the total PADR budget. However, the median size of PADR projects remained rather modest at EUR 1.5 million. PADR is indeed a small-scale research programme. As for the technological maturity of funded projects, they were rather well distributed between TRL 2 (technology concept formulated) and TRL 7 (system prototype demonstration in operational environment), as illustrated by the graph below:

**Figure 5: PADR – types of research projects**



Source: European Commission: 'News from the European Defence Fund' 24 February :  
'Forschung für ein souveränes Europa'

Criteria used for the selection of the projects are of interest as they reveal the intent of PADR. According to the PADR Financial Regulation <sup>(12)</sup>, proposals had to be chosen for their: (a) contribution to excellence; (b) envisioned impact; (c) quality and efficiency of implementation. For the disruptive technologies' category (PADR-FDDT-OPEN-03-2019 Challenging the future), an additional criterion was used: the impact of the project in a military context.

### 3.1.2 EDIDP

EDIDP was intended to address more specifically defence R&D, providing Member States with incentives to conduct more advanced defence research and develop jointly prototypes at the top level of the TRL scale. As a policy innovation, the EDIDP required a new basic act and its launch the adoption of a specific regulation. The EDIDP regulation <sup>(13)</sup> was adopted in July 2018 for a duration of two years. Calls for proposals were launched in 2019 and 2020. The EDIDP had a budget of EUR 500 million and was managed directly by the European Commission. As of April 2021, the results of the second round of calls were still to be made public. Once this occurs, EDIDP will no longer be active as a funding instrument, but projects funded will still be ongoing.

EDIDP's EUR 500 million budget was broken down as follow:

- (1) EUR 200,5 million in 2019 allocated to calls for proposals;
- (2) EUR 162,5 million in 2020 allocated to calls for proposals;
- (3) Two direct awards:
  - a) a EUR 100 million grant (i.e., 20% of the EDIDP total budget) awarded over two years to Airbus, Dassault and Leonardo for and their 'Eurodrone' project;
  - b) a EUR 37 million grant to Thales, Leonardo, Indra, Radmor, Bittium and Rhode & Schwarz for their 'ESSOR' project, which aims to develop interoperable and secure military communications.

The rationale for the direct awards is laid out in the biannual EDIDP work programme and relates to both military needs and competition matters. As for the calls, a total of 21 were launched over 2019 (nine calls) and 2020 (12 calls). Although, as indicated above, the results of the 2020 call for proposals have not yet been made public, it is possible to draw conclusions from the results of the first call and the structure of both calls. **The EDIDP 2019 calls attracted 40 proposals involving more 441 entities.**

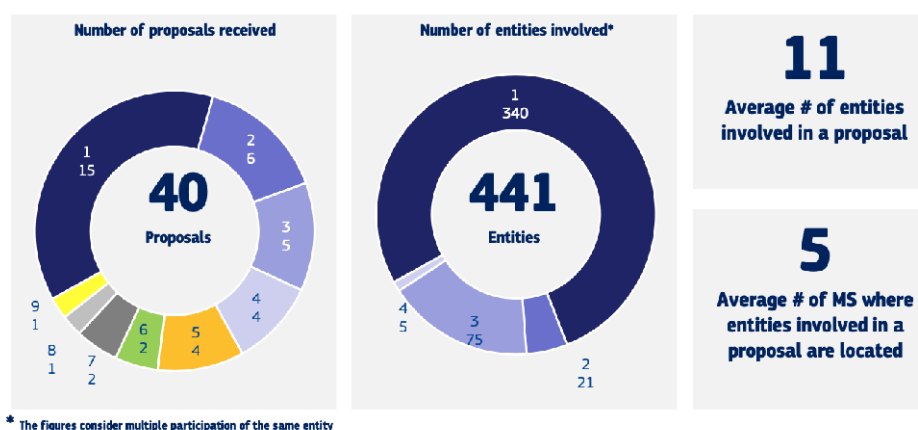
<sup>12</sup> Commission Decision on the financing of the 'Preparatory action on Defence research' and the use of unit costs for the year 2017, C(2017) 2262, April 11<sup>th</sup>, 2017 ; Commission Decision on the adoption of the work programme for 2018 and on the financing of the 'Preparatory action on Defence research', and authorising the use of unit costs under the preparatory action, C(2018) 1383, March 9<sup>th</sup>, 2018; Commission Decision on the financing of the 'Preparatory action on Defence research' and the adoption of the work programme for 2019, C(2019) 1873, March 19<sup>th</sup>, 2019.

<sup>13</sup> Regulation (EU) 2018/1092 of the European Parliament and of the Council of 18 July 2018 establishing the European Defence Industrial Development Programme aiming at supporting the competitiveness and innovation capacity of the Union's defence industry – Official Journal of the European Union 7.8.2018 L 200/30



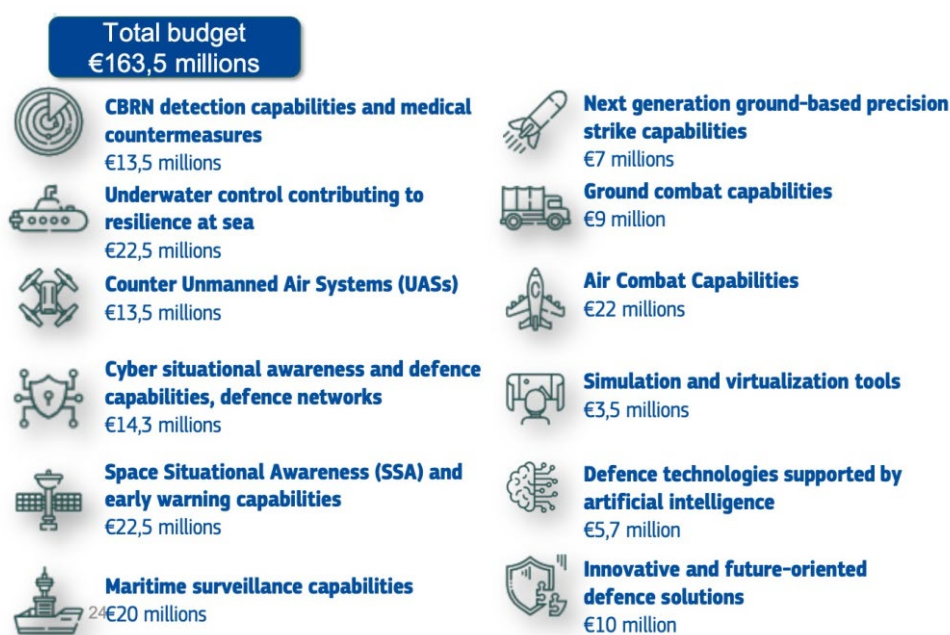
**Figure 6: First tranche of EDIDP – proposals received**

**40 Proposals with real cooperative and multi-national dimensions covering all the calls and the different topics. 40% of all proposals received in the SME call**



Source: European Commission: 'News from the European Defence Fund' 24 February 2021  
'Forschung für ein souveränes Europa'

These calls resulted in the **financing of 16 projects**, again with a **large geographical footprint**: 166 entities from 24 Member States. In addition, and in compliance with the EDIDP regulation, **three entities controlled in the US, Canada and Japan are associated**. With rules on the size of consortia comparable to PADR's, the EDIDP projects also largely exceed the minimum requirements, with a **median number of participants per consortium of 10.5**. The biggest project (GEODE) gathers 18 participants. **Even more than for PADR, SMEs are quite well represented** as 40% of the proposals were received in the call specifically targeting SMEs. SMEs also account for 37% of the beneficiaries of EDIDP funding.

**Figure 7: First tranche of EDIDP (without direct awards)**

Source: European Commission: 'News from the European Defence Fund' 24 February 2021  
'Forschung für ein souveränes Europa'

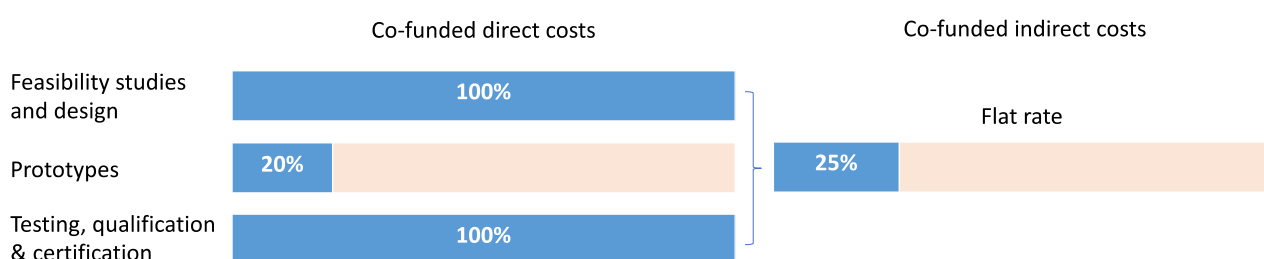
**An important take-away from the EDIDP calls and results is their capability-driven intent.** First, the direct award of EUR 137 million is in favour of projects, which aim at tackling direct and identified military needs. Second, the weight of selection criteria used in the EDIDP 2020 calls for proposals, such as the contribution to excellence or to the industrial autonomy of Europe, points in that direction. Nine out of the 16 selected projects are related to Permanent Structured Cooperation (PESCO) (see below section 3.3.1), accounting for almost 80 % of the EDIDP 2019 budget.

A second important take-away is that, in the EDIDP, like in PADR, **bidding consortia have largely overplayed the ‘cross border criterion’**. In lieu of three entities from three Member States, **the average number is 11 entities from five different Member States**, with a median number of 10.5.

**The third take-away concerns eligible costs.** For any project/action, funding rates are expressed as a percentage of eligible costs, rather than as a percentage of the total estimated cost of the project/action. Covered eligible costs are those directly related to the performance of the project/action (‘direct costs’) and a part of costs which are indirectly related to it (‘indirect costs’). In line with Horizon Europe, article 11 (5) of the EDIDP regulation provides that indirect eligible costs shall be assessed at a 25% flat rate of direct costs. However, indirect costs can sometimes equal direct costs in defence R&D (especially for large capitalisation firms (large caps)). This too low coverage of indirect costs proved to be a serious limitation of the EDIDP. According to interviews with industry representatives, such a provision was tolerable in a two-year preparatory programme but would not for a longer term one. The EDF regulation seems to have factored in this feedback by allowing for an opening for a higher coverage of indirect costs (see section 3.2.3). How the Commission will interpret this opening, however, remains to be seen.

**The fourth take-away concerns co-funding rates.** One of the main principles of EU budgetary law is that grants shall only co-finance an action (article 190 of the EU financial regulation <sup>(14)</sup>). According to article 11 of the EDIDP regulation, up to 100% of eligible costs can be funded except for prototypes which can be funded up to 20% of their eligible costs. This is also consistent with the rationale for the EDIDP, which was not meant to substitute for Member States’ own efforts but **to have a significant leverage effect on national defence investments**.

**Figure 8: EDIDP maximum co-funding rates**



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**In addition**, the EDIDP regulation provides for bonuses (expressed as additional points of percentage of funding) under certain conditions. The rationale of such bonuses is to incentivise certain types of behaviour from applicants. Among others, they aim at ensuring a certain level of consistency among EU defence initiatives (PESCO bonus) and promoting the Europeanisation of defence value chains (SMEs and mid-caps bonuses). Bonuses may be cumulated but cannot exceed 35 percentage points (article 11 (6)).

<sup>14</sup> [Regulation \(EU, Euratom\) 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union](#), OJ L 193, 30.7.2018, p. 1–222

**As a result of the combination of various bonuses such as the PESCO or the SMEs ones, the most mature and most costly projects ('prototypes') can be funded by the EDIDP up to 55%.**

### 3.1.3 Feedback from applicants to PADR / EDIDP calls for proposals

It is too early to assess the effects of PADR and EDIDP on the competitiveness of the EDTIB or Europe's strategic autonomy, especially as the two precursor programmes are still being implemented. However, from the large number of testimonies collected in preparation for this study, it appears quite clearly that they have achieved their objectives to incentivise cooperation at EU level and that positive experiences largely outweigh negative ones.

#### ***A positive assessment***

**Overall, PADR and, to a lesser degree, the EDIDP are largely considered by applicants as positive and enriching experiences.** The most striking is probably that this feedback is shared by both successful and unsuccessful applicants. Indeed, those precursor programmes have been perceived as opportunities to develop and increase skills in structuring and preparing accurate and suitable proposals.

Another interesting consequence, which has been valued by applicants, is **the expansion of their networks at European level.** The requirement of inclusiveness in the building of consortia has encouraged applicants to look beyond their current networks. This concerns all types of applicants (RTOs, firms, etc.). However, one should note that the very short deadlines of the calls for projects have made it quasi-impossible for new entrants to the defence market to participate to consortia in absence of previous partnerships with one or several participants to the consortia. The consortia building exercise may also have had side effects on previous partnerships and distended some links. However, such a reconfiguration of networks does not alter the very positive perception of PADR and the EDIDP by the applicants.

This reconfiguration of networks also concerned Member States to a certain extent. The elaboration of the work programmes, but also additional criteria required for certain activities under the EDIDP, such as the existence of common requirements from at least two Member States<sup>(15)</sup>, forced them to multiply interactions in different formats with concrete outputs.

From an industrial point of view, the EDIDP may also be seen as a welcome source of change in the management of cooperative industrial projects. Indeed, in intergovernmental cooperation, industrial negotiations remain generally managed by States. **The EDIDP offers more flexibility and liberty in the constitution of the consortia.**

#### ***Difficulties faced by the applicants***

**Such a positive global assessment of PADR and the EDIDP shall not lead to overlook real difficulties that have been faced by applicants.** Some of these are linked to the nascent character of the programmes and will certainly fade away with the progressive implementation of the EDF. For instance, the EDIDP regulation introduced eligibility criteria such as the necessity for consortia to demonstrate that at least two Member States intended to procure the final product or to use the technology in a coordinated way (article 6 (4)). Another such criterion was the obligation for actions funding prototyping, testing, qualification or certification to be based on common technical specifications jointly agreed by the Member States who will co-finance or intend to jointly procure the final product or to jointly use the technology (article 6 (5)). These criteria constituted an EDIDP novelty for participants compared to PADR and Horizon 2020, and they were a source of complexities and difficulties. New entrants in defence activities in particular experienced great difficulties complying with them. Considering that the EDF is applying similar criteria, this is a concern for the future given that major sources of innovation are located today out of the traditional circles of defence

<sup>15</sup> EDIDP Regulation, article 6, §5.



industrial actors, and that it is vital for the latter to ensure that these innovations are made available for military applications.

The EDIDP also revealed national discrepancies between Member States in the appreciation of the budgetary implications of their support to funded projects. In some cases, it has been reported that this support was initially understood by the concerned Member States merely as a moral one. According to the Commission and several interviewees, one of the added values of the EDIDP has been to bring Member States some clarity on their obligations.

However, some of the difficulties faced by applicants refer to more structural factors. One of the main shared criticisms is **the absence of a structured dialogue between the end users (the Member States) and the contracting authority (the Commission) on the one hand, and consortia on the other hand**. This lack poses two distinct challenges. First, there is often a need for a holistic dialogue between military personnel, armament engineers and industry experts to detail the requirements for complex programmes. At the national level, armament agencies – thanks to the link they have developed with industry – play this role. In absence of such a forum at the EU level, within the EDIDP framework, this dialogue has been ensured at the national level in the 27 Member States. Second, and as a consequence, this absence gives a privilege to applicants which are based in Member States where such a structured dialogue exists, i.e., generally those with a strong and developed DTIB. Some smaller applicants thus perceived that some consortia had been structured before the publication of calls for proposals as they came up quickly with well-structured projects.

Finally, a **major uncertainty** remains for many applicants on the planned exploitation of the results of the PADR and EDIDP projects. Some applicants have expressed concerns regarding this lack of clarity as the projects funded are meant to give rise to the development of full-fledged military capabilities. This is a concern since, by incentivising European cooperation over traditional national networks and value chains, the EDIDP and to lesser extent PADR are having a destabilising effect on national industrial organisations and innovation ecosystems. Such an effect would be acceptable if it were balanced by a new stable structuration at European level. As short-term programmes, PADR and the EDIDP have the capacity to incentivise the opening of value chains but not to stabilise them in the long run.

## 3.2 The European Defence Fund

The EDF regulation was proposed by the Commission in June 2018. It builds on the experiences of PADR and the EDIDP and is close in content to the EDIDP regulation. Of its EUR 7.953 billion budget, one third (EUR 2.651 billion) will finance competitive and collaborative research projects (R&T), in particular through grants, and two-thirds (EUR 5.302 billion) will complement Member States' investments by co-financing the costs of defence capabilities development following the research stage (R&D). As this report is being drafted, the EDF regulation has yet to be formally adopted. According to observers <sup>(16)</sup>, this should be done by mid-May 2021, based on a provisional agreement, on which the assessment of the present report is based <sup>(17)</sup>. According to the Commission, the first calls should be published in June with a deadline for submission in December.

### 3.2.1 The main points of the legislative process

The belated endorsement of the EDF regulation in December 2020, two and a half years after it was proposed by the Commission, reflects an intense and at times acrimonious debate among institutional stakeholders on key aspects of the Fund. The issues behind those debates remain alive and will to a large

<sup>16</sup> [Blog B2Pro Carnet - confidentiels](#) 6 March 2021

<sup>17</sup> [14285/20 – C9 xxxxx/2020 - 2018/0254 \(COD\)](#)

extent reveal themselves through future discussions on the work programme and selection of projects. They are largely reflected in the analysis below.

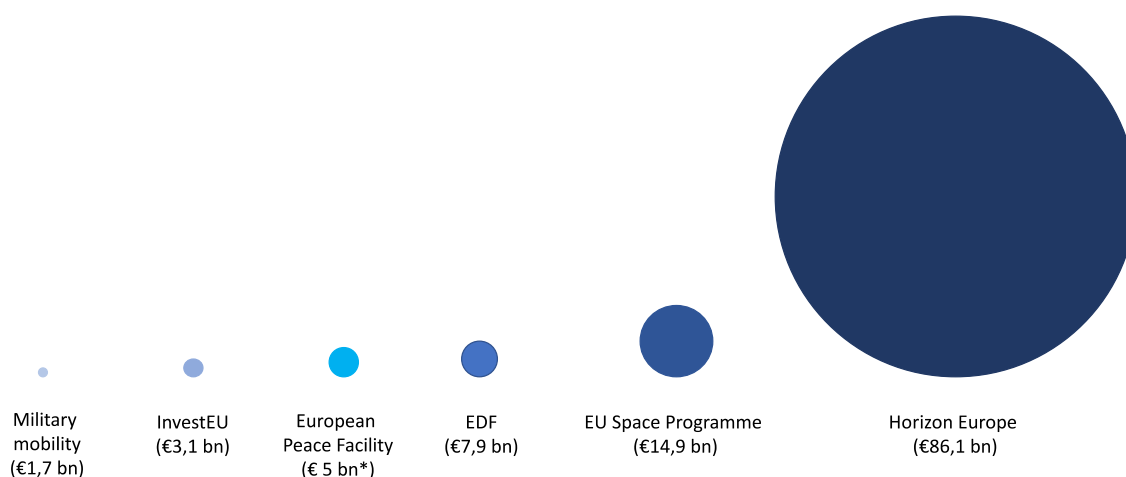
### ***The size of the budget***

Among the key items of discussions, the size of the EDF budget was crucial as it largely determined its ambitions. The initial proposal of the Commission, in 2018 was to allocate EUR 13 billion to the Fund (in current prices) of which: EUR 4.1 billion for R&T and EUR 8.9 billion for development. With this amount to be spent over 7 years, the EDF would have enabled Member States to more or less comply with the objective they set to themselves in 2007 to dedicate 35% of their equipment spending to cooperative programmes <sup>(18)</sup>.

However, negotiations within the European Council resulted in a significant decrease of the EDF budget, which was almost halved. With EUR 7.9 billion (i.e., approximately EUR 1.1 billion per year), the Fund cannot be expected to bridge the EU Member States' investment gap in defence R&D/R&T. Still, it will enable Europeans Member States to reduce it. If Member States respect their commitment to use the EDF to fund new projects and no substitution effects happen at the national level, then EDF should enable them to spend 20% of their equipment budget cooperatively.

In comparative terms, the EDF budget accounts for 0.66% of the EU's budget over the period. This is equivalent to half of the EU space programme (EUR 14,9 billion), one tenth of Horizon Europe (EUR 86,1 billion), but twice as much as InvestEU, the EU's flagship investment programme (3,1 billion).

**Figure 9: EDF budget in the Multiannual Financial Framework 2021-2027**



\* EPF budget is outside the MFF. The €5 bn figure is a ceiling over the 2021-2027 period

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The split between R&T and Development budgets is no coincidence. According to EDA data (see annex 2), the ratio between R&D and R&T expenditure at EDA-26 level (i.e., without the UK) is comprised between 2 and 2.2. In the Commission proposal, this ratio was of 2 and it stayed the same in the final figures (EUR 2,65 billion for research and EUR 5,3 billion for development activities). Article 4 of the EDF regulation provides that budget reallocations between research and development activities may not exceed 20%. This is a significant figure as 20% gives the Commission an important margin of flexibility in attributing the awards and drawing up the work programme 'in order to respond to unforeseen situations or new developments and needs' (art. 4).

<sup>18</sup> European Commission, [Ex-ante Evaluation accompanying the proposal for a regulation establishing the European Defence Industrial Development Programme aiming at supporting the competitiveness and innovative capacity of the EU defence industry](#), SWD/2017/0228, June 7<sup>th</sup>, 2017, p.21.

### ***Intellectual property rights***

Thanks to the experience of the EDIDP, intellectual property rights ownership – a highly sensitive matter for the defence industry and Member States – has not been an issue for the EDF. The solution brought by the EDIDP regulation in this regard was sufficiently satisfactory for stakeholders not to reopen it in the context of EDF negotiations: ownership of the results is determined within each consortium.

### ***Access of entities related to third countries***

Another important issue has been the conditions of access to the Fund for entities located in third countries or controlled by an entity located in a third country. This constraint obeys the logical rule that 'EU money' should create 'EU added value' and contribute to 'EU strategic autonomy'.

The perspective of a lack of access to the EDF did provoke tensions with some third countries, in particular the United States during the course of the negotiations. On 1 May 2019, US Under Secretary of Defence for Acquisition and Sustainment Ellen Lord and Under Secretary of State for Arms Control and International Security, Andrea Thompson sent an official letter to the High Representative to complain about the lack of EDF and PESCO openness to US firms and technologies <sup>(19)</sup>. They called both initiatives 'a dramatic reversal of the last three decades of increased integration of the transatlantic defence sector'. The letter did not have the desired effect. In their response, the Commission and the EEAS defended the system set up by the EDF, recalling that it was more transparent than its US counterparts.

The end result is that the EDF regulation is a compromise between the countries that wanted an open access to third countries and the ones more sensitive to 'EU strategic autonomy'. The principle remains that only entities based in the EU or in EFTA/EEA countries (namely, Iceland, Liechtenstein and Norway) and which are not 'subject to control by a non-associated third country or by a non-associated third country entity' (Article 10 (1)) may bid for EDF grants. However, strictly defined exceptions provide for the participation of: (a) entities controlled by a non-associated third country or by a non-associated third country entity (article 10 (2)) and (b) 'assets, infrastructure, facilities and resources located or held outside the territory of the Union's Member States or associated countries' (article 10 (4)).

In practice, as the notion of 'control' posed problems for all European subsidiaries of American companies, a 'derogation' was accepted. European subsidiaries of foreign companies can be eligible if the 'guarantees approved by the Member State or the associated country in which it is established, in accordance with its national procedures, are made available to the Commission'. This measure does not forbid the collaboration between European and American entities, but it ensures that 'European's taxpayer money' goes exclusively to 'European-controlled entities' – considering that the 'Buy American Act' ensures the same for third countries entities operating in the US. As stated by Commissaire Thierry Breton: 'Autonomy does not mean protectionism. Europe is not a fortress. [...] Strategic autonomy means having the possibility to choose and not to make choices by default due to the absence of alternatives or too strong dependencies' <sup>(20)</sup>.

### ***Participation of SMEs and mid-caps***

A specificity of the European defence industry is that it is concentrated in a few countries and structured around national supply chains generally led by large companies. In such a context, an important item of debate has been how to enable industry from across Europe to effectively take part in EDF projects, as Europeanisation of defence value chains is one of the objectives of the EU. This debate took place against the failure of efforts to open up national value chains thanks to the subcontracting arrangements foreseen

<sup>19</sup> This letter can be read on [www.csfederalismo.it](http://www.csfederalismo.it)

<sup>20</sup> Thierry Breton – [speech at the 'Conférence sur l'avenir de l'Europe : quelle ambition pour la défense européenne? - Les entretiens de la défense européenne'](#) 4 November 2020

by directive 2009/81/EC on defence public procurements. This failure caused a degree of bitterness among countries with a smaller defence industry. The solution found in the EDF context was to insert a number of SME-dedicated provisions in the regulation, such as for instance an award criterion targeting specifically the cross-border market access of SMEs and mid-caps (article 13 (e) EDF regulation), a bonus for activities involving SMEs (article 14 (3) (b)), or a specific monitoring of funds effectively allocated to SMEs and mid-caps.

### **European Parliament prerogatives**

The rights of the European Parliament have also been subject to intense debates between the institutions. These discussions concerned mainly the adoption of the EDF annual work programmes. The European Parliament wanted work programmes to be adopted through delegated acts (article 290 TFEU), thanks to which the Commission would have been accountable before both the Council and the Parliament in this regard. However, such a solution faced a strong opposition from the Council and was discarded. Instead, work programmes are to be adopted through implementing acts (article 291 TFEU), which give the Commission more leeway. Governance arrangements for the adoption of the work programme (detailed below) also give Member States a significant weight. In return, the possibility for the Commission to adopt a multiannual work programme – which was included in the initial EDF regulation proposal) has not been retained. However, a non-binding multiannual perspective is normally to be annexed to the annual work programme.

### **Ethical matters**

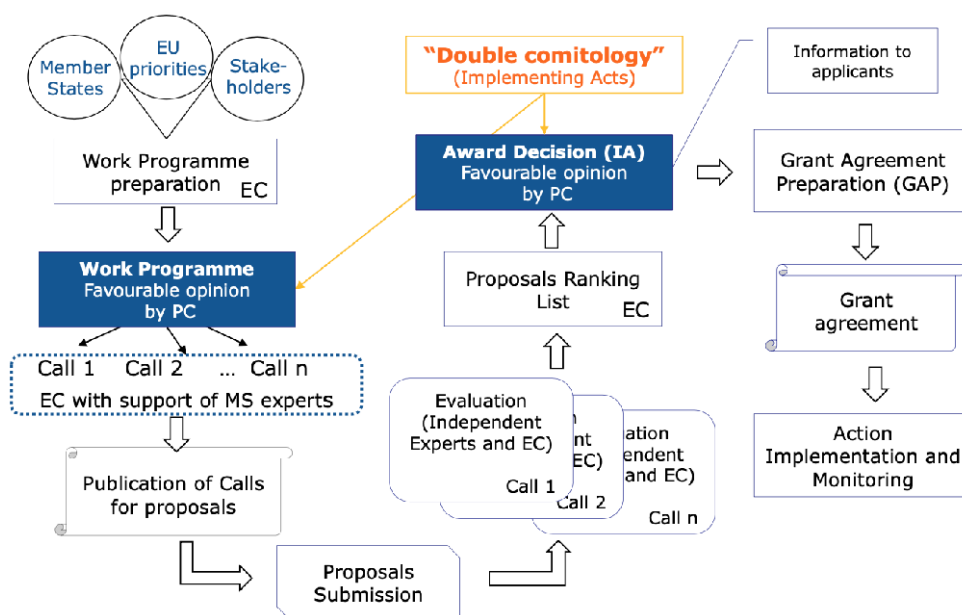
The introduction of a specific financial instrument dedicated to defence research funded out of the EU budget has triggered ethical concerns regarding some potential applications. More specifically, the question of the application of artificial intelligence (AI) to weapons systems has crystallised the debate. Some stakeholders, such as Human Right Watch for instance, have been very vocal against the so-called ‘killer robots’<sup>(21)</sup>. In order to take into account legitimate concerns regarding the development of weapons, the EDF regulation provides that an ethical assessment of each project will condition the support of the Fund (article 7). In addition, the development of *‘lethal autonomous weapons without the possibility for meaningful human control over the selection and engagement decisions when carrying out strikes against humans’* shall be excluded from any EDF funding.

### **3.2.2 Governance of the Fund, work programme and selection process**

Rules laid out by the EDF regulation for the governance of the Fund, the establishment of the working programme, and the selection process are of the utmost importance, as they are the instruments through which the Member States and the Commission will ‘fine tune’ the functioning of the Fund. These rules, obeying the so-called ‘double comitology system’ as well as the role of the Programme Committee (PC) are illustrated in Figure 10 and described in detail below.

<sup>21</sup> See for instance the global campaign « [Stop Killer Robots](#) »

**Figure 10: EDF implementation process**



Source: European Commission: 'News from the European Defence Fund' 24 February 2021  
'Forschung für ein souveränes Europa'

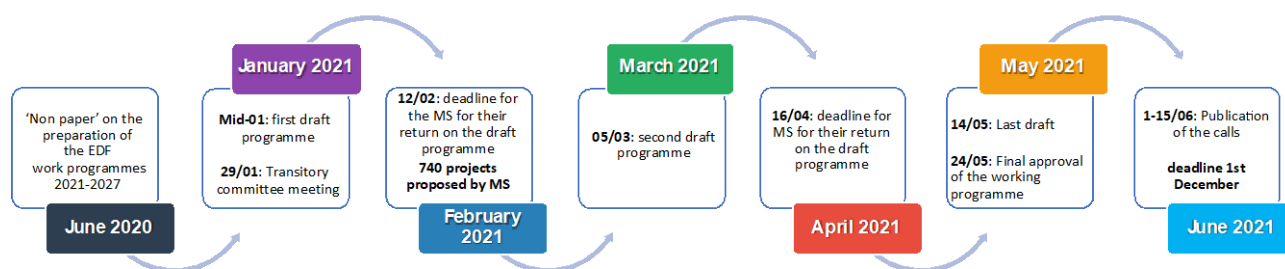
### **Adoption of the work programme**

As mentioned above, annual work programmes are to be adopted by means of implementing acts, which are ruled by article 291 TFEU and a specific regulation (Implementing Act Regulation – IAR) <sup>(22)</sup>. Within that framework, the adoption of the EDF annual work programme is governed by articles 27 and 28 of the EDF regulation. For the adoption of implementing acts, the Commission is assisted by a 'work programme committee' composed of representatives of Member States (article 3 (2) IAR). In the case of the EDF, article 27 of the regulation provides that EDA and EEAS are invited as observers to the meetings of the committee. They can intervene in the debates, but do not take part in any decision.

The Commission chairs the committee, submitting the first draft implementing act. Although each member may propose amendments to this draft, only the Commission may propose an amended version to the committee. Thereby, the Commission has a crucial steering function in building a majority, if not a consensus in the committee. This is important as the role of the committee is far from being neutral: although the Commission adopts the annual work programme, it may only do so based on a positive opinion of the committee. Opinions are to be adopted by qualified majority voting – whereby the Commission does not take part in the vote. In case of a positive opinion, the Commission shall adopt the implementing act (article 5 (2) IAR); in case of a negative opinion, the Commission shall propose a new draft (article 5 (3) IAR) to the consideration of Member States. Since **the work programme can only be adopted once it reaches a qualified majority among Member States, this grants them significant power in the choices made.**

Even though the EDF regulation has yet to be formally adopted, a transitory work programme committee is already preparing the 2021 work programme, which is a prerequisite for the issuance of calls for proposals.

<sup>22</sup> Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers.

**Figure 11: EDF – adoption schedule**

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As of the writing of this study, the Commission's second work programme draft has triggered opposite reactions from two groups of Member States. Most of them support the draft. However, several Member States have expressed their concern regarding the lack of an overarching programme structure and the absence of a true pluriannual perspective. At the same time, political pressure is high when it comes to reaching the widest possible consensus within the committee on the first work programme.

**When it comes to the content of EDF work programmes, one of the main questions is whether they will reflect priorities identified in existing EU documents, and in particular in the Capability Development Plan (CDP) and its derived outputs (the Strategic Context Cases (SCCs) and the Technology Building Blocks (TBBs))** (one these elements, see further in section 3.2.2 below). If no certainties exist as the first EDF work programme is still under negotiation, EDIDP work programmes provide a possible reference point. In 2019, all but one call for proposals explicitly referred to one of the 11 CDP 2018 priorities (see below section 2.3). The only exception was the call dedicated to SMEs, which was technology-pushed.

**Figure 12: EDIDP 2019 calls for proposals: explicit links with the CDP 18 priorities**

EDIDP 2019 calls for proposals	Corresponding CDP priority
1. Multipurpose unmanned ground system	Ground Combat Capabilities
2. Permanent air or space capabilities for ISR and communication, tactical RPAS and sensor suite for integration into air-traffic management	Air Superiority
3. Cyber situational awareness and defence capabilities, defence networks and technologies for secure communication and information sharing	Enabling capabilities for cyber responsive operations
4. Positioning, Navigation and Timing (PNT) and satellite communication capabilities	Space-based information and communication services
5. European Command and Control (C2) system from strategic to tactical level	Space-based information and communication services
6. Upgrade of current and development of next generation ground-based precision strike capabilities	Ground Combat Capabilities
7. Air combat capabilities	Air Superiority
8. Future naval platforms and related technologies	Naval manoeuvrability
9. Innovative and future-oriented defence solutions (SMEs)	

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In the 2020 calls for proposals, direct reference to CDP priorities was less frequent: four out of the 12 calls (in addition to the SME call) did not refer explicitly to any CDP priority. However, it shall be noted these calls focused on areas which appear to be related to CDP 2018 priorities. The call 'Defence technologies supported by artificial intelligence' (EDIDP-AI-2020) focuses on an area related to the CDP priority 'Cross-domain capabilities contributing to achieve EU's Level of Ambition'; the call 'Counter-UASs capabilities' seems to refer to the CDP priority 'Air superiority', and the call 'Ground combat capabilities' mirrors a CDP priority with the same name.

**Figure 13: EDIDP 2020 calls for proposals: explicit links with the CDP 18 priorities**

EDIDP 2020 calls for proposals	Corresponding CDP priority
1. Chemical Biological Radiological Nuclear (CBRN) detection capabilities and medical countermeasures	Ground combat capabilities
2. Underwater control contributing to resilience at sea	Underwater control contributing to resilience at sea
3. Counter Unmanned Air Systems (UASs) capabilities	
4. Cyber situational awareness and defence capabilities, defence networks and technologies for secure communication and information sharing	Enabling capabilities for cyber responsive operations
5. Space Situational Awareness (SSA) and early warning capabilities	Space-based information and communication services
6. Maritime surveillance capabilities	Naval manoeuvrability
7. Upgrade of current and development of next generation ground-based precision strike capabilities	Ground combat capabilities
8. Ground combat capabilities	
9. Air combat capabilities	Air superiority
10. Simulation and virtualisation tools and equipment for training, exercises, systems design, development and integration, testing and validation	
11. Defence technologies supported by artificial intelligence	
12. Innovative and future-oriented defence solutions (SMEs)	

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### **Grant awards**

The second layer of the double comitology system comes in after the evaluation of the proposals and functions as validation of the results. In a first stage, according to articles 12 and 29 of the EDF regulation, proposals received by the Commission are to be evaluated with the help of independent experts. These experts are selected on the basis of their skills, experience and knowledge once calls for expression of interests have been launched. They should be European citizens 'from as broad a range of Member States as possible'. This is quite a standard process for high technicity projects (i.e., Horizon Europe). However, a specificity of defence research lies in the requirement that these experts have security credentials. Procedures for obtaining such credentials are not harmonised across EU countries and the duration of the process varies widely.

The composition of the pools of experts may, in the future, trigger some issues. In particular, given the high degree of specialisation required, the number of experts in a precise field may be very low. This would then make it difficult to gather a knowledgeable group, as relevant experts may be in situations of conflict of interests. Generally speaking, reinforcing the internal expertise of the European Commission in certain fields relative to defence matters would appear necessary to mitigate such risks.

Another essential point when it comes to the selection of projects is the award criteria used by the Commission to score and rank proposals. These criteria are defined by the EDF regulation and differ on several aspects from those defined for the purpose of Horizon Europe. According to article 25 of the draft

Horizon Europe regulation (consistent with the Horizon 2020 regulation), three award criteria must be taken into account whereas no less than six criteria must be taken into account for the purpose of the EDF.

**Figure 14: EDF – Horizon Europe: comparison of award criteria**

Horizon Europe (article 25)	European Defence Fund (article 13)
(a) Excellence	(a) Excellence or potential of disruption
(b) Impact	(b) Contribution to the innovation and technological development of the European defence industry
(c) quality and efficiency of implementation	(c) Contribution to the competitiveness of the European defence industry
	(d) Contribution to the autonomy of the European defence technological and industrial base
	(e) Contribution to the creation of new cross-border cooperation (especially SMEs and mid-caps)
	(f) Quality and efficiency of implementation of the action

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Criteria (a) and (f) of the EDF regulation are similar to criteria (a) and (c) of Horizon Europe, whereas EDF criteria (b) to (e) ‘unpack’ in the defence context the Horizon Europe ‘impact’ criterion. Strikingly, the components of the expected impact of EDF-funded actions all concern the very structure of the European defence industry, highlighting in reverse three of its main challenges for the future: (1) remaining competitive and so, innovative; (2) being able to address a military demand which tends to aggregate at European level; and (3) Europeanising its value and supply chains. These three objectives also reflect the compromise achieved between the interests and aims of Member States and industrial stakeholders.

In addition to these general criteria, high-level technical requirements are spelled out in calls for proposals, in accordance with operational needs and the search for performance.

At the end of the technical evaluation process, Article 12 of the EDF regulation provides that award decisions shall be adopted by the Commission by means of implementing acts, on the model of work programmes. Here again, in case the committee is unable to reach a positive opinion, the Commission cannot adopt the award decision. According to the Commission, award decisions for calls launched at the same time should be adopted as a whole, which should limit the possibility for Member States to interfere in the choice of selected projects.

#### ***Indirect management: the role of OCCAr, the EDA and executive agencies***

One of the main differences between the EDF and its preparatory programmes is the role of the EDA in the management of research activities. The Commission delegated the implementation of PADR to the EDA under indirect management rules. Interviews with stakeholders highlighted that the EDA’s track record in managing PADR calls for proposals was quite positive. However, delegating the management of the ‘research window’ of the EDF to the EDA is not possible. This choice is due to the legal basis chosen for the creation of the EDF, i.e., Article 173 TFEU, which belongs to the realm of Community methods whilst the Agency is based on Article 45 TEU and is submitted to intergovernmental principles. There is a watertight separation between the two areas, under the strict control of the CJEU.



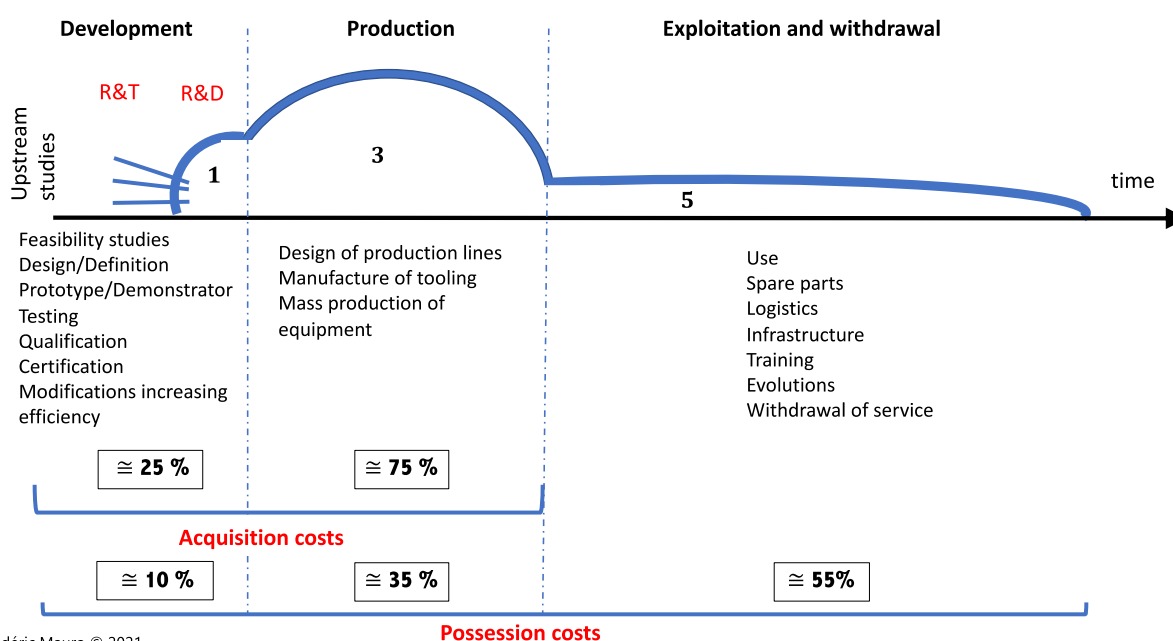
Still, the EDF regulation enables Member States to task a contracting authority to manage a project (article 2(9)). Such a programme manager can, for instance, be the EDA or the Organisation for Joint Armament Co-operation (OCCAr), as occurred under PADR and EDIDP. For example, two EDIDP projects (ESSOR and MALE RPAS) are implemented under indirect management by OCCAr. Depending on the areas they cover, projects could also be managed by EU executive agencies, for example the Research Executive Agency (REA). Further, Member States have the possibility to designate a project manager to manage a specific project on their behalf. In such a case, the Commission will consult the project manager before proceeding with the payment of the implementing consortium. For instance, a Member State could perfectly act on the behalf of a group of Member States to manage a project.

### 3.2.3 EDF funding rules

#### **EDF cost coverage in armament cycles**

**R&D is a fraction only of the total cost of any armament programme across its life cycle.** As a rule of thumb, it represents some 10% of this cost whereas production / acquisition represents 30-35% and 'possession, i.e., costs linked to its exploitation and withdrawal, account for 55-60% as depicted in the following graph.

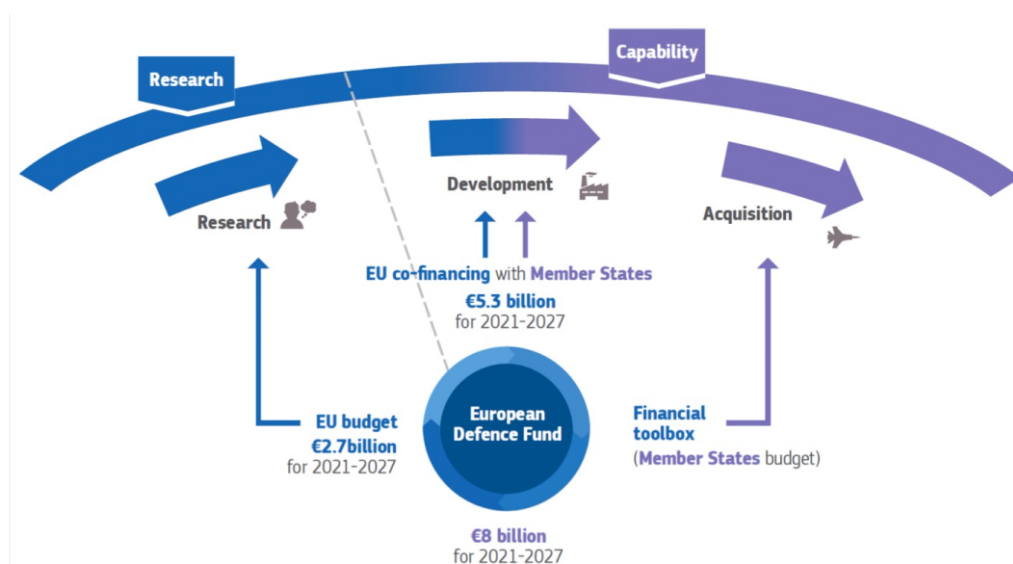
**Figure 15: An example of procurement costs rule of thumb - the German 'mouse'**



Frédéric Mauro © 2021

For the post-R&D phases (i.e., acquisition), the Commission plans to implement a 'financial toolbox' to support Member States efforts in acquiring capabilities resulting from EDF funded projects. However, such a toolbox remains largely to materialise.

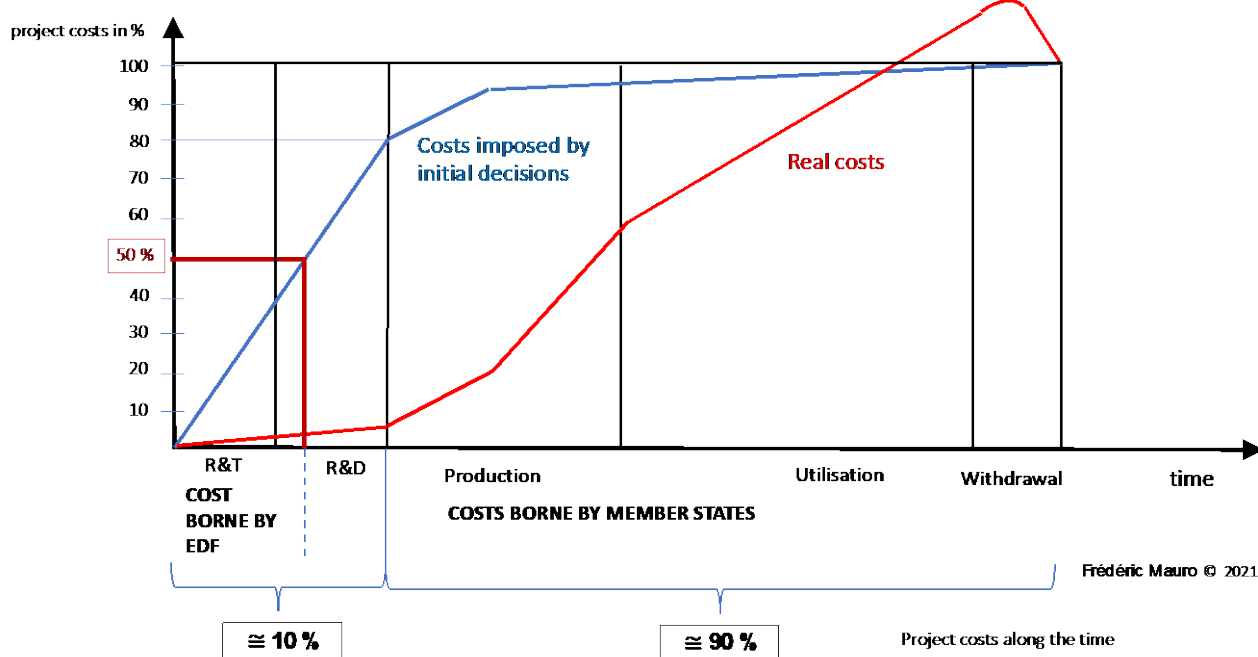
**Figure 16: EDF vs Member States' funding through the life cycle of armaments**



Source: European Commission: 'News from the European Defence Fund' 24 February 2021  
'Forschung für ein souveränes Europa'

Still, because most of the choices impacting the total cost of an armament programme are made during the upstream phases, Member States wish to be closely involved in drafting EDF work programmes and calls for proposals, as well as in selecting projects, as they will have to bear the downstream costs. As shown in the following graph, it can be estimated that 50 % of a project's total costs will result from decisions made by the Fund authorities, which will support less than 10 % only of the possession costs.

**Figure 17: Impact of upstream decisions on downstream project expenditure**



### **Spending build-up**

The EDF budget provides for a flat spending rate at somewhat less than EUR 1 billion per year over 2021-24, followed by a gradual increase to above EUR 1.6 billion per year over 2025-27. This shall enable DG DEFIS [Defence Industry and Space] to grow and get used to this new instrument and avoid funding in excess of the absorption capacity of Member States and industry in the first few years.

**Table 2: EDF - Annual budget allocation (current prices)**

	2021	2022	2023	2024	2025	2026	2027	2021-2027
EDF budget (€ million)	946	946	946	974	1 163	1 352	1 626	7 953

Source : Multiannual Financial Framework 2021-2027 (in commitments) - Current price

### **Earmarking**

EDF agreements provide for a degree of earmarking of the funding. Thus, recital 41 of the agreed regulation's explanatory memorandum spells out that the EDF is expected to contribute to the EU's objective to dedicate 30% of its budget to supporting climate objectives. This objective could be achieved, for instance, through the support of projects aiming at 'maximising energy resilience and reducing energy costs of defence capabilities, without compromising operational effectiveness' <sup>(23)</sup>. Article 4 (4) of the regulation is more prescriptive, mandating that between 4 and 8% (between EUR 318 and EUR 636 million, or between EUR 45 million and EUR 90 million per year) of the budget be used to support activities related to disruptive technologies for defence.

### **Co-funding rates**

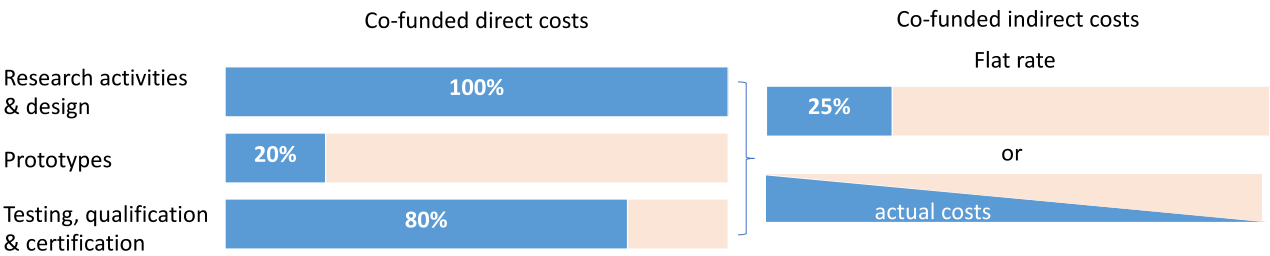
Like the EDIDP, the EDF must comply with co-financing principles. However, two modifications have been introduced in the EDF regulation compared to the rules governing the EDIDP.

The main one concerns indirect eligible costs. Similar to the EDIDP, article 16 of the EDF regulation provides that those shall be calculated at a 25% flat rate of direct costs. However, drawing on the experience of the EDIDP it foresees an alternative for their calculation to take into account the fact that 'large caps' can support very high indirect costs. Hence, article 16 (2) of the regulation provides that indirect eligible costs may also be calculated on the basis of 'actual indirect costs provided that these cost accounting practices are accepted by national authorities for comparable activities in the defence domain'.

The second modification concerns the maximum co-funding rates applicable to certain activities (testing, qualification and certification) which has been lowered at 80% of eligible costs.

<sup>23</sup> The works of EDA's Consultation Forum for Sustainable Energy in the Defence and Security Sector (CF SEDSS) could serve as a basis in this matter: <https://eda.europa.eu/docs/default-source/consultation-forum/cfsedss-phase-iii---factsheet.pdf>.

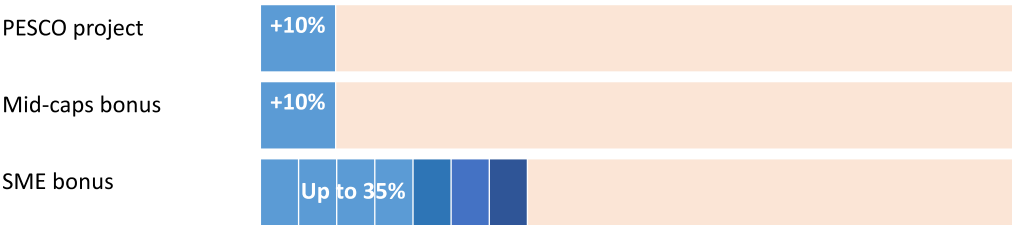
Figure 18: EDF maximum co-funding rates



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Regarding bonuses, the EDF regulation provides comparable bonuses to EDIDP. Those are expressed as additional points of percentage of funding and apply under certain conditions. The rationale for such bonuses is to incentivise certain types of behaviour from applicants. Among others, they aim at ensuring a certain level of consistency among EU defence initiatives (PESCO bonus) and promoting the Europeanisation of defence value chains (SME and mid-cap bonuses). Bonuses may be cumulated but cannot exceed 35 percentage points (article 14 (d)). **As a consequence, and as has been the case for the EDIDP, the leverage effect is limited, which represents a serious impediment to the Fund reaching its original intent.**

Figure 19: EDF bonuses



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In addition to grants, the EDF may also support pre-commercial procurement (PCP), i.e., coordination efforts from national contracting authorities or entities in their procurement of R&D services, lump sums and grants not linked to project costs, which may kick start the industrialisation phase of a project.

3.2.4 The EDF’s convoluted objectives

Forming a clear understanding of the Fund’s objectives is not a mere rhetorical exercise. Indeed, in analysing the conformity of the legal basis of a regulation with the Union Treaties, the CJEU always checks that it complies in its objective and content with the article chosen as its legal basis <sup>(24)</sup> and that its implementation does not affect the extent of the powers of the institutions laid down by other provisions of the Treaties for the exercise of Union competences (Article 40 TEU). Mindful of averting challenges to its

<sup>24</sup> Judgment of the ECJ of 26 March 1987, Case 45/86 "Tariff Preferences" - Commission v. Council of the Communities - point 11 and Judgment of the ECJ of 11 June 1991, Case C300/89 "Titanium Dioxide" Commission v. Council of the Communities - point 10.

role in the realm of the defence industry <sup>(25)</sup>, the Commission therefore directly connected the objectives of the Fund to competitiveness, as per its mandate under article 173 TFEU <sup>(26)</sup>.

The definition of the EDF objectives led to intense negotiations between diverging visions and interests of EU institutions and EU Member States (see annex 8), whereas the reading of the European Parliament and the result of institutional negotiations made only marginal changes to the EDF's objectives. Major changes were introduced by the Council. Indeed, two different visions emerged and had to be reconciled. On the one hand, the main producer and investor countries (France, Germany, Italy, Spain, the UK – who took part in the talks –, and to some extent the Netherlands and Belgium) supported an approach oriented by capacity priorities and efficiency of expenditure, to be promoted by incentive mechanisms and the accountability of prime contractors in their supply chains. On the other hand, the so-called 'Cohesion States' promoted a vision oriented towards geographical balance, regional representativeness and, above all, the cross-border access of new SMEs to established defence spheres.

The result of the negotiation is a fragmented text, trying to patch up the differences between those in favour of competitiveness and those in favour of a geographical return, between a vision of the defence industry as an industry among many others and that of this industry as a servant of defence capability objectives serving the greater goal of the Union's strategic autonomy. This result was so unsatisfactory that, despite the extremely tight timeframe within which the text of the regulation had to be finalised <sup>(27)</sup>, the European legislators felt the need to reword the articles describing the Fund's objective – unlike other articles, which are a simple 'copy and paste' of the EDIP regulation. The comparison of the different versions (see annex 8 – part B) shows the attempts made to come to a more orderly picture <sup>(28)</sup>. However, a grammatical analysis of the text reveals the complicated patchwork of objectives pursued by different stakeholders and reveals to be a lexical nightmare.





<sup>25</sup> This challenge was led by the European Parliament's group GUE/NGE, under the leadership of Sabine Loesing, who asked for an *opinio juris* from Prof. Andreas Fischer-Lescano of the University of Bremen. He concluded that the legal basis of the EDF was not compliant with the Treaties - [Rechtsgutachten zur Illegalität des Europäischen Verteidigungsfonds](#) - 30 November 2018.

<sup>26</sup> 'Art. 173. 1. The Union and the Member States shall ensure that the conditions necessary for the competitiveness of the Union's industry exist. [...] '3. The Union shall contribute to the achievement of the objectives set out in paragraph 1 through the policies and activities it pursues under other provisions of the Treaties [...]'.

<sup>27</sup> The Proposal from the Commission was issued the 13 June 2018, whilst the EDIDP regulation from which it was inspired was formally approved only on 5 July 2018.

<sup>28</sup> European Parliament, [Report on the proposal for a regulation of the European Parliament and of the Council establishing the European Defence Fund](#), 2018/0254(COD)), 28 November 2018, Zdzisław Krasnodębski (ECR) and David McAllister (EPP) rapporteur for opinion for the Committee on Foreign Affairs.

**Table 3: EDF's objectives - Article 3 of Provisional Regulation 14285/20**

The <b>general objective</b> of the Fund is				
to <b>foster</b> the	<b>competitiveness efficiency and innovation capacity</b>	of the European defence technological and industrial base	<b>throughout the Union</b>	<b>which contributes</b> to the <b>Union strategic autonomy</b> and its <b>freedom of action</b> ,
		by <b>supporting</b>	<b>collaborative actions</b> and <b>cross-border cooperation</b>	between legal entities throughout the Union, in particular SMEs and mid-caps,
		as well as (by) <b>strengthening</b> and <b>improving</b>	the <b>agility of both supply and value chains</b> ,	
		(by) <b>widening</b>	<b>cross-border cooperation</b>	between legal entities
		and (by) <b>fostering</b>	the <b>better exploitation</b> of <b>innovation, research and technological development</b> ,	at each stage of the industrial life cycle of defence products and technologies
The Fund shall have the following <b>specific objectives</b>				
(a) <b>support collaborative research</b>	<b>that could significantly boost the performance of future capabilities</b>	<b>throughout the Union</b> ,	aiming at <b>maximising innovation</b>	
			and <b>introducing new defence products and technologies</b> , and at the most <b>efficient use of defence research spending</b> in the Union; <b>reducing the risk of unnecessary duplication</b>	including <b>disruptive ones</b> ,
(b) <b>support collaborative development</b> ,	<b>of defence products and technologies</b>	thus contributing to <b>greater efficiency of defence spending</b> within the Union, achieving <b>greater economies of scale</b> and <b>reducing the fragmentation</b>	<b>of defence products and technologies</b> throughout the Union.	and as such incentivising the <b>market uptake</b> of European <b>products and technologies</b>
	Ultimately, the Fund <b>will lead to an increase</b>	in the <b>standardisation</b>	<b>of defence systems</b>	
		and <b>greater interoperability</b> .	between <b>Member States' capabilities</b>	
Such cooperation shall be <b>consistent</b>	<b>with defence capability priorities</b> commonly agreed by Member States	within the <b>framework of the Common Foreign and Security Policy</b>	and particularly in the context of the <b>Capability Development Plan</b> .	
In this regard, <b>regional and international priorities</b> ,	when they serve the <b>Union's security and defence interests as determined under the Common Foreign and Security Policy</b> ,	and taking into account the need to avoid <b>unnecessary duplication</b> ,	may also be taken into account, where appropriate,	wherever they do not exclude the possibility of participation of any Member State or associated country.

### 3.3 Links with other EU initiatives

#### 3.3.1 EDF and PESCO

The provisions on 'permanent structured cooperation', better known as PESCO, are laid out in article 42.6, and article 46 TEU and further spelled out in Protocol No 10 to the Treaty. Therefore, PESCO, which is part and parcel of TEU, and the EDF, which stems from TFEU, belong to two different legal realms, with few bridges between them.

Notwithstanding these differences in legal basis, there are obvious links between PESCO, which is about defence capabilities, and EDF which is a Defence R&D programme supposed to encourage the capabilities 'in line' with the needs of the Common Security and Defence.

PESCO can be described as a **capability process based on the progressive integration of national capabilities and interoperability of forces** by a 'vanguard of willing and able' Member States ready to take the responsibility to carry out so-called 'Peterberg's tasks' (TEU Articles 43 and 44). It is therefore one of the means to build the '**operational capacity drawing on civilian and military assets**' (Article 42.1) required by the **CDSF** to carry out 'missions outside the Union for peacekeeping, conflict prevention and strengthening international security (...)'.

Taking stock of the lessons learned from European industrial cooperation failures since the end of WW II, PESCO required participating Member States to raise **simultaneously** five pillars. Indeed, according to Protocol No 10, art. 2, Member States 'shall undertake to': (a) set common and regularly updated 'objectives concerning the level of investment expenditure on defence equipment' [**budgetary pillar**]; (b) 'harmonis[e] the identification of military requirements' and, 'where appropriate, specialis[e] their defence means and capabilities' [**defence planning pillar**]; (c) 'enhance the availability, interoperability, flexibility and deployability of their forces, in particular by identifying common objectives regarding the commitment of forces, including possibly reviewing their national decision-making procedures' [**pre-operational pillar**]; (d) fill 'the shortfalls perceived in the framework of the 'Capability Development Mechanism'' [**capability pillar**], and (e) 'take part, where appropriate, in the development of major joint or European equipment programmes in the framework of the European Defence Agency' [**defence industry pillar**]. The foresight of PESCO's designers was to understand that those five pillars had to be developed simultaneously

Unfortunately, the type of PESCO that 25 Member States decided to launch in November 2017, almost ten years after the entry into force of the Treaty, had little to do with the original PESCO (<sup>29</sup>). Instead of being a 'vanguard' of 'the willing and able' to engage into more 'binding commitments', the actual PESCO is a mere 'framework', in the words of then German Minister of Defence, Ursula von der Leyen. Others have described participation in PESCO as 'voluntary', 'inclusive' and 'modular'. All EU Member States, some for good and others for bad reasons, wanted to be part of it, but insisted on the fact that it could not infringe on their sovereign rights to decide whatever they wanted to.

The result was a flurry of 46 projects (see annex 5 – PESCO projects) in three waves (March 2018, November 2018 and November 2019). Most of these projects were already in the drawers of the ministries of Defence or in development phase at OCCAr. Only a handful of them are, or could be, real 'enablers' of European defence: The Integrated Unmanned Ground System (UGS), the European Patrol Corvette (EPC), the European Male RPAS (Eurodrone), the 'Timely Warning and Interception with Space-based Theatre Surveillance' (TWISTER) or the 'European Military Space Surveillance Awareness Network' (EU-SSA-N). Only

<sup>29</sup> Frédéric Mauro and Federico Santopinto '[Permanent Structured Cooperation national perspective and state of play](#)' – European Parliament – July 2017



four projects gather more than ten Member States: Military Mobility (24), European Medical Command (17), Network of Logistics Hubs in Europe (15) and Integrated Unmanned Ground System (11). Only five countries take part in 30 % or more of the projects (Italy 61%; France 57 %; Spain 54%; Greece 35 % and Germany 33 %). It is symptomatic that flagship projects such as the FCAS (Future Combat Air System) or the MGCS (Main Ground Combat System) have not been incorporated in PESCO.

A major problem of PESCO is that being a mere 'framework' for cooperation is in part duplicating the EDA, which already offers a platform for modular and inclusive cooperation with its so-called 'Cat B' projects in which Member States can partner whenever and with whomever they are pleased to do.

This does not mean that PESCO has no value. It has significantly increased the numbers of collaborative procurement and development projects among Member States, which is no mean achievement. However, unlike the EDF, PESCO is a pure 'bottom up process', obeying ever changing Member States' interests, even if its first 'Strategic Review' could be seen as a first attempt for such a plan <sup>(30)</sup>.

**Encouraging PESCO projects with bonuses could increase the coherence between both initiatives. However, the EDF cannot be 'the bank' for PESCO projects and PESCO cannot help in building the EDF work programme, since it is itself not guided by a plan.**

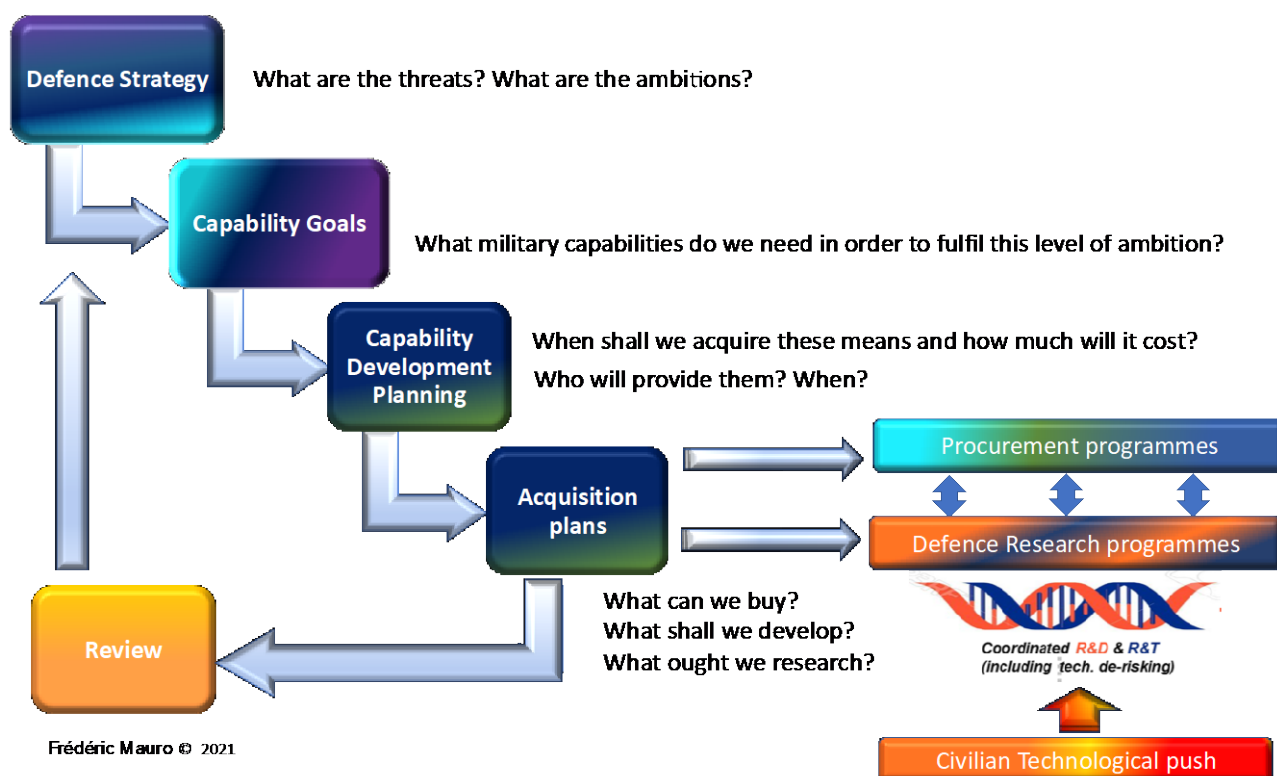
### 3.3.2 The EDF and the multiple 'EU-Defence Planning Processes'

Defence research must be oriented by sound defence planning. Therefore, in theory at least, a logical chain should unfold from (1) the definition of a defence strategy ('what do we want to be able to do militarily?'), leading to (2) an assessment of capability shortfalls – the difference between the capabilities required to fulfil the ambitions and present capabilities –, then to (3) a plan to acquire those capabilities, including a budget, timetable and technical solutions to be developed, followed by (4) a procurement plan for equipment to be acquired or built and finally, (5) the development of armament and research programmes in R&T and R&D. Obviously, there are many variants to this sequence, and steps may be merged at times. However, this is the overall strategic path, as illustrated by the figure below.

<sup>30</sup> [Council conclusions on the PESCO strategic review](#) 13188/20 20 November 2020.



**Figure 20: Theoretical link between defence planning and defence research**



In practical terms, **the EU defence planning capacity has made remarkable progresses since 2016** <sup>(31)</sup>. It includes a range of partly linked and partly overlapping workstreams, detailed below.

### **Headline Goal Process (HLPG)**

Although the **‘European Union Global Strategy’** presented by the HR/VP in June 2016 cannot be defined as a proper ‘defence strategy’, it allowed the Council to derive an **‘Implementation plan on Security and Defence’** (IPDS) in November 2016 defining a ‘Level of Ambition’ (LoA). This LoA assigns the Union three broad objectives: ‘responding to external conflicts and crises’, which ‘covers the full range of CSDP tasks in civilian and military crisis management outside the Union’; ‘Capacity building of partners’, which corresponds to ‘CSDP missions or operations with tasks in training, advice and/or mentoring within the security sector’, and finally, ‘Protecting the Union and its citizens’, which covers a broad range of challenges and threats having an impact along the ‘nexus of internal and external security’.

Based on the IPDS, but with focus on CSDP missions and taking into account the belated ‘Helsinki Headline Goals’ <sup>(32)</sup>, the EUMC/EUMS worked out a **‘Military CSDP level of ambition’** that allowed for the resumption of a full cycle of the ‘Capability Development Mechanism’ mentioned in the TEU, also known as the **‘Headline Goal process’** (HLPG) <sup>(33)</sup> at the beginning of 2017. Thus a **‘Requirement Catalogue’** [RC17] was approved by the Council in November 2017, then a **‘Force Catalogue’** [FC17] taking stock of Member States’ capabilities available to the Union was agreed in February 2018 and finally, a **‘Progress Catalogue’** [PC18] was produced in May 2018 and agreed by the Council on 25 June 2018. Based on lessons identified from CSDP operations and missions PC18 takes into consideration future trends and mitigating

<sup>31</sup> Frédéric Mauro - ‘[EU Defence: The White Book implementation process](#)’ European Parliament December 2018.

<sup>32</sup> The Helsinki Headline Goals were supposed to be achieved in 2010.

<sup>33</sup> The ‘Capability Development Mechanism’ and the ‘Headline Goal Process’ are related to one another in in article 2. d) and 2 e) of Protocol number 10 of the Treaty dedicated to Permanent Structured Cooperation. The first HLGP was launched even before the entry into force of the treaty at the beginning of the 2000s.

factors, including the relevant NATO trends, in order to provide a set of '**High Impact Capability Goals (HICGs)**' for the short and medium term (see details in annex 6). Further, it assesses the feasibility of 'illustrative scenarios' and the 'concurrencies' of these scenarios. The HICGs were adopted in the wake of PC18 in March 2019. They are foreseen as the most efficient way of pursuing the fulfilment of the EU CSDP Military LoA through a phased approach. As described in the next section, the HLGP, managed by the EUMS under the guidance of the EUMC, was reshaped in 2018 and aligned with the corresponding NATO process (NATO Defence Planning Process).

### **Capability-based planning**

Since its inception, the EDA has been tasked to conduct a sort of capability-based planning, better known as the **Capability Development Plan (CDP)**. EDA's fourth CDP was published on 28 June 2018. Like its predecessors, this CDP was developed using four different strands of inputs, all validated by the Member States: strands A (CSDP shortfalls derived from the HLGP) and D (lessons learned from recent military operations for capability purpose), provided by the EUMC; strand B, analysing long-term capability development prospects (2035 and beyond) from a technological perspective; and strand C, identifying the potential for cooperation between Member States by analysing the EU collaborative database (CODABA) hosted and managed by the EDA where Member States indicate their willingness to cooperate. These strands combine short term perspectives (strands A and D), medium term perspectives (strand C) and long-term perspectives (strand B), and they are brought together in 11 '**EU Capability Development Priorities**' drafted by the EDA and approved by its Steering Board composed of Member States defence ministers. As stated in the EDA's CDP factsheet, in comparison with the 2014 CDP priorities, two new orientations should be noted: 'on the one hand, [these priorities] address main capability shortfalls for deployed operations (land, maritime and air capabilities as well as logistic and medical support) with a reinforced focus on high-end warfare. On the other hand, they also cover other focus areas of Member States, such as the adaptation of military capabilities required for territorial defence and security or cyber defence, as required by the EU Global Strategy published in 2016.'

The 11 CDP priorities are designed in very broad terms and detailed in 38 modules to 'help guide Member States' capability development efforts irrespective of the framework and level (national, multinational, EU) at which they will be implemented'. (See annex 7 for the full list of CDP agreed priorities and modules).

**Table 4: The CDP 11 Capability Development Priorities**

- Cyber responsive operations
- Ground combat capabilities'
- Space-based information and communication services
- Enhanced logistic and medical supporting capabilities
- Information superiority
- Naval manoeuvrability
- Underwater control contributing to resilience at sea
- Integration of military air capabilities in a changing aviation sector
- Air superiority
- Air mobility
- Cross-domain capabilities contributing to achieve EU's level of ambition

The CDP implementation process is supported by the elaboration of so-called '**Strategic Context Cases (SCC)**'. The SCCs present an overview of the capability landscape in each of the 11 CDP priorities, thereby serving as a reference point to generate collaborative capability development projects. They are meant to provide the 'necessary roadmaps with dedicated objectives and milestones, for those areas where Member States task EDA to be involved'.

In order to complete its capacity-based planning with a more research-oriented planning, the EDA launched in 2018 the so-called '**overarching strategic research agenda**' (OSRA) with the aim of 'providing a harmonised view of relevant European defence research priorities and the possible paths to achieve them'. For that purpose, 'OSRA aligns the Strategic Research Agendas (SRAs) of EDA's various Capability Technology Groups ('CapTechs') with military tasks and long-term capability needs agreed by Member States in the CDP. CapTechs are run by the EDA and bring together experts from government, industry, SMEs and academia. Currently, the EDA hosts 12 such CapTechs and two working groups. Building on CapTech's SRAs and Member States' capability development needs, OSRA defines common research and technology (R&T) priorities in the form of so-called 'Technology Building Blocks' (TBBs).'

In December 2018, the EDA Member States' R&T Directors approved the outcome of the OSRA review, including a total of 139 specific TBBs, 'each of them focused on a specific R&T domain in which a European collaborative approach would be beneficial to support the development of defence capabilities identified by Member States in the CDP' <sup>(34)</sup>.

Significant initiatives further include the 'Member States-driven **Coordinated Annual Review on Defence**' (CARD), launched by the European Council in its conclusions on 15 December 2016. As stated in the EU Global Strategy, the goal of CARD is to 'enhance strategic convergence between Member States and facilitate and promote defence cooperation' through the 'gradual synchronisation and mutual adaptation of national defence planning cycles and capability development practices'. CARD is described by the EDA as a 'comprehensive overview of the European defence landscape, including capability, research, and industrial aspects' <sup>(35)</sup>. The EDA, in cooperation with the EEAS/EUMS, produced a CARD trial run during the autumn 2018 and the first full-fledged CARD report on 20 November 2020. The report identifies 55 'collaborative opportunities throughout the whole capability spectrum, considered to be the most promising, most needed or most pressing ones, also in terms of operational value.' Based on this catalogue of identified opportunities, Member States are recommended to concentrate their efforts on the following six specifics 'focus areas', which are not only covered by the EU 2018 CDP, but where the prospects for cooperation are deemed to be good, namely:

**Table 5: The CARD 6 'focus areas'**

- Main Battle Tanks (MBT)
- Soldier Systems
- Patrol Class Surface Ships
- Counter Unmanned Aerial Systems (Counter-UAS) Defence Applications in Space
- Defence in Space
- Enhanced Military Mobility

In addition, CARD identifies 'operational collaborative opportunities' stemming from the HICGs not yet addressed and requiring a cooperative approach due to their 'magnitude', namely:

**Table 6: The CARD priority areas for operational collaborative opportunities**

- Power projection
- Non-Kinetic capabilities (STRATCOM/stabilisation and reconstruction/cyber actions)
- Force protection (ballistic missile defence)

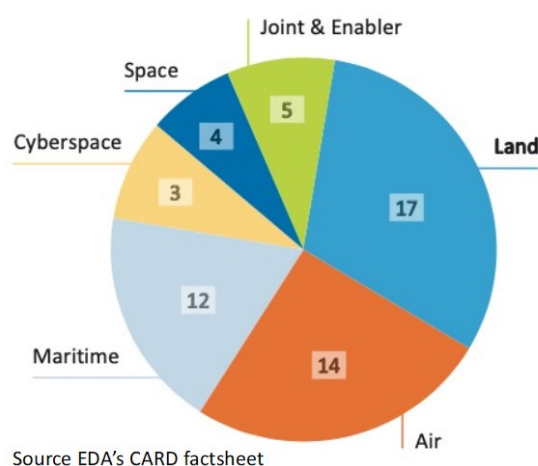
<sup>34</sup> [EDA's Overarching Strategic Research Agenda \(OSRA\) fact sheet](#)

<sup>35</sup> [EDA's CARD fact sheet](#)

The collaborative opportunities as well as the ‘focus areas’ are expected to generate cooperative projects in the PESCO and EDF frameworks, making the best use of the CARD pathfinder function towards more integration of Member States’ capability development in the most promising domains. Member States are invited to take them duly into consideration when elaborating the next PESCO project proposals. The Commission is also encouraged to consider them when elaborating the EDF work programme and yearly call for proposals.

Linked to CARD’s 55 collaborative opportunities, 55 options to cooperate in R&T have been identified. They span from artificial intelligence and cyber-defence to new sensor technologies, emerging materials and energy efficient propulsion systems, as well as unmanned systems and robotics.

**Figure 21: 55 collaborative capability development opportunities across domains**



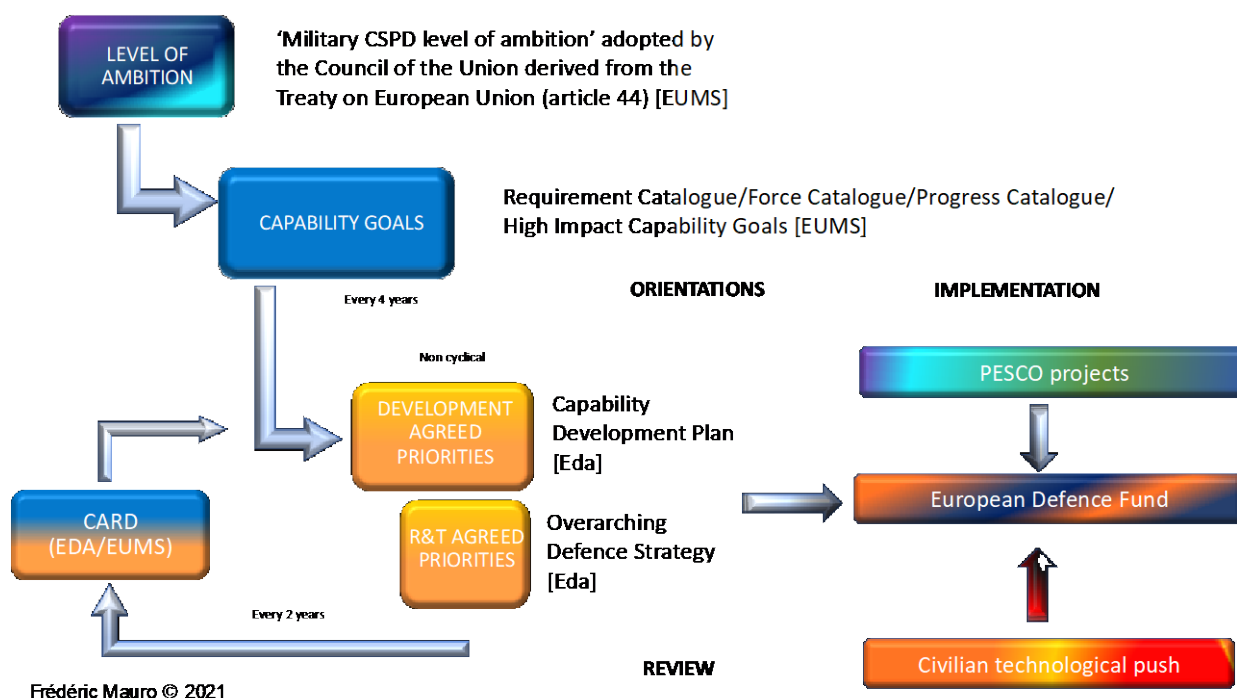
Finally, on 17 June 2020, the Council of the EU launched an initiative intended to provide the Union with a ‘**Strategic Compass**’ (SC) in the first semester of 2022. The SC is expected to fulfil three objectives: (a) to formulate a common ‘threat analysis’ for the first time ever in the Union’s long history; (b) to ‘define policy orientations and specific goals and objectives in areas such as crisis management, resilience, capability development and partnerships’; (c) to ‘provide a coherent guidance’ for ‘the ongoing work on the security and defence initiatives’<sup>(36)</sup> which can be interpreted as ‘political guidance for the future military planning processes’<sup>(37)</sup>.

**Piece after piece, the EU has put in place the elements of a proper defence planning process, which has the potential to bear fruit once the Strategic Compass is adopted, assuming its different components are connected in a coherent way. Whether this will happen remains however uncertain.**

<sup>36</sup> [Council of the European Union Brussels, 17 June 2017 8910/20](#)

<sup>37</sup> Christian Mölling and Torben Schütz – DGAP report [‘The EU’s Strategic Compass and its four baskets’](#) - November 2020

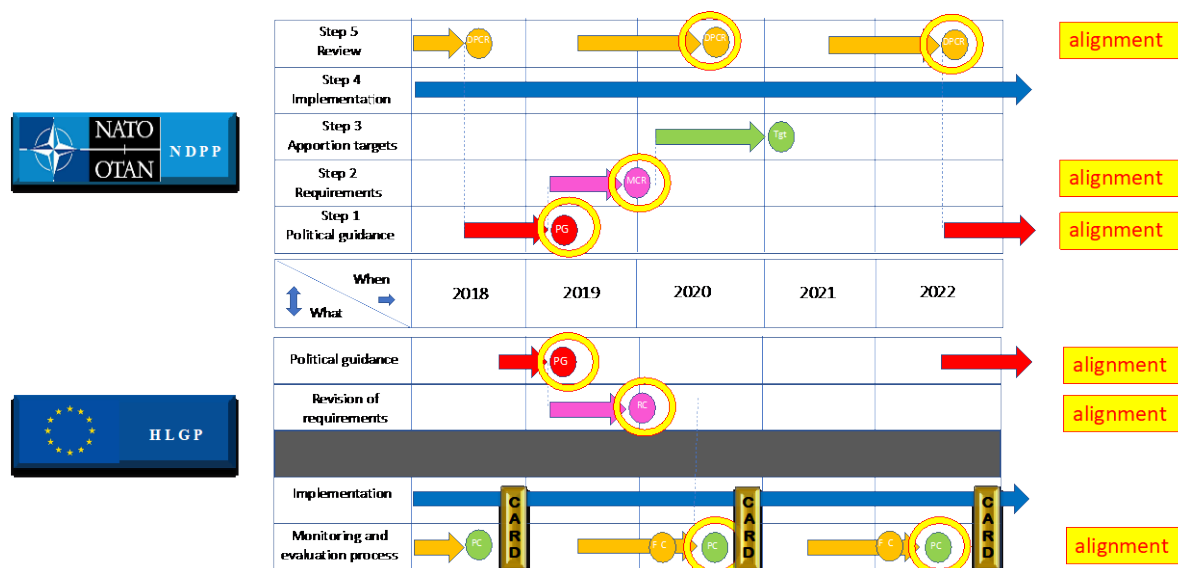
**Figure 22: the actual EU capability-based planning process**



### 3.3.3 EDF and the cooperation with NATO and NATO's allies

In the general opinion of those interviewed, relations between NATO staff and the staff of the services concerned of the EU have improved dramatically since 2016, and hardly a week goes by without staff from both institutions meeting each other. Information flows are fluid and relations are collaborative. However, when it comes to the key issue of communication of classified information, the Turkish-Cypriot dispute remains an insurmountable obstacle. EU staff therefore have no access to the NATO sensitive data they need for defence planning.

In spite of these limitations, concrete progress has occurred in aligning the Headline Goal Process (HLGP) and the NATO Defence Planning Process (NDPP): since 2018 the HLGP has become cyclical, and it is aligned with the corresponding NDPP phases. As a result, a Political Guidance (PG) was issued in March 2019 followed by a new EU Requirement Catalogue in October, in conjunction with the NATO PG and 'Minimum Common Requirements' (MCR), then by a new Force Catalogue in May 2020 (endorsed by the Council in June 2020) and a new Progress Catalogue in November (endorsed by the Council the same month), in phase with the NATO Defence Planning Capability Survey (DPCS). A new EU PG will be produced at the beginning of 2023, simultaneous to the NATO one.

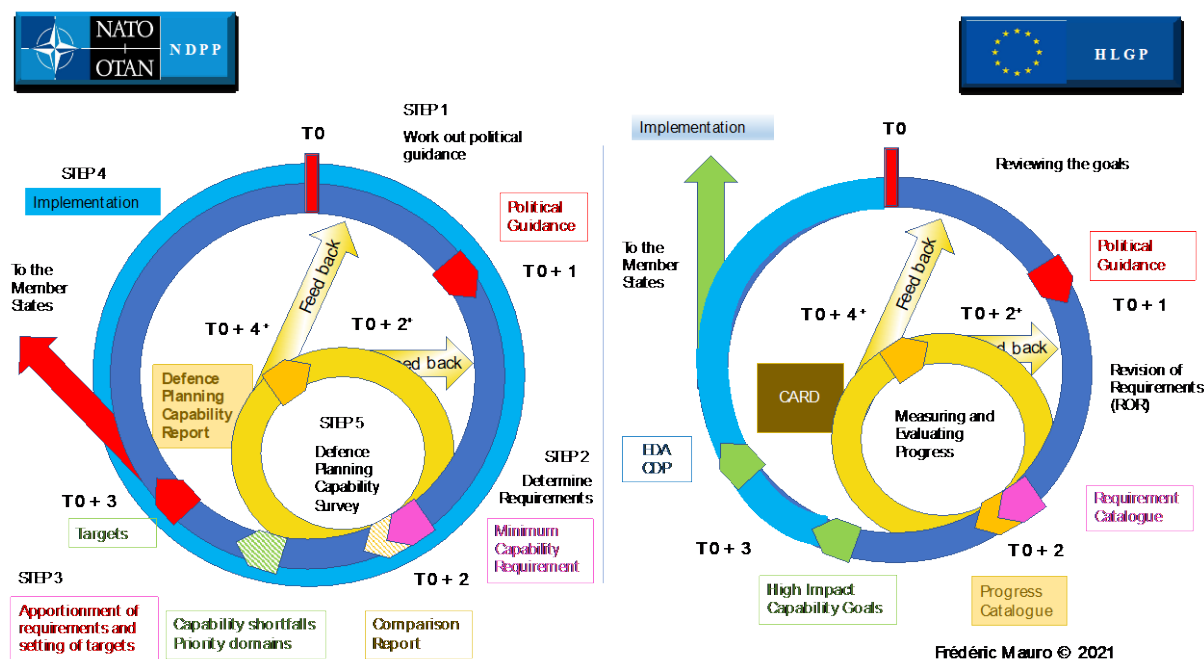
**Figure 23: Synchronisation of processes between NDPP and HLGP since 2018**

Frédéric Mauro © 2021

The EUMS (supported by the EUMC) has adopted the same taxonomy as NATO to describe military tasks and shares the same questionnaire as NATO to collect information from the Member States (with a few exceptions related to the visibility of NATO capability targets). Furthermore, the EUMS uses the same tool (software) to work on illustrative scenarios, and NATO is invited to participate in scenarios reviews, although this is not reciprocal. The main alignment feature, however, is that, since 2018, the HLGP's cycle is the same as the NDPP (4 years). They have the same starting point and end point, and their main steps have been harmonised. A noteworthy difference is that, in the HLGP, there is no apportioning of capability development targets among Member States as is done at NATO. Moreover, if timelines and taxonomy have been aligned and cooperation on substance has improved, alignment can never be complete for two reasons: (a) the tasks of the two organisations are different – collective defence for NATO vs crisis management for the EU; (b) planning with consideration of US defence capabilities and without those capabilities is not comparable.



**Figure 24: Harmonisation of processes between NDPP and HLGP since 2018**



From discussions with NATO stakeholders, it appears that the EDF is seen quite positively at NATO, as it is interpreted as the proof that the European members of the Alliance are committed to do more collectively for their defence and increase their expenditure.

Still, there are discordant voices to this harmony. As reported earlier (section 3.2.1), under the Trump administration, defence officials formally expressed their concern to the HR/VP that the EDF and PESCO initiatives would bar the European defence market to American industries. The convoluted arrangements found after long negotiations to regulate access to the Fund by 'non associated third countries' and 'non-associated third country entities' may not be sufficient to assuage those concerns. By contrast, the British government has remained out of the debate and shown no interest in accessing EDF support – thereby demonstrating consistency in its vision of European defence.

For the sake of completeness, it should be added that in March 2021, the US Government officially applied to join the PESCO project on Military Mobility led by the Netherlands <sup>(38)</sup>. This participation raises serious legal questions <sup>(39)</sup> as **PESCO is intended to be an integrative capability process for and by the European Member States** who are parties to the Treaty, in the CSDP general framework.

Besides, the potential for NATO-EU competition in defence R&T and R&D remains, even if staff from the two organisations readily collaborate. For example, the document issued by the reflection group appointed by the NATO Secretary General 'NATO 2030 – United for a New Era' recommends that NATO Allies 'should agree to, and begin to enact, a **'NATO's Emerging and Disruptive Technologies (EDT) Implementation Strategy'** as soon as possible' <sup>(40)</sup>. If adopted, such a 'strategy' would **enter in competition with the EDF work programme** – even if NATO has no money to offer to its participants. Such a competition coming from NATO is not new, nor surprising. Among other examples, one need only to recall the concept of 'smart defence' that was issued just months after the EDA had proposed the concept of 'sharing and pooling'.

<sup>38</sup> Sebastian Sprenger 'Pentagon pushes to partake in EU military mobility planning' – Defense News 2 March 2021

<sup>39</sup> Nicolas Gros-Verheyde 'L'association des pays tiers à la PESCO repose-t-elle sur une base légale solide?' Blog B2pro 3 March 2021

<sup>40</sup> NATO 2030, op. cit., page 29



Obviously the 'no duplication' mantra is only seen as an EU obligation vis-à-vis NATO, and not as a reciprocal one.

### 3.3.4 Other EU initiatives having a potential link with EDF

#### **Horizon Europe**

Like the adoption of the EDF regulation, that of the Horizon Europe regulation was suspended to a global agreement on the MFF 2021-2027. EU institutions reached a political agreement on Horizon Europe on 11 December 2020. As indicated earlier, Horizon Europe is a massive programme of EUR 94 billion (2020 current prices), including EUR 86,1 billion for civilian research encompassing: (a) the 'specific programme implementing Horizon Europe'; (b) a financial contribution to the 'European Institute of Innovation and Technology' (EIT); in addition to (c) EUR 7.9 billion for the EDF.

The Horizon Europe framework, which encompasses the EDF, is broader than the Horizon Europe regulation, which pertains only to research in the civilian domain. There is no legal ambiguity in this regard. Article 5 of the regulation establishing Horizon Europe <sup>(41)</sup> is explicit:

'Art.5.- Defence research and development

**'1. Activities to be carried out under the (...) European Defence Fund, shall have an exclusive focus on defence research and development,** with the following objectives and broad lines of activities:

'– activities aiming to foster the competitiveness, efficiency and innovation capacity of the European defence, technological and industrial base.

**'2. This Regulation [Horizon Europe Framework] does not apply to the [EDF].'**

Although recital 15 of the explanatory memorandum of the above-mentioned regulation encourages 'the [Horizon] Programme [to] seek synergies with other Union programmes', annex IV ('Synergies with other programmes') does not mention synergies between the EDF and the Horizon specific implementation programme. Nor are synergies between the latter and the EDF mentioned among the 'Synergies and value added within Horizon Europe' (annex I, point 3 c.) Nevertheless, as there is nothing such as a fundamental defence science (between TRL1 and TRL3) the issue of synergies between the EDF and civilian Horizon Europe projects will arise (see below section 4.1.).

#### **Military Mobility**

As indicated in section 3.3.1, 'Military mobility' is a PESCO project <sup>(42)</sup>, under Dutch coordination. As such, some of its sub-projects could theoretically benefit from an EDF contribution <sup>(43)</sup>. Beyond the PESCO project, Military Mobility is also a Commission initiative in the framework of the 2017 'European Defence Action Plan' <sup>(44)</sup>. Launched in 2018, the 'Action Plan on Military Mobility' aims to facilitate rapid and seamless military movements within and beyond the EU. The budget proposed by the Commission for Military mobility was initially of EUR 6,5 billion, but in the agreed version of the MFF in December 2020, it was severely cut down

<sup>41</sup> Article 1 – Proposal for a regulation of the EP and of the Council establishing Horizon Europe - the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination - Interinstitutional File: 2018/0224(COD) - 14239/20 - 18 December 2020.

<sup>42</sup> <https://pesco.europa.eu/project/military-mobility/>

<sup>43</sup> 'Implementing the European Defence Fund and the Action Plan on Military Mobility' – Michael Gahler – The European files 22 October 2020

<sup>44</sup> European Parliament 'Military Mobility at a glance' Tania Latici – EPRS - March 2019

to EUR 1,5 billion, earmarked in the 'Connecting Europe Facility'. A joint report on the implementation of the action plan was published in October 2020 by the HR/VP and the Commission <sup>(45)</sup>.

### ***The European Peace Facility (EPF)***

The EPF is an 'off-budget instrument' proposed outside the Multiannual Financial Framework <sup>(46)</sup> by then HR/VP Federica Mogherini in 2018. This instrument offers the possibility to finance the supply of military and defence-related equipment, infrastructure or assistance requested by third countries, regional or international organisations (e.g., the G5 Sahel). It has no direct link with EDF.

### ***The European space programme***

On 12 January 2021, at the 13<sup>th</sup> European Space Conference, EU Commissioner Thierry Breton said that 2021 would be a 'defining year' for **Europe's space strategy** and he laid out future plans for the EU's EUR 13.2 billion space budget, which will complement investments by the European Space Agency (ESA) and Member States <sup>(47)</sup>. This space strategy in the years to come lies in four main dimensions: (a) consolidate Galileo & Copernicus; (b) secure digital connections for the future; (c) ensure strategic autonomy in launchers and Space Traffic Management (STM); (d) position Europe as a space entrepreneurship hub. At the same Space Conference, the European Investment Fund and the European Commission announced their intention to invest EUR 300 million in the EU space sector using two space tech-focused funds – Orbital Ventures and Primo Space, under the first ever EU-backed equity pilot – the **InnovFin Space Equity Pilot** <sup>(48)</sup>. These agreements are supported by the European Fund for Strategic Investments, the central pillar of the Investment Plan for Europe. It is too soon to identify the linkages between the 'space strategy' and the EDF, but cluster(s) of calls within the EDF are likely to concern space. Such was indeed the case of EDIDP, which included several workstreams in the space domain: Positioning, Navigation and Timing (PNT) and satellite communication capabilities; Space Situational Awareness (SSA) and early warning capabilities.

### ***The 'Action Plan on Synergies between Civil, Defence and Space Industries'***

This Action plan <sup>(49)</sup> was presented by EC's Executive Vice-President, Margrethe Vestager and EU commissioner Thierry Breton on 22 February 2021 <sup>(50)</sup>. The main goals of the Action Plan are to: (a) enhance the complementarity between relevant EU programmes and instruments covering research, development and deployment to increase the efficiency of investments and effectiveness of results (the 'synergies'); (b) ensure that EU funding for research and development, including on defence and space, has economic and technological dividends for European citizens (the 'spin-offs'); and (c) facilitate the use of civil industry research achievements and civil-driven innovation in European defence cooperation projects (the 'spin-ins'). This 'Synergies action plan' is further discussed below (section 5.1.3).

<sup>45</sup> [Joint report to the European Parliament and the Council on the implementation of the Action Plan on Military Mobility from June 2019 to September 2020](#) Brussels, 19 October 2020 JOIN (2020) 16 final

<sup>46</sup> [European Peace Facility Factsheet](#) – European Commission December 2020

<sup>47</sup> [Speech by Commissioner Thierry Breton at the 13<sup>th</sup> European Space Conference](#) – 12 January 2021

<sup>48</sup> EC press release: ['European Investment Fund announces EUR 300 million of space sector finance with new investments into Orbital Ventures and Primo Space'](#) 13 January 2021

<sup>49</sup> [Communication COM \(2021\) 70 final](#)

<sup>50</sup> [Questions and Answers: Action Plan on synergies between civil, defence and space industries ; Creating synergies between the European civil, defence and space industries](#)

## 4 The conditions of success

Assessing the prospect for the Fund's success is not an easy task. As suggested by the debates that accompanied its creation EDF stakeholders, including both Member States and companies, have different objectives. Those objectives, reflected in the convoluted text of the regulation (see section 3.2.4), are difficult to disentangle, whereby aims, ways and means are not always easy to differentiate. This section aims to elucidate the Fund's success factors and how they must be articulated both among themselves and with other determinants of progress in European defence – in particular defence planning – to produce results. Doing so, it also identifies the risks and pitfalls that must be avoided if the investments allowed by the Fund are not to be wasted.

### 4.1 Fulfilling the objectives

#### 4.1.1 EDF's potentially conflicting objectives

The simple fact that the co-legislators had to explain the Fund *raison d'être* in 69 recitals before the articles of the regulation speaks volume about the difficulties to come to an agreement on its purpose<sup>(51)</sup>. However, it is important, for reasons relating to the **effectiveness of economic policies**<sup>(52)</sup> as well as to comply to the most ancient **common sense**<sup>(53)</sup>, to better understand the Fund's objectives, if one wants to have any chance of measuring its success.

**In truth, the objectives of the EDF** – like those of the EDIDP previously – **can be mutually conflicting**. Indeed, the aim '**competitiveness**', which is the '**general objective**' of the Fund, goes along with the **reduction of duplication**, which means concentration of the main manufacturers and integration of the value and supply chains in order to reduce the fragmentation of the European defence industry – one of its major weaknesses<sup>(54)</sup>. However, are Member States really ready to accept a drastic reduction in the number of their defence industries and how far should this consolidation go to favour the creation of European champions? The question is not obvious as the notion of 'European champions' is itself far from being consensual.

Then, Article 173 TFEU drives towards competition. However, **competition does not guarantee inclusiveness**. If 'excellence' is to be applied as a prime criterion, as it is in the civilian research programme 'Horizon Europe', this could lead to select the 'usual suspects' from a handful of countries with a long tradition of defence industry, thus contradicting the objective of a '**cross border**' benefit '**throughout the Union**'. Conversely, giving subsidies to SMEs to produce goods and technologies already produced by other SMEs in the Union could increase rather than decrease fragmentation, reduce the competitiveness of the EDTIB and eventually lead to '**less value for money**'... Fortunately, competitiveness is not necessarily achieved through competition but can be also reached through a smart industrial policy and the 'fine tuning' of adequate tools. Otherwise, there would be no place for 'cross border cooperation'. Moreover, as per the logic of Article 173 TFEU, the geographic return cannot be an objective in itself of the programme, it is only a way to achieve this objective. **Thus, a delicate balance needs to be stricken between competitiveness and cross border cooperation.**

<sup>51</sup> The record for defence is still held by Directive 2009/81/EC of 13 July 2009 on defence and security procurement, whose regulatory framework is preceded by 79 recitals.

<sup>52</sup> The so-called rule of Tinbergen-Mundell states that policymakers trying to achieve multiple economic targets need to have control over one policy tool for each policy target.

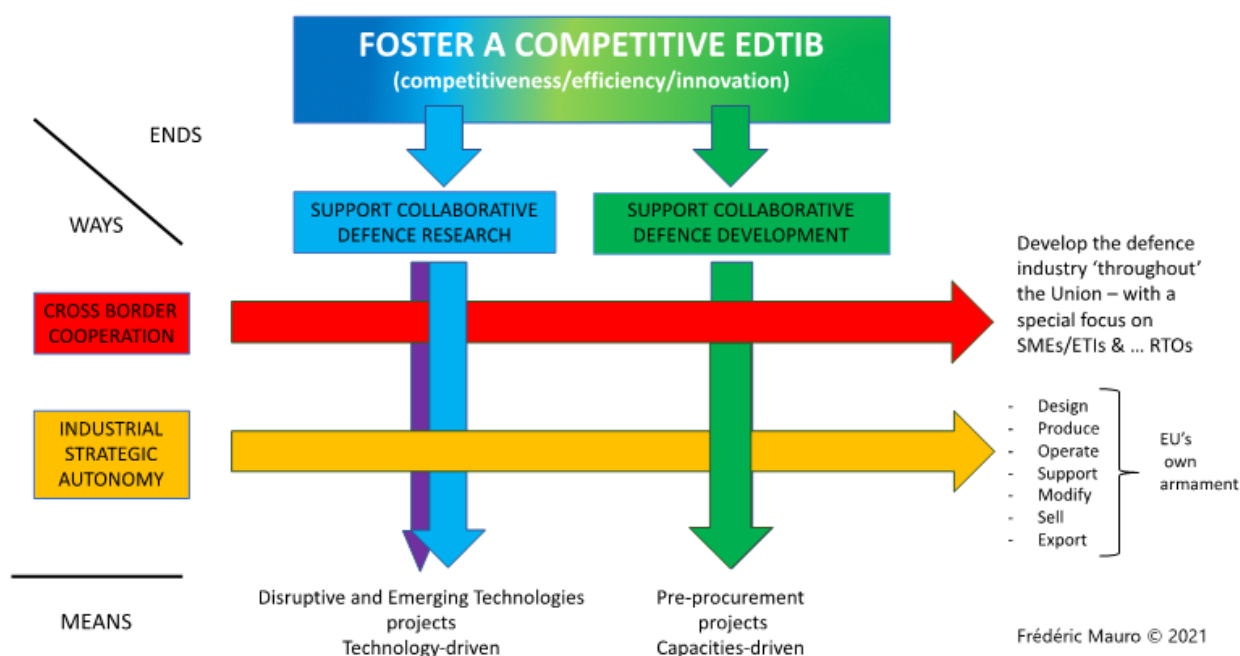
<sup>53</sup> Seneca: '*Ignoranti quem portum petat nullus suus ventus est*' (If you do not know to which port you are sailing, there is no such thing as a favourable wind). L. A. Ad Lucilium Epistulae Morales. LXXI, 3.

<sup>54</sup> [European Defence Action Plan](#), Communication from the European Commission, COM(2016) 950, 30 November 2016

### 4.1.2 A complex matrix of ends, ways and means

The EDF has been designed as a swiss knife, capable to cut, saw, screw, cruciate, sting, and do this at the lowest possible price. To use it correctly, it is essential to know exactly what can be done and cannot be done with each tool it contains ('the means'), using it in which manner ('the ways') and to what purpose ('the ends').

**Figure 25: The European defence fund's matrix of ends, ways and means**



#### The ends

**The overarching 'end'** i.e., the 'general objective' as stated in Article 3 of the Fund regulation is **'to foster a more competitive European Defence and Technological Industrial Base'**. Without getting lost in too many details, competitiveness can be defined as the ability to produce at the lowest cost (price competitiveness) and/or at the best quality (structural competitiveness). To achieve this, one must not only choose one's market strategy carefully (marketing, target, etc.) but above all bring together the right talents around the right processes. The end result must be an EDTIB capable of producing military equipment at least as good as the one used by the Union's strategic competitors and at best as good as the one used by Europe's main ally, namely the US, in order to be interoperable. The effort should be carried out at a price that is acceptable.

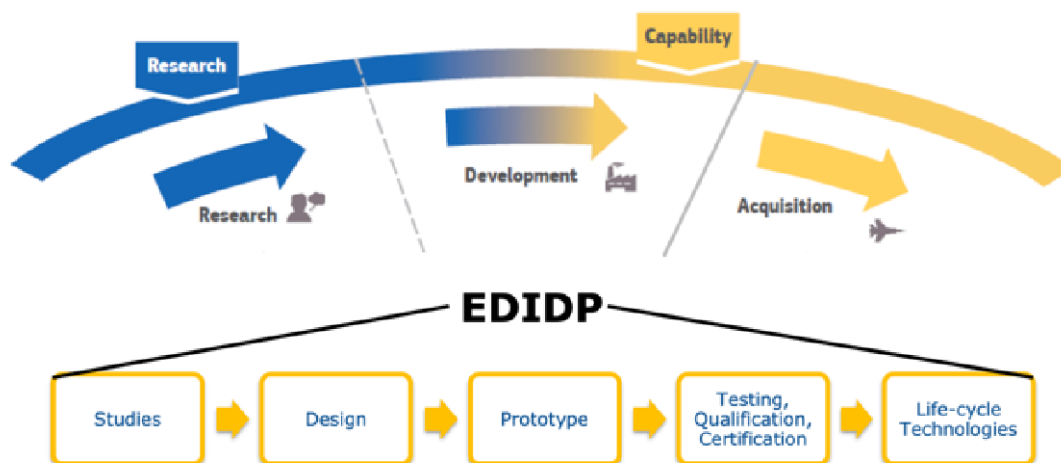
This overarching end encompasses two specific objectives or intermediaries ends:

**The first 'specific' objective is to 'support collaborative research'.** This objective is inherited of the PADR and it is the easiest objective to fulfil. This stems from three reasons. First defence R&T is much cheaper than defence R&D. Second the world of defence R&T is the world of RTOs and SMEs which, by nature, are more evenly spread across the Union's territory than the major defence industries, which are concentrated in only a few countries. Finally, the world of R&T is by nature much more inclined to share discoveries than that of industry, which is highly protective of its innovations. The objective of supporting collaborative research 'includes' that of working on disruptive technologies.

**The second 'specific' objective is to 'support collaborative development'.** This objective takes over from the EDIDP. Indeed, '[fostering] better exploitation of the results of defence research and [contributing]

to **closing the gaps between research and development** has been a constant objective of the Commission since the very beginning of the EDIDP process, as reflected through its Communication documents throughout the legislative steps accompanying its creation. The scheme has been refined over the years and shows clearly the Commission's vision of the defence research and development nexus and the gaps within it.

**Figure 26: Theoretical capability development cycle seen by the Commission**



Source: European Commission: 'News from the European Defence Fund' 24 February 2021  
'Forschung für ein souveränes Europa'

The first gap between research and development may happen when public subsidies for research end and the project moves to the development phase, where ordinary competition rules begin to apply. The second gap may occur between development and acquisition in cases where, although a lot of research may have been done, a defence project does not become a programme due to e.g., the de-synchronisation of the budget cycles of the participating states, changes of government or simply the lack of political will of successive governments. These two gaps could easily derail a project and lead it to 'the **valley of death**' (see Annex 9).

The Commission – advised by the Member States – will have to avoid those pitfalls, never losing sight of the fact that the end is contribute to the development of '**military products and technologies** that shall ultimately lead 'to an **increase in the standardisation of defence systems** and greater **interoperability** between Member States capabilities.'

### **The ways**

Two 'ways' are possible to achieve the goals. The first is intra-European cooperation ('cross border cooperation') and the second is 'strategic autonomy'. These are 'ways' because they must be followed in the achievement of each of the two aforementioned 'ends', whether it be R&T or R&D.

**'Cross-border cooperation' is not a path naturally followed in the realm of defence.** A reason for this is that international cooperative defence projects are generally longer, more complicated and ultimately

more expensive than programmes conducted on a national basis <sup>(55)</sup>. To be efficient, cooperation needs a good alignment of operational specifications and financing, as well as a good distribution of roles and responsibilities between primes and subcontractors. Major actors are therefore reticent. Thereby, it was one of the motivations of the EDIDP to remove the extra cost of cooperation to facilitate it. Globally, the Commission estimates the cost of non-cooperation in defence among Member States – between EUR 25 and 100 billion per year <sup>(56)</sup>. In this light, ‘cross-border cooperation’ might be a little price to pay to secure the political acceptability of the Fund. However, whether this cost will be accepted by those actors who risk losing from it – at least in their perception – for the sake of the interests of Europe as a whole remains to be seen. In any case, the existence of a tension between those interests cannot be denied.

‘**Strategic autonomy**’ is more difficult to define because it is a ‘mot-valise’ (rag bag) in which everybody puts the clothes that it pleases, including by its detractors in order to discredit the idea.

For the purpose of this report, what is at stake is the EDF’s capacity to deliver to the EU more ‘**strategic defence autonomy**’ <sup>(57)</sup>, which means the ability to decide to wage war and the capacity to do it effectively, alone if necessary and with allies if possible. This aligns with the agreed language in the Union’s vocabulary <sup>(58)</sup>, as well as with the 1998 Franco-British St Malo declaration <sup>(59)</sup>, which gave birth to the concept at the European level. This being said, it is not the same military *apparatus* which is required to go to war with Russia in the Polish plain, with China in the Chinese sea, to confront cyber-crime, to counter information warfare or to conduct crisis management operations in Africa or the Middle East. This is why ‘strategic autonomy’ is a relative and contingent concept that must be negotiated and renegotiated politically among Member States over time.

Conceptually, it is generally accepted that ‘strategic autonomy’ is composed of three elements <sup>(60)</sup>: political autonomy, operational autonomy and industrial autonomy. These three elements can be grouped into two: the ability to decide (political autonomy) and the capacity to act (operational and industrial autonomy).

<sup>55</sup> A rule of thumb for cooperative projects, often highlighted by manufacturers, is that the cost of a project is multiplied by the square root of the number of participants:  $\text{Cooperation total cost} = \text{normal cost} \cdot \sqrt{\text{Number of participants}}$ . For example, a EUR 1 billion project would cost EUR 1.41 billion if it were carried out with two participants, EUR 1.73 billion if it were carried out with three, EUR 2 billion if it were carried out with four, EUR 2.24 billion if it were carried out with five, and so on.

<sup>56</sup> [EDF fact sheet](#) 13 June 2018

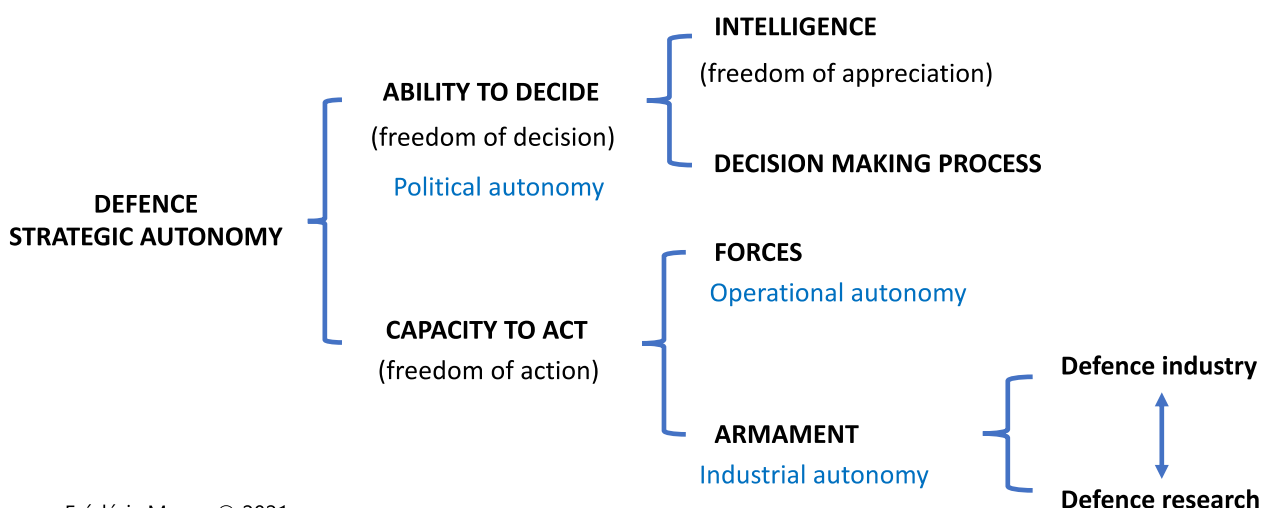
<sup>57</sup> The expression is used in the ‘[Commission Staff working document, impact assessment accompanying the document ‘Proposal for a regulation \[...\] establishing the European Defence Fund’](#) – SWD (2018) 345 final 13 June 2018 p. 41

<sup>58</sup> The Implementation plan of the EU Global Strategy in the area of security and defence of November 2016 (14149/16) states: ‘The Council is committed to strengthening the Union’s ability to act as a security provider and to enhance the Common Security and Defence Policy (CSDP) as an essential part of the Union’s external action. This will enhance its global strategic role and its capacity to act autonomously when and where necessary and with partners wherever possible.’

<sup>59</sup> ‘Joint Declaration on European Defence’ issued at the 1998 British French Summit of Saint-Malo: ‘The Union must have the capacity for autonomous action, backed up by credible military forces, the means to decide to use them, and a readiness to do so, in order to respond to international crises’

<sup>60</sup> Frédéric Mauro – ‘[Strategic autonomy under the spotlight: The New Holy Grail of European Defence](#)’ – GRIP report – March 2018



**Figure 27: Defence 'strategic autonomy' components**

Frédéric Mauro © 2021

The 'strategic autonomy' the EDF regulation refers to is **industrial (strategic) autonomy**. In general terms, this autonomy can be defined as the capacity to design, produce, operate, support, modify, sell and export the armament needed for forces in operation. What is important here is to achieve the confidence that one will be able to access, use and refurbish the desired military equipment whenever and however needed. Obviously, strategic autonomy does not mean the same for a helmet, a rifle, a bullet, a bomb, a battle tank, a submarine, a cruise missile, a combat aircraft or a satellite... One can acquire helmets from many manufacturers but depends heavily on the provider of a complex combat aircraft. In this context, the definition and monitoring of 'Key Strategic Activities' by the EDA is of utmost importance.

This being said, there are not many ways to ensure the industrial part of strategic autonomy.

One is the **national** approach. It is used by the Americans, the Russians, the Chinese as well as the French, among others. It consists in trying to build a national armament DTIB capable of producing all armaments (or at least the most important of them) needed for the national forces to fulfil the level of ambition they have been assigned. **This can lead to armaments costing more**, or even much more, than if they had been procured on the international market through competition.

Another is to acquire armaments through the so-called '**best value for money**' logic, which has long been that of the British, the Swedes, the Dutch as well as many other countries that do not have a strong DTIB. In this model, **autonomy is ensured by the expected solidity of an alliance** (e.g., US-Saudi relations), which 'guarantees access' to the armaments needed. Such an approach may not be compatible with the maintenance or the build-up of an armament industry in the country practicing it, and its industrial consequences must therefore be assumed.

In practice, most countries use a **mixed approach between these two archetypal models**. For example, in its 2018 White Paper on National Defence, France differentiates defence industrial policies corresponding to 'three circles of sovereignty' <sup>(61)</sup>.

### **The means**

The '**means**' are the practical tools the Commission will rely upon to fund the **programmes** to be launched by RTOs, industry and Member States. They can be broken down into four elements:

<sup>61</sup> [Livre blanc sur la défense et la sécurité nationale](#) 17 June 2018

- The **overall budget** and its **annual distribution**, which can vary from year to year especially with regards to the R&T/R&D mix;
- The **regulation** with all its rules on eligibility and selection;
- The **annual work programme**;
- The project **selection process** and subsequently, the award of grants or procurement.

Since the budget is fixed for seven years, despite yearly refinements and a mid-term review foreseen in 2024, in practice, the two levers on which the Commission will be able to act – always with the support and under the control of Member States – will be **the annual work programme and the selection of projects**. It is with those two levers that it will have to meet, and if possible, overcome the challenges arising.

## 4.2 Meeting the challenges

### 4.2.1 Conflicting 'ends' and 'ways'

**The first and most obvious hurdle to overcome will be the potential contradiction between the 'end' of competitiveness and the 'ways' chosen to reach it.**

#### ***Cross-border cooperation***

In substance, one of the main challenges resulting from the cross-border cooperation imperative is how to **find an efficient balance between 'cohesion' and 'excellence'**.

This challenge is easy to understand by calling upon a metaphor: if we had to choose a team to represent Europe at the Olympic Games, would we choose the members of this team by making sure that we have an athlete per Member State, whatever his or her performance might be? Or would we prefer to choose the 'best athletes', even if they concentrate in few countries?

What Europe is trying to achieve with the EDF is to have the **'best athletes'** yet **trying to balance all EU nationalities in the team**.

This is of concern as, in practice, confidential feedback on past EDIDP calls from a large number of interviews reveal that, to win those calls, heads of consortia try to take in as many 'cross-border SMEs' as possible, so as to get as close as possible to a 100% subsidy rate. Doing so, they do not always select these SMEs on their qualities as this would take time and resources, which they cannot afford (e.g., strengthening purchasing departments, doing in-depth vetting of foreign companies, mapping them in the first place, etc). Therefore, the primary objective of consortia is to win calls, 'painting the biggest number of flags on the project cockpit', with little regard to the quality of the members. In this case, the principle of excellence clashes head-on with the principle of cross-border cooperation.

Making cross-border partnerships a requirement for eligible actions is certainly essential to build Europe's cohesion over the EDF approach. However, specific requirements could perhaps have been defined differently, all the more so as consortia over-interpret its importance. By comparison, as indicated in section 3.2.2., cross-border is not a requirement in Horizon Europe (see figure 14).

#### ***Industrial strategic autonomy***

Strategic autonomy' is fully compatible with competitiveness ... as long as Member States consider themselves as part of a bigger European ensemble and not as isolated players. Strategic autonomy, however, has a cost: States may have to pay more for military equipment than if it were procured on the international market. This cost is the price to pay to be absolutely certain that, if the time comes, European forces will be able to use the weapons at their disposal, as well as the munitions and spare parts needed for their use, without obtaining authorisation from a third State that supplied them.

This additional cost is acceptable, up to a certain level, for a State that wants to be autonomous and has an industry that enables it to be so. However, this is not the case of the majority of EU Member States, which do not have a highly developed defence industry and for whom it is a secondary priority whether they acquire their military equipment from European allies or other major allies. These countries will generally make their procurement decisions on a case-by-case basis, depending on their industrial, military, political or simply financial interests of the moment.

On balance, those Member States who are not interested in building a national DTIB are also those which do not see the Union as a political entity that needs to have its own defence policy. They may therefore not be strong supporters of the Commission's efforts, through the EDF, to build up Europe's industrial strategic autonomy. Worse, they may even undermine those efforts if they fear that those Member States with a strong DTIB may disproportionately benefit from it.

#### 4.2.2 The weaknesses of the European defence planning process

Despite all the progress demonstrated in section 3.3.2. the EU defence planning process (EU DPP) as a whole is **yet unable to provide useful guidance on targeted military capacity needs** that are themselves essential to guide development and, to some extent, R&T.

The first and foremost reason for the ineffectiveness of this process is its **hideous complexity, the lack of coherence between all its components and the inter-institutional rivalries that it structurally generates within the Union institutions and with NATO**.

The second reason for the **failure of the Union's defence planning architecture lies in the absence of a clear direction towards which European defence should go**. Indeed, the 'level of ambition' set by the EU's 2016 Implementation Plan on Security and Defence (IPSD) was rather vague, especially in its last item 'protecting Europe and its citizens'. This is the reason why, quite rightly, the EUMS in its process stuck to 1999 Helsinki Goals of the CSDP and the promise of a dedicated military tool for crisis management outside the Union, capable of intervening for 'the most demanding missions' without the support of a third State. This is, after all, nothing else than the commitments made in Chapter V of the TEU. Times have changed, however, since the drafting of the Treaty, and nowadays few Member States are interested in building such a military tool. In practice, EU CSDP military missions have declined in intensity since 2009, although they have increased in numbers. Despite all the pressures exerted by the American ally, from the 'leadership from behind' to the bewildering retreat from Syria, Member States never envisaged to send European forces on their own to accomplish 'tasks of combat forces in crisis management, including peace-making and post-conflict stabilisation' (article 43.1. TEU) in Mali, Syria, or Libya, although these crises affected the Union and threatened its unity. Many more European countries are preoccupied today by a 'resurgent' Russia, cyber-attacks – among others from Russia – or an assertive Turkey to the east and south of the Mediterranean periphery. However, there is neither agreement among Member States on the seriousness of the threats these actions pose to the Union, or the best way to address them. In any event, they would require much more than an expeditionary force to be tackled.

**A third flaw is that the Headline Goal process**, which is implemented with the same professionalism than the NATO defence planning process (NDPP), but with a tenth of its resources and less willingness from the Member States to participate, **is diluted in the CDP process, which reflects the agreed priorities of the Member States rather than the operational needs of the Union in the field of CSDP** <sup>(62)</sup>. The difficulty is that what the Union needs to fulfil its level of ambition may differ substantially from the Member States' priorities.

<sup>62</sup> In this regard it is interesting to note that article 3 of the Fund regulation states that 'Such cooperation shall be consistent with defence capability priorities commonly agreed by Member States within the framework of the Common Foreign and Security Policy and particularly in the context of the CDP', although the CDP force spectrum is broader than the CSDP's.

**With regards to the CDP**, words are misleading. It is important to understand what the CDP is not, and what it is to grasp its true value. First, despite its denomination, the CDP ('Capability Development Plan') is everything but a plan. **It is a list of 'agreed priorities'**, which are the capability areas that Member States agree to recognise as important and on which they want to cooperate. Second, the CDP does not assign Member States capability targets to be acquired in a defined timescale and it is not processed on a cyclical basis. Third, the 'agreed priorities' are too broad to serve as a plan for capability acquisition <sup>(63)</sup> and they are not sufficiently focused for to serve as a basis for defence research planning, be it R&D or R&T. This is the reason why the necessity appeared to bring more precision with the so-called Strategic Context Cases (SCCs) and the Overarching Strategic Research Agenda (OSRA) that draw more detailed avenues for cooperation.

This does not mean that the CDP is useless, however. The CDP has a **value in that it allows the CARD (Coordinated Annual Review on Defence) to be sharp by providing an agreed basis to review Member States' defence investments**. Being an 'exercise in sincerity', CARD is useful in tacking stock of the state of play along three dimensions:

- **Defence spending** i.e., defence investment plans, in a dynamic perspective which means looking not only at what Member States are spending, but at what they are planning to invest (which is more valuable than NATO statistics);
- **Defence planning**, which a description of the EU's capability landscape;
- **Defence collaboration**, based on the description of the EU's capability landscape.

In all these dimensions CARD assesses in a detailed manner whether Member States are fulfilling or not their 'agreed priorities'. This in itself is a fantastic progress, acknowledged by all those who have been working in the field of European defence planning for some time.

The CARD report brings to light in reverse **the fourth and may be the most important flaw of the EU defence planning** and development process, i.e., **its lack of coherence with national defence planning processes and timelines** which continue to be led by 'national defence interests'.

Thanks to the 2020 CARD report, it has now been highlighted that Member States are not sufficiently addressing the 'agreed priorities', and not even the HICGs although they are less demanding in scope and in quality <sup>(64)</sup>. Certainly, a major mistake has been in trying to align the national development processes through the EDA's CDP without aligning them with the EU defence planning process led by the EUMC/EUMS. The CARD report further confirms that the European defence landscape is characterised by fragmentation, with very high diversity of types of major equipment and different levels of modernisation and interoperability.

This lack of coherence stems from the fact that countries with a long-established national planning tradition and clear defence objectives logically prioritise their national planning over any EU priorities. Many other countries, find it easier to follow the capability targets set by the NDPP, even if they do not always fully comply or comply on time. In any case, until now, few Member States have dedicated particular attention to the European defence planning processes (DPP), simply because they do not want an additional defence plan on top of their own national defence plans and the NDPP.

This disinterest for the EU DPP is visible vis-à-vis the work carried out by the EUMS, which, despite all the efforts made in the last years, does not receive the reception it deserves. The main reason is that a large

<sup>63</sup> For example, if Member States were to fulfil the priorities of only the 'Air superiority' cluster, which includes 1.) Air combat capability 2.) Air ISR platforms 3.) Anti-Access Area Denial (A2/AD) capability 4.) Air-to-air refuelling 5) Ballistic Missile Defence, they would have to spend more than EUR 50 billion per year in acquisition.

<sup>64</sup> [2020 CARD report executive summary](#) p. 2.

number of Member States do not feel bound by the objectives of the CSDP. Some even reject the very idea of European defence and strategic autonomy, even though the latter is enshrined in the Treaty and the former in acts of the European Council.

It is also visible vis-à-vis the EDA's CDP, although everyone agrees that CARD represents real progress and is a potentially very useful element. As for OSRA and the TBBs, they also seem to be valuable concepts, but they have yet to be operationalised. The unanswered question for the moment is 'how?'

It is also important to note that CARD brings to light that **'allocations made to already launched national programmes leave limited margins for manoeuvre for collaborative defence spending until the mid-twenties'**. This is an important statement to bear in mind as it limits the likelihood of impact of the EDF in its first years.

Considering the gaps described, it will not be possible in the short term to use the outputs of the EU defence planning and development processes to give a clear direction to the Commission in elaborating the EDF work programme, as expected in the EDF regulation. Thus, it will not come as a surprise that the EDF work programme will be, at least for the first year, informed by proposals made by Member States across the entire spectrum.

### 4.2.3 Funding scarcity

#### ***Budget limitations and the sprinkling effect***

In theory, fostering 'collaborative defence development' across borders would be best served by a 'Gießkannenpolitik' (**'watering can policy'**) that would spread EDF resources widely with the aim of facilitating the development of a web of defence SMEs, ETIs and RTOs across Europe.

This may be achievable with the EUR 86 billion of Horizon Europe, but in the case of the EDF, the money is scarce. The in-built temptation for consortia to include the maximum number of nationalities is likely to lead to a dangerous dispersal effect, especially if a large number of calls were to take place each year. As a rule of thumb, if we count on EUR 633 million per year for development and the number of calls is 20, this makes for an average of EUR 30 million per call. If each consortium is made up of an average of 10 companies, this makes EUR 3 million each. Even if the financial returns for the companies involved were still attractive – which is less than certain at that level – **too many projects, with too many calls and too many companies will have a scattered effect and limited impact**. This will prevent the Fund from ever achieving the objective of 'cooperative development' capable of opening the path to military capabilities.

This risk could be even more serious in the hypothesis – already materialised in some States such as Sweden – that Economics and Finance ministries would deduct from national subsidies for defence research sums received from the EDF by beneficiary companies. This kind of **crowding-out effect** would deprive the Fund of any leverage, as the sums allocated at European level would only be substitutes for those previously granted at the national level. **A perverse ripple effect** is that this may **deter Member States and their companies from competing**. Indeed, why assume the burden of taking part in very complex projects, at great cost and with no guarantee of success, if you are sure to benefit from national funding?

To compensate – in part – for the risks of the 'watering can policy', there will be a need to **'organise' the emulation/cooperation between European RTOs**, finding the right balance between competition, to 'foster competitiveness', and 'collaboration', to avoid unnecessary duplication and dispersion, i.e., different RTOs making use of the same little money to conduct identical research. This aim here should be to stimulate RTOs to step outside their frame of reference by questioning industrial expectations and projecting a vision of transition from the research stage to the industrial stage, and not just a research-for-research perspective.



**Table 7: Major RTOs with defence research in their portfolios**

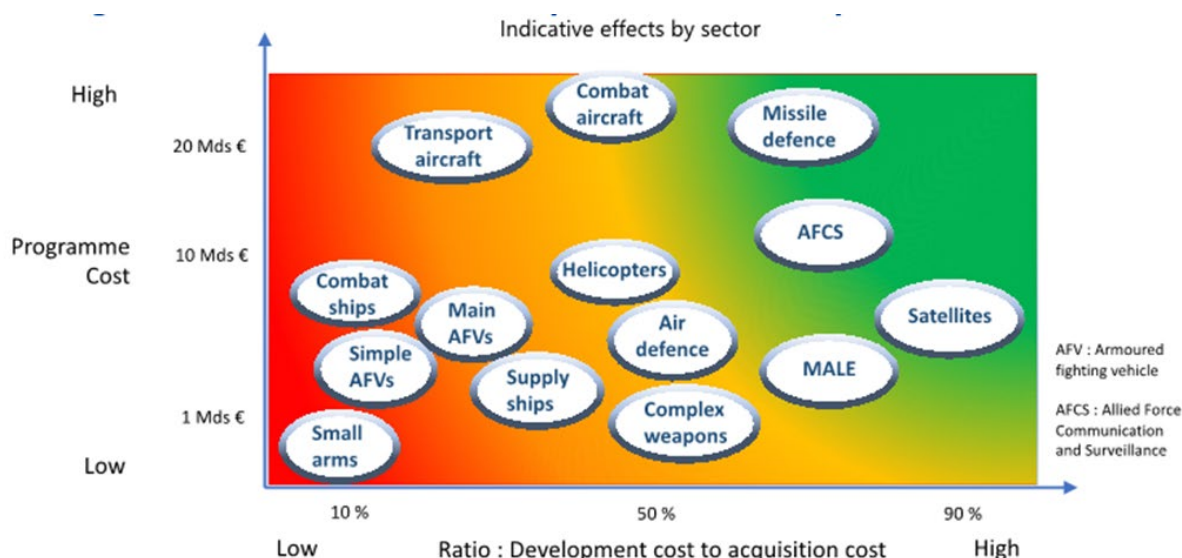
2019	In alphabetic order from open sources	Country	Turnover (M€)	Number of employees
AIT	Austrian Institute of Technology	Austria	163	1 136
CEA	Commissariat à l'énergie atomique et aux énergies alternatives	France	1 950	4 409
CNES	Centre National d'Études Spatiales	France	2 346	1 885
DLR	Deutsches Zentrum für Luft und Raumfahrt	Germany	1 155	8 200
FOI	Swedish Defence Research Agency	Sweden	123	983
FRAUNHOFER	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung	Germany	2 760	27 988
IABG	Industrieanlagen Betriebsgesellschaft mbH	Germany	192	1 000
INTA	National Institute for Aerospace Technology	Spain	189	1 500
ISL	French-German Research Institute of Saint-Louis	France/Germany	49	378
ONERA	The French Aerospace Lab	France	237	1 968
SINTEF	Research, technology and innovation	Norway	345	1 858
TECNALIA	Research & Innovation Foundation	Spain	115	1 388
TNO	Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek	Netherlands	554	3 431
UAR	Upper Austrian Research GmbH (UAR)	Austria	95	920
VTT	Technical Research Centre of Finland LTD	Finland	245	2 103

This list must be understood as a rough overview as comparison is difficult. Factors coming into play include currency conversion rates, different definitions of the financial year, different financial and human resources reporting rules, a wide range of organisational set-ups (from government agencies to non-profit organisations), different breadths of technical research areas (mixed civil and military / military only). Procurement agencies like the French DGA or the British QinetiQ are made up of 'experts' and not researchers.

Edouard Simon © 2021

Regardless of the cross-border aspect, the limited EDF resources will certainly prevent the financing of major 'structuring' projects. Indeed, the two main drivers of European armaments cooperation are the cost of programmes and the ratio of research costs to variable costs<sup>65</sup>. The former is particularly high in the defence industry since, by definition, it is always necessary to invent the weapon that does not exist in order to acquire military supremacy. Logically, the higher the cost of the programmes and the more limited the series to be produced, the greater the interest in cooperating. **Unfortunately, the narrow financial base of the Fund will not allow for the development of major projects.**

**Figure 29: Economic drivers of European defence development collaboration**



Frédéric Mauro © 2017

<sup>65</sup> Of course, these two main drivers are not the only ones. There are also political benefits (common response to the same threat, willingness to please a major ally), economic benefits (industrial development, mastery of new technologies) or military benefits by accessing capabilities that cannot be accessed nationally.



### ***The budget annuity principle***

By its very nature, the development of equipment projects takes place over many years or even decades, especially when it involves complex equipment such as combat aircraft, complex weapons systems, complex land collaborative systems or command and control centres as well as 'combat clouds'. It is therefore necessary for consortia to have a long-term vision of what the client ordering the equipment wants and to have the guarantee of benefiting from commitments over the medium to long term. This is not created by a single call for a handful of million euros. Rather, it takes a long period of time for projects to mature from feasibility studies to prototype. This is difficult to reconcile with the principle of the Fund's annual budget.

### ***The lack of dialogue between customers and industry***

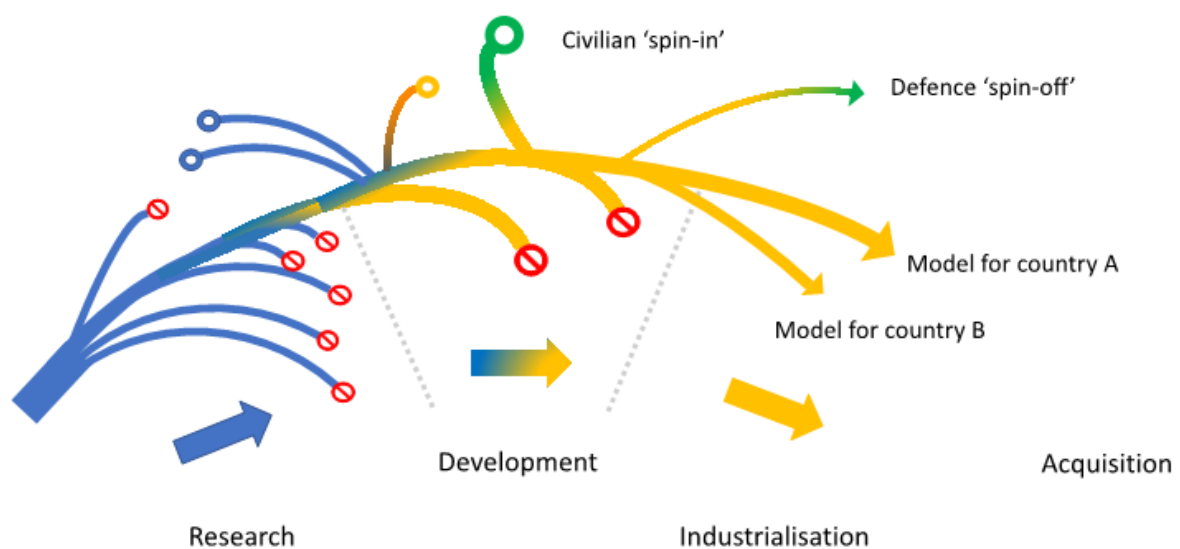
The experience of major armament programmes shows that it is very difficult to develop a programme without permanent interaction between operational military staff, armament engineers and the manufacturing industry. Such a dialogue is difficult to organise in a framework of pure competition, especially in a context of annual programming.

#### **4.2.4 Risk aversion**

**Risk aversion is an obstacle to efficient R&T** especially for the Commission services which are not yet accustomed to defence research. The first obstacle EDF implementers will face will be in the evaluation of bids. Indeed, how to judge *ex ante* something that can be defined only *ex post* as innovative, not to say disruptive or dual? A risk is that evaluators will tend to put themselves on the 'safe side' of the road, i.e., 'incrementation' of what is already known, rather than going for concepts, ideas or designs they have never seen.

**Tolerance for failure** will be needed, which is not in the nature of a bureaucratic organisation such as the Commission. One of the added values of the EDF should be to compensate this risk aversion, especially with regards to the funding of disruptive technologies. The EDF must also allow the riskiest projects to emerge from the 'valley of death', i.e., commit to supporting them latter to reach the industrial stage. But will the Fund tolerate such a risk-taking policy?

**Figure 30: Capability development cycle in real industrial life**



Frédéric Mauro © 2021

### 4.2.5 The bureaucratic burden

Two features of the EDF construct in fostering defence R&T/R&D may obstruct the achievement of the objective. One is general, the other specific to disruptive technologies.

#### ***The cost of preparing bids***

R&T companies, especially small ones, are no project management professionals. For them, the cost – in time and money – that it takes to participate in a bid can easily become higher than the expected benefits. If the costs of collecting legal and accounting documents in parallel to designing methodologies and running bilateral negotiations of financial returns among consortium members become unmanageable, then the major contractors, who earn money elsewhere, will not answer the calls and the EDF will end up with a cohort of ‘subsidy professionals’ coming to ‘collect their pay’ only because they represent this or that state or fill in this or that box.

Too heavy an application process therefore involves a risk of ‘levelling down’.

#### ***Bureaucratic process vs innovation***

**Disruptive technologies** specifically will be difficult to foster in the same manner as the rest of defence research. Indeed, it seems improbable that asking people to present their disruptive technologies via competitive calls will ever produce some impact.

One key success of US DARPA, as described in Annex 10, lies precisely not in organising ‘calls’ but in entrusting for a limited amount of time (two years – renewable once) loyal ‘programme managers’, i.e., known individuals with a solid scientific and technological background, and ... letting them choose the best projects they can think of. With the limited amount at the disposal of the Fund (between EUR 45 and 90 million per year according to the regulation) this sort of disruptive ‘task force’ could be very limited in size to a few managers appointed by the Commission. Alternatively, the equivalent amount of money could be delegated without bids to specialised networks known to be invested in disruptive technologies in Europe. Such approach does involve risks, but it may be as productive as the creation of a large new structure, with many staff, new regulations, new offices ... and new red tape.

### 4.2.6 Member states’ difficulties to think of themselves as Europeans

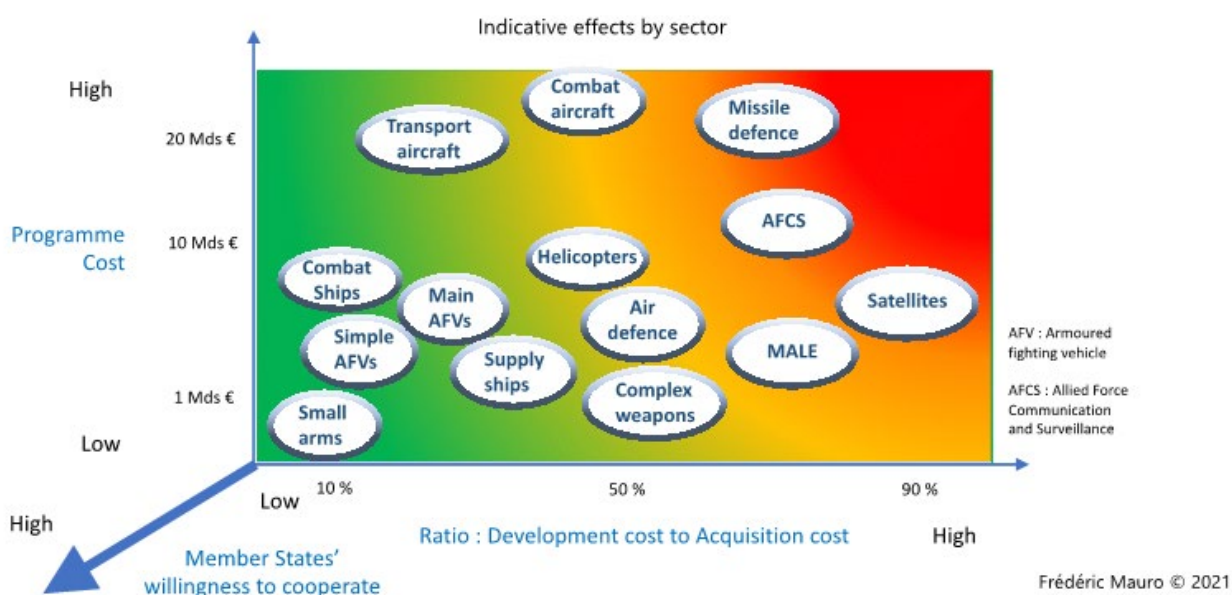
With regards to the operational dimension of the CSDP, it is acknowledged that EU Member States show a very low commitment to current missions and operations, both with regards to deploying manpower and sharing in the common costs of operations. Therefore, the HICGs are not sufficiently addressed and, as a consequence, the CSDP military level of ambition is currently not achievable, at least for the most demanding missions stemming from the ‘illustrative scenarios’. Threat analysis and assessment remain quasi-exclusively national, and Member States rarely consider threats that bear on their European partners. Furthermore, a significant number of EU Member States prefer to entrust NATO – and the US – with their security. They fear the building of a European defence could be perceived as a sign of mistrust against NATO and the US and, as such, could put their security at stake. The Strategic Compass process would be a game changer if it enabled EU Member States to put aside these scattered and divergent perspectives and enabled them to form a common approach to threat analysis, assessment and management at EU level. Whether it will do so remains to be seen in the next few years.

With regards to the defence industry, it must be admitted that the experience of the major European programmes of the last fifteen years hardly pleads for collaboration, even if negative effects are often exaggerated. The history of European armaments cooperation is full of sore experiments, which are regularly unearthed by military, political and industrial leaders in order to denigrate cooperation, quantify its additional costs and highlight its perverse effects. This ‘narrative’, which is often partial and always one-sided, maintains a state of mind that is not conducive to cooperation.

Cooperation – especially in the field of armament – is driven by multiple and heterogeneous factors, often defying prediction <sup>(66)</sup>. For instance, States use cooperative programmes to benefit their industrial champions and at times to block the progress of industrialists from other States. In the absence of an accepted guardian of the common European interest, cooperation has until now often been perceived as a zero-sum game, where the gains of some are necessarily the losses of others. The relations that States maintain with their industrialists resemble in their complexity the relations that some parents may have with their children, jealous of ensuring the best place for their offspring and sometimes too sensitive to their demands.

The political considerations formed by the leaders of the Member States are sometime the most powerful brakes on industrial cooperation in the military field – whether these considerations are motivated by the desire to give an advantage to national companies and jobs, by the conviction that the country is sufficiently strong on its own, or by the aspiration to closeness with another country outside or inside the Union. The end result can easily be demonstrated through PESCO: the complex chemistry of defence collaboration, done on artificial premises, can lead programmes to the exact opposite of what would be done if economic drivers were to be followed. It is the least structuring programmes, the cheapest and those of least use for strategic autonomy that are financed in cooperation, whilst Member States continue to conduct their most important programmes outside the EU framework, with the secret hope of getting more and sharing less.

**Figure 31: Political reality of European development collaboration**



<sup>66</sup> Edouard Simon, Rôles et fonctions du droit de l'Union Européenne dans l'intégration des politiques d'acquisition d'armement, PhD thesis, Paris 1 Panthéon-Sorbonne University, defended on 13 July 2017, pp. 523-553.

## 5 Recommendations

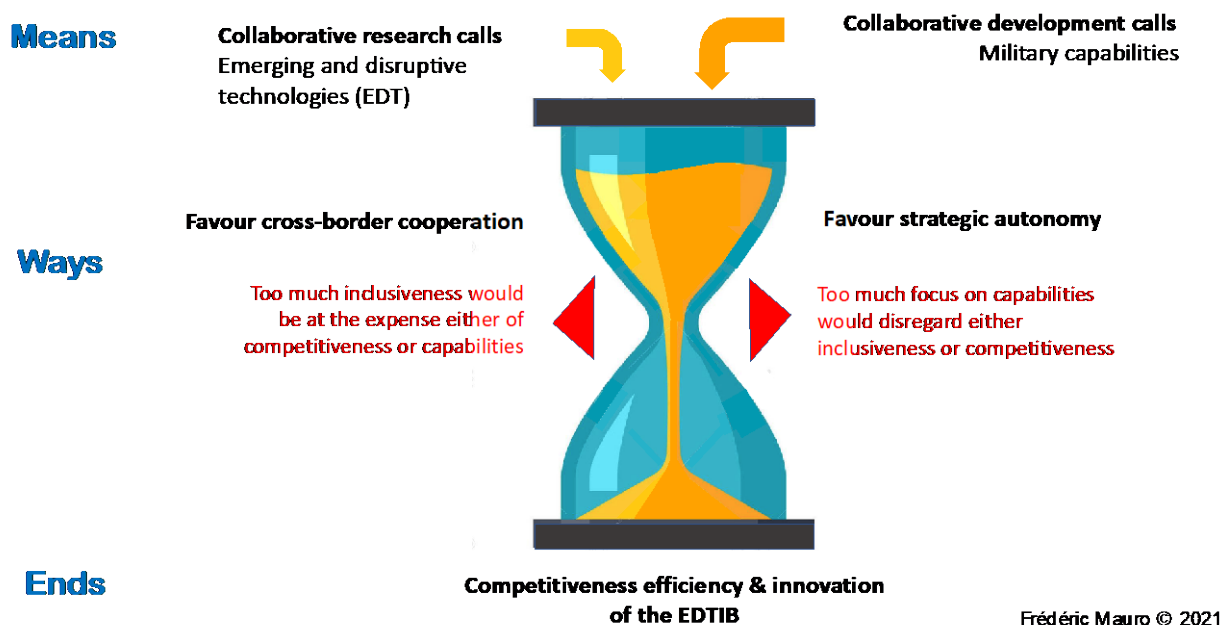
Insofar as the Fund's regulation is closed and will not be reopened for review for a potential new phase (2027-2034) until 2025, it seems important to distinguish between recommendations that could be implemented immediately and those to be considered at a later stage, should this new phase be undertaken. The former focuses on interpretations to be given to current rules and decisions based on them. The latter aims to address structural limitations already apparent in the make-up of the Fund. They also intend to raise the EU's level of ambition for the EDF.

### 5.1 Recommendations for EDF 1.0

#### 5.1.1 Differentiate between R&T and R&D calls

The figure below evidences the existence of a triangle of incompatibility: moving too far in the direction of cross-border cooperation could lead Europe astray from the necessity to deliver military capabilities at a reasonable cost and within a timeframe compatible with military needs. This would deflect from the goal of **'strategic autonomy'**, which would be a capital loss for **'military ownership'**. Conversely, trying to develop military programmes only on the basis of efficiency could lead to forego the pursuit of **balanced cross-border cooperation**, at the detriment of **'political ownership'**.

**Figure 32: The EDF Hourglass – the narrow way to balance ends, ways and means**



A possibility to avoid both pitfalls, at least to some extent, would be to treat in a differentiated manner collaborative research (R&T) and collaborative development (R&D). In practice, this would mean managing 'collaborative research' calls and 'collaborative development' calls differently.

#### **R&T calls**

**With regards to R&T calls, priority should be given to the proposals issued by the consortia themselves, and cross border cooperation should be rewarded on its own merit.** As already commented, cooperation is more natural among researchers and RTOs than it is between industrialists.

The Commission should exploit this difference by increasing the weighting of points awarded to the cross-border element of R&T projects. In this field, it should be feasible to conduct some sort of ‘watering can’ industrial policy that may fertilise even patches of earth that initially looked infertile for defence. In this context, there might be an important role to play for the EDA, which knows the world of defence R&T very well. Coming from the demand side, the EDA might strengthen its position as the hub, if not the head, of a network of European Defence RTOs, orienting, preventing duplication and organising research on disruptive technologies.

Communication on the existence of the EDF will be of the utmost importance, as its existence is not yet well-known, particularly by SMEs. This is essential to ensure that the Commission taps into all research capacity available with the brains and the curiosity to make a contribution to European defence. Coaching procedures should also be considered by Member States for their own SMEs, where it is not already the case. This implies active communication campaigns that could be led by the Commission.

### ***R&D calls***

**With regards to R&D calls, priority should be given to the proposals most strongly supported by Member States** as, in the end, they will be the ones that fund the projects. The best way to ascertain their interest is to ensure that they are at the source of the tender – and not only present to sign a project to please a national company at the last moment. This supposes some **‘fine tuning’ in the elaboration of the work programme** to avoid too brutal a competition between divergent governments, industries and other interests or conversely complicit agreements behind closed doors between clans.

In the realm of development, major projects could be **naturally implemented through OCCAr**, whose *raison d'être* it is. In any event, for major projects, designating ‘project managers’, as foreseen by Article 28 a), will be unavoidable in order to facilitate a dialogue between military end users, armament engineers and manufacturers.

## **5.1.2 Ensure coherence between R&T and R&D**

### ***The creation of European industrial ecosystems (defence value chains)***

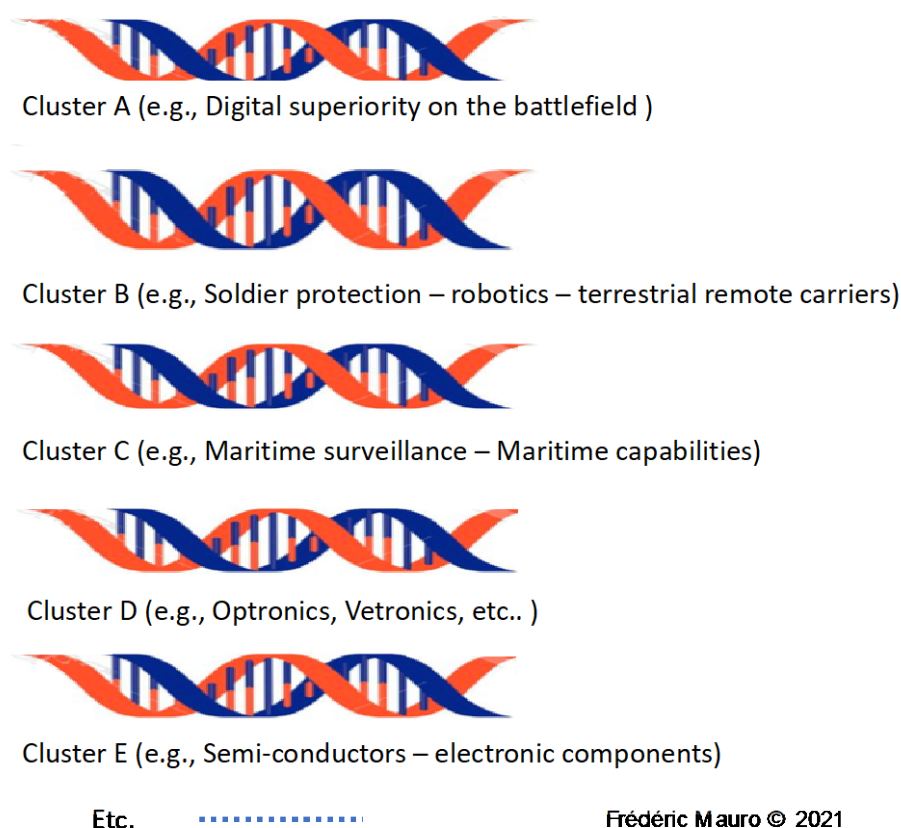
As commented earlier, the linearity between R&T and R&D is not perfect. However, companies cannot respond to two calls at the same time for the same project. This would be too heavy in terms of human resources, especially if new calls are to be launched every year. It is therefore of prime importance that **as many linkages as possible appear in the EDF work programme between R&T and R&D work streams**.

Since money is scarce, the **Commission should concentrate its work programme on a limited number of ‘industrial clusters’** that are the most important for strategic autonomy. The aim here would be to create **value chains** focussed on the development of some of the ‘technological building blocks’ (TBB) listed by the EDA, from the basic components to their integration into a system. This could be for example in the optronics sector, the radar sector, materials, electronic components, etc. This approach would be coherent with the EDA’s work on the Key Strategic Activities (KSA).

These **value chains** could be fostered by combining R&T and R&D activities in the same calls. These combined calls could bring into coherence all actions and sub-actions which serve a common purpose, whilst differentiating clearly the responsibilities of the various actors. They could focus on areas feeding into the development of more ambitious programmes, such as the ‘remote carriers’ for the ‘Future Combat Air System’ (FCAS), their equivalent for the ‘Main Ground Combat System’ (MGCS), or other programmes of the same kind.

Another way to put in harmony ambitions and means would be to drastically reduce the number of calls per year, and to focus on the six ‘focus areas’ evidenced by CARD.

**Figure 33: The setting up of defence industrial value chains linking R&T and R&D**



### ***Enable a pluriannual strategic planning***

**The MFF has one big advantage over annual programming laws: the certainty of the availability of money.** It is as if the national military staffs had the certainty that their military programming laws would always be respected. But **this advantage is nullified with an annual programming.**

For research entities as well as companies, it is impossible to commit to flagship programmes without being sure to benefit from multiannual funding over a very minimum of two or three years, and ideally much longer. In addition, yearly calls are much too heavy both for bidding consortia and the Commission, at the expense of energy put into substantive work.

For the purpose of developing technological bricks of ‘flagship programmes’, as well as ensuring coherence between R&T and R&D, **pluriannual ‘strategic planning’** of the EDF is essential, as is done for Horizon Europe. The Commission is reportedly seeking ways of making this possible within the confines of the Financial Regulation, which allows for the use of so-called ‘commitment appropriations’ and is used in certain framework contracts. This was used, e.g., in PADR, where the OCEAN2020 project was funded over the three years without reopening competition.

In this model, a competition would take place the first year and, once a consortium has been chosen, the award would be allocated for a defined period of time and appropriated every year. Another option – although less preferable as it would not remove the pressure of annual calls – may be for the Commission to propose to the programme committee successive annual work programmes simultaneously. This would increase the visibility and transparency of the EDF and facilitate its political acceptance by Member States. In a way, this would amount to a kind of **‘military programming law’**, with a multiannual perspective, but annual authorisations.



### 5.1.3 Build up the expertise of the Commission

Navigating between conflicting interests and priorities, whilst not losing sight of the aim (enhancing Europe's defence competitiveness) will not be easy for the Commission. The Commission will have to be **close enough to the Member States to listen to their demands**, but **far enough from them to draw up a line in accordance with** what it considers to be the **general European interest**. The Commission should focus on projects or subjects that are neglected at the national level and where cooperation could make a difference.

In this regard, it will be decisive for the Commission to maintain a consensus among Member States. This will be primarily the role of the Commissioner in charge of DG DEFIS, who should hold a regular dialogue with Member States ministers to explain the options taken by the Commission outside of the elaboration of the work programme and the choice of projects.

To accomplish these tasks, DG DEFIS will have to increase its own expertise on defence matters. In order to elaborate the work programme, organise the evaluation of projects and monitor their implementation, DG DEFIS requires a good understanding of defence research and the defence industry. As of March 2021, the number of personnel in charge of defence inside the Commission was around 70. This number is expected to double in the next three years, which is needed and seems fairly reasonable.

### 5.1.4 Improve European defence planning and its coherence with national defence planning

First, the development of a **Strategic Compass in early spring 2022 must translate into something concrete** <sup>(67)</sup>. This is essential if the Union does not want the Strategic Compass to become an additional piece of paper, further denting its 'credibility gap'.

If Member States agree on a realistic EU level of military ambition, compatible with NATO's, it will then be possible to issue a **'political guidance'** i.e., a classified document drawn up by the military (EUMS/EUMC), validated at political level and specified again for the military, which would underpin the definition of a new HLGP associated with clear capabilities objectives. This should yield a new list of **strategic EU capability shortfalls (HICGs)** in mid-2023.

Secondly, regardless of the new perspectives that may be opened by the Strategic compass <sup>(68)</sup>, **it is not too early to start thinking of how to marry what is done at the EU level with the various national capability processes**. To achieve this, it is important to distinguish more clearly the two kinds of tools at the disposal of the EU: PESCO projects and the EDF (see figure below).

With regards to **PESCO**, the progress catalogue linked to the HLGP should serve as a 'defence planning' process, which should play a major role in orienting 'top-down' the projects to be implemented. Furthermore, the **HICG** should go a step further in informing Member States precisely of what assets they have to acquire (in kind and numbers) collectively and under which schedule. This could potentially be done by geographic clusters, if this idea was to be retained by the Strategic Compass <sup>(69)</sup>. Accordingly, the

<sup>67</sup> The first seminar of 'Strategic Dialogue' phase was held by the EU-ISS on 19 February 2021 – ['Finding direction with a Strategic Compass – reflecting on the future of EU security and defence'](#). We will retain of this event that 'a bold Strategic Compass may not please all the Member States, but inclusivity must be balanced with ambition'.

<sup>68</sup> For a brilliant and humorous plea for more coordination: Sven Biscop: ['EU and NATO Strategy: A Compass, a Concept, and a Concordat'](#) \* Egmont Security Policy Brief, March 2021.

<sup>69</sup> Alexander Mattelaer ['Rediscovering Geography in NATO defence planning'](#) Egmont 30 August 2018 Defence studies, Volume 18, 2018 Tandonline

CDP – which is not cyclical – should be put to the service of the HICGs – which is a needs-based planning process – reversing the current situation.

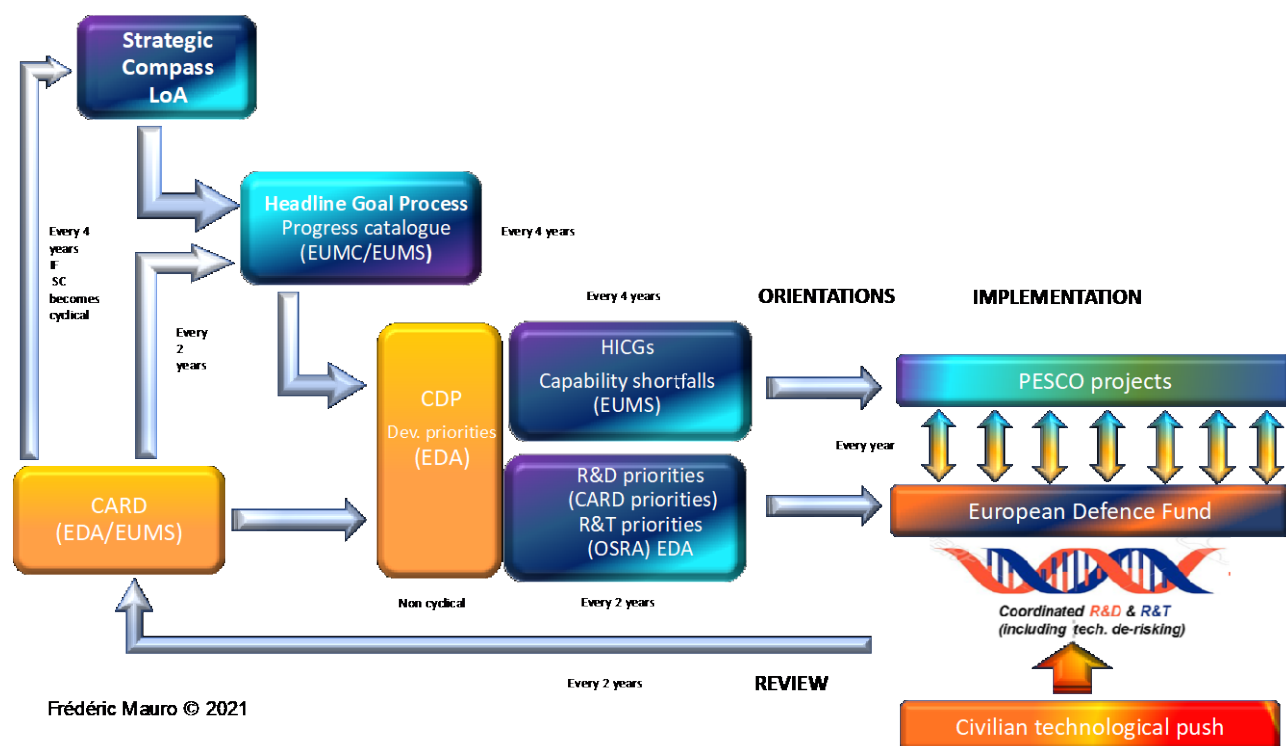
**With regards to the EDF**, the CARD secretariat (EDA/EUMS) should also continue to improve **the CARD detailed ‘priorities’ for the ‘development window’** and the **overarching research agenda (OSRA) which would feed the ‘research window’ of the EDF**<sup>70</sup>.

Finally, **foresight analysis** should be done by the Commission itself through the **Joint Research Centre (JRC)** which already exists with an impressive task force, rather than be externalised.

Obviously, proper EU defence planning, and in particular managing CARD and the HICG, would require **adequate staffing of the EUMS and the EDA**. Those organisations cannot be asked to do with 10 or 20 personnel what NATO’s Alliance Command for Transformation (ACT) International Staff (IS) are doing with 140 and as many in NATO HQ delegations and in the Member States. Logically, if Member States have been able to provide 1 200 additional officers to NATO since 2016, they should be capable to provide the EUMS with 90... This is a small price to pay for EU Member States to autonomously and rationally assess what they really need and not simply ‘copy and paste’ the NDPP. This requires method and more personnel.

**In the long run**, one of the most important action that should be taken to improve the EU DPP would be to **rationalise it and better organise the relations between the EUMC/EUMS and the EDA**. Because of the power issues behind such a reorganisation, breaking away from the status quo will be a daunting enterprise, although it is an indispensable one.

**Figure 34: Proposed reform of EU Defence planning processes**



<sup>70</sup> 'CARD implementation process has been discussed at a highlevel seminar' 11 March 2021

### 5.1.5 Maximise EDF synergies with other EU programmes

As indicated earlier (section 3.3.4), in February 2021, the Commission presented an **'Action plan on synergies between civil, defence and space industries'** <sup>(71)</sup>. Among the eleven actions composing this plan, it seems important to underscore the most significant ones:

- Before the end of 2021 and with a view to the 2022 work programme, the Commission aims to **'[improve] coordination of EU programmes and instruments'** namely: Horizon Europe; Digital Europe; Connecting Europe Facility; the Internal Security Fund; the Space programme and the EDF.
- The Commission will initiate the creation of a new **'Observatory for Critical Technologies'**, which will be tasked to develop **technology roadmaps** to 'boost innovation on critical technologies for the defence, space and related civil sectors and stimulate cross-border cooperation using all relevant EU instruments in a synergetic way.' The work of the EDA on critical technologies 'will be taken into account where appropriate, including through the Overarching Strategic Research Agenda (OSRA) and related Technology Building Blocks (TBB).'
- Together with the European Innovation Council and other stakeholders, in the first half of 2022 the Commission will launch an **'innovation incubator'** to support new technologies and shape dual-use innovation. The Commission will also **support cross-border defence innovation networks** <sup>(72)</sup> that will 'test the relevance of technologies from the civil sector in the defence domain and support responsible innovation in defence value chains'.
- From June 2021 onwards, together with the Member States, the Commission will set up a **Cybersecurity Competence Centre**. The Commission 'will seek to strengthen synergies, spin-ins and spin-offs between the work of the Centre, the EDF and the EU Space programme on cybersecurity and cyber defence with a view to reduce vulnerabilities and create efficiencies.'
- To promote synergies and cross-fertilisation, **the Commission is launching three flagship projects** which build on initiatives to be funded by EU instruments: EU Drone Technologies; the EU space-based Global Secure Communications System; and the EU Strategy for Space Traffic Management.

It is too soon to tell whether this action plan will be a game changer, but its very existence and the direction to which it is heading are extremely positive elements for the success of the EDF. The plan can help **ensure that the EDF resources remains focussed on defence research only – which is especially important for first programmes that will set the tone** – whilst its results are exploited as 'spin-offs' in civilian technologies and products – and conversely the results of EU-funded civilian programmes feed into EDF-funded projects.

**Segregation between civilian and defence industry is counterproductive.** Duality must be at the heart of the integration project, as the United States has been doing since the Obama administration ("Manufacturing USA", Third Offset Strategy, etc.) or even China with the 'civil-military fusion' launched by President Xi Jinping. Identifying areas for cross-fertilisation should be one of the main tasks of the new **'Observatory for Critical Technologies'**, working hand in hand with the EDA. Obviously, important synergies exist in fundamental science and technologies with very low TRLs, such as quantum technology, radars, artificial intelligence, electronic components, materials, optronic etc. But more synergies can also be found in technologies at higher TRLs.

<sup>71</sup> [Communication COM \(2021\) 70 final](#)

<sup>72</sup> Such as the 'European Network of Defence-related Regions' (ENDR), the European Defence Research and Innovation Network (EDRIN), the Enterprise Europe Network (EEN) and industrial clusters such as those on the European Clusters Collaboration Platform.

### 5.1.6 Avoid bureaucracy, increase transparency, improve classification

Due to the mostly political nature of the discussion around the Fund regulation, little attention was paid in the process to benchmarking and the introduction of best practices that could have been inspired from US DARPA or even from Member States agencies, some of which have been working efficiently for a long time or have recently created dedicated structures like the French 'Agence de l'innovation de défense'. Nevertheless, complexity in the procedures foreseen (see sections 4.2.4 and 4.2.5) could certainly be reduced through flexible implementation practices.

One area in which past EDIDP practices must be improved is in the Commission's communication of its selection decisions to candidates, which must be thoroughly grounded and explained. This is essential for the legitimacy of the Fund, but also as a learning tool for those candidates, some of whom may have excellent projects but would have stumbled on administrative hurdles.

Another area is information security. Information security was not an issue in the PADR because it was an EU classification, and the consortia did not pay much attention. It became an issue in the EDIDP because it was the Member States that classified it and this caused problems for the Commission to release funds without having all the information. Information that the programme managers could not give them, since the information was classified. This situation seems to have been resolved by the fact that the States hardly ever give classified information to the Commission. Nevertheless, this situation does not seem to be optimal and there is undoubtedly room for improvement.

### 5.1.7 Establish an effective and useful Parliamentary scrutiny of the EDF

The question of the oversight of the EDF both by the European Parliament and national Parliaments has been extensively covered in a study written at the request of the Subcommittee on Security and Defence of the European Parliament <sup>(73)</sup>.

However, it is important to highlight the following points. Based on Articles 173 (3), 182(4), 183 and 188 (2) TFEU, the role of the Parliament – as well as other Union bodies such as the Court of Justice and the Court of Auditors – falls within the remit of the **Community method**.

Beyond the general principles, Parliament's scrutiny is exercised within the framework of the rules laid down by the EDF regulation itself. The regulation in its provisional version <sup>(74)</sup> mentions the European Parliament three times:

**Recital (34)** - 'The Commission should endeavour to maintain a dialogue with Member States and industry to ensure the success of the Fund. **As a co-legislator and key stakeholder, the European Parliament should also be engaged in this regard.**'

**Recital (40a)** - 'The Commission should regularly monitor the implementation of the Fund and annually report on the progress made, including how lessons identified and lessons learned from the EDIDP and the PADR are being taken into account in the implementation of the Fund. To this end, the Commission should put in place necessary monitoring arrangements. **This report should be presented to the European Parliament** and to the Council and should not contain sensitive information.'

**Article 31.** [Monitoring & Reporting] '3. **The Commission shall** regularly monitor the implementation of the Fund and **annually report, to the European Parliament** and the Council, on the progress made, including how lessons identified and lessons learned from the EDIDP and PADR are being taken into account in the implementation of the Fund. To this end, **the Commission shall put in place necessary monitoring arrangements.**'

<sup>73</sup> 'The Scrutiny of the European Defence Fund by the European Parliament and national parliaments' – Daniel Fiott – 1 April 2019

<sup>74</sup> [14285/20 – C9 xxxxx/2020 - 2018/0254 \(COD\)](#)

Thus, the European Parliament has, by virtue of the *lex generalis* (the Treaty), as well as of the *lex specialis* (EDF regulation), and in addition to its role as co-legislator, **the right and the duty to scrutinise the Fund implementation and its monitoring by the Commission** through, *inter alia*, the annual report that the Commission is bound to provide to the Parliament.

The Parliament should be guided by two principles in exercising this scrutiny:

- a. First, the Parliament should ensure that the EDF leads to the creation of true 'European added value' by actually stimulating Member States to invest more in defence R&D and acquiring equipment developed and manufactured in the EU. There is indeed always the **risk that Member States will use EDF funding to substitute for their own R&D funding and/or instrumentalise the EDF to finance their companies** and then not buy the final product developed or buy it elsewhere.
- b. Second, as representative of European citizens, the **Parliament has a particular role in fostering European ownership of the EDF**, watching that differences of perspectives among Member States do not come to undermine the results of the Fund. For this, it is important to ensure that choices made by the Commission – and the Member States – remain balanced, taking into account the coherence of work programmes with the final objectives, confronting the 'pros' and 'cons', and assessing the results in view of the political aims pursued via the creation of the Fund.

In order to properly exercise its oversight over the EDF in all its magnitude, the European Parliament should give serious consideration to the possibility of **upgrading the Subcommittee on Security and Defence (SEDE) to the status of a full committee**. Ideally, this would be done at midway of the current parliamentary term (2022), as the EDF becomes operational.

In addition, the Parliament could revive a request it made in 2016 that a '**stakeholder conference on the subjects of development of a European armaments and capability policy and harmonisation of the respective national policies on the basis of an EU defence review**' be launched immediately <sup>(75)</sup>. The implementation of this request, which fell on deaf ears at the time, could frame an annual review of the Fund.

## 5.2 Recommendations for (a potential) EDF 2.0

### 5.2.1 Increase the coverage of indirect costs

It remains to be seen whether the convoluted formula found in the EDF regulation on the coverage of indirect costs will lead to solutions considered as acceptable by large defence players <sup>(76)</sup>. According to most of the industrialists interviewed for this study, those indirect costs are in the order of 50 to 75% - to be compared with the standard coverage rate of 25% of such costs by EU funds. With good reasons, the question been discussed many times between the Commission, large industries and professional association such as the Aerospace and Defence Industries Association of Europe. It must remain on the agenda as leaving it unaddressed may jeopardize the Fund's attractiveness to large players, and therefore its chance of success.

<sup>75</sup> [European Parliament resolution of 22 November 2016 on the European Defence Union \(2016/2052\(INI\)\)](#) point 47

<sup>76</sup> As a reminder, Article 16 (2) of the regulation provides that indirect eligible costs may be calculated on the basis of 'actual indirect costs provided that these cost accounting practices are accepted by national authorities for comparable activities in the defence domain'.



## 5.2.2 Facilitate joint procurement and undertakings

The EDF on its own is not sufficient to strengthen the EDITB. For this to happen, dedicated efforts must be made to promote **joint procurement initiatives** that will build on its results. Three types of joint procurement can be envisaged.

The first is **joint procurement directly conducted by Member States**. Experiences have been made since the end of World War II, producing as many good apples as bitter lemons, because of the poison pill of 'juste retour'. In practice, **OCCAr** has proven to be the only undertaking able to mitigate this poison by applying a 'global balance' principle <sup>(77)</sup>. Since 2001, OCCAr has contracted and monitored more than EUR 70 billion of multilateral programmes, some of them with great success, in all fields of the defence industry. All of these programmes were launched upon an agreement on the operational needs and the financial commitments. The best (and biggest) example to date of joint procurement is the A400M, which alone cost more than EUR 21 billion to the seven participating States. Outside OCCAr, another good example of such a 'hands off, eyes on' programme is the combat drone demonstrator 'Neuron', led by Dassault in partnership with five other European manufacturers. The key to its success is that the choice of the subcontractors was left to the prime contractor <sup>(78)</sup>.

Unfortunately, for the most structuring military programmes, Member States prefer private arrangements behind closed doors, within a restrained circle of 'trusted' partners, rather than looking for new cooperation opportunities. The reasons for this are both military (to retain control over operational specifications) and industrial (to preserve/or acquire certain industrial capabilities). However, even this kind of restricted joint procurement is not necessarily a recipe for success. The difficulties encountered in the FCAS, MGCS or Eurodrone programmes are an illustration of the damage caused by States being tougher negotiators than 'their' own defence manufacturers.

**Yet, what is important is the defragmentation of the demand, more than the defragmentation of the supply side.** The sheer budgetary interest of the Member States, as well as that of the taxpayer, would require that, at the very beginning of a procurement cycle, governments make the firm commitment to purchase and fund the same weapons system produced by a manufacturer selected after a fair competition on the basis of agreed operational specifications, themselves derived from a sound defence planning process. Manufacturers should then be left to organise themselves to submit their best offers, rather than States sponsoring 'national champions'. Assuming that Member States are capable to agree on requirements, the result might be an industrial concentration, as the one that happened after the so-called '**last supper**' that triggered the defragmentation of the American aerospace & defence industry at the beginning of the 1990s <sup>(79)</sup>. However, there is little probability that this will happen in Europe, due to the Member States' inability to think themselves as Europeans and their will to privilege their manufacturers.

<sup>77</sup> The principle of 'global balance' provides for the distribution of work share in compensation for orders i.e., cost share, ['juste retour'] not on a programme-by-programme basis, but across all programmes.

<sup>78</sup> Commission des Affaires étrangères, de la défense et des forces armées 10 mars 2021, [audition de M. Eric Trappier, Président Directeur Général de Dassault Aviations](#). 'Quite quickly and with six countries [France, Spain, Switzerland, Sweden, Italy, Greece], we flew a drone the size of a Mirage 2000, ultra-flexible, with better performance than the initial specifications while remaining within the budget of EUR 450 million, half of which was paid by France. And the difference with the SCAF was that Dassault Aviation was able to choose its subcontractors... This cooperation met several conditions: a single prime contractor, a simple and clear organisation, a single contact [the French DGA], and contributions from the partners based on their skills and not on those they could have acquired at the expense of the programme and therefore of the European taxpayer.'

<sup>79</sup> The coinage refers to a 1993 Pentagon dinner for the chiefs of the nation's biggest defense contractors, hosted by then-Secretary of Defense Les Aspin and his deputy, William J. Perry (who later succeeded Aspin in the top job). Along with the meal, Aspin and Perry served a blunt notice-the level of defense spending, which was already on a five-year slide, was going to fall much farther, and fast. Most of the guests were savvy to the situation; defense buyouts, mergers, and sell-offs had been proceeding apace since 1986. However, Aspin and Perry urged their dinner guests to take consolidation much further and much faster. Among many references see: 'The Distillation of the Defense Industry' Air Force magazine 1 July 1998.



The second type of **joint procurement** would see the **Union in the role of a facilitator**. One of the main problems Member States face with joint procurement is that national budget plans do not necessarily coincide, or changes in Government in one country translate into changes in its commitments towards partners. Thus, for a while, PESCO held the promise that Member States' defence procurement projects could be put on more solid grounds, but these hopes were disappointed, as described earlier. Similarly, the idea that the EDA should conduct 'major joint European equipment programmes' never really took root, despite the text of the Treaty.

As a result, the idea of building bridges across disharmonised national defence budgets through a '**financial toolbox**' was taken up in the Defence Action Plan and restated in the explanatory memorandum to the Fund regulation. Recital 17 provides that: 'Different types of financial arrangements should be at the disposal of Member States for the joint development and acquisition of defence capabilities. The Commission could provide different types of arrangements that Member States could use on a voluntary basis to address challenges for collaborative development and procurement from a financing perspective. The use of such financial arrangements could further foster the launch of collaborative and cross- border defence projects and increase the efficiency of defence spending, including for projects supported by the Fund.' However, as mentioned earlier (see section 3.2.3), no details of implementation have been fleshed out yet, and the project now seems secondary compared to the elaboration of the EDF work programme. The issue is that, as the CARD report underlines, national defence acquisition plans are generally built on a mid-term perspective. In this context, the EDA's Cooperative Financial Mechanism (CFM), which provides for loan facilities to Member States in the framework of cooperative projects, appears as a very promising tool... once it is ratified by all participating Member States.

A third solution is for **the Union to envisage its own capability plan for dual uses assets** <sup>(80)</sup>. The first sector to serve as an experiment could be the maritime one. The Union has already agreed that Member States should share the data they collect on sea spaces, such as the Mediterranean Sea. Doing so would be much easier if the bodies involved in border protection were using the same sensors, i.e., ships, e.g., a 'European corvette', as envisaged in the eponym PESCO project. The EDA could serve as a 'central purchasing agency' as the NATO Support and Procurement Agency (NSPA) has done for the shared fleet of multi-role tanks and refuelling aircraft. The second sector that could benefit from a capability plan from the Union could be border control, especially using unarmed drones, but also maritime patrol aircrafts. A third obvious sector of cooperation is space, where a plan for the acquisition of capabilities by the European Union could include, for example, surveillance satellites. Some of these capabilities have already been acquired in the civilian and dual-use sectors (Galileo, Egnos, Copernicus) and constitute a major success, insufficiently credited to the Union.

If the Union is not able or willing to implement on its own a solid 'capability plan', it may want to consider the option of initiating one or several **Joint Technological Undertakings** (JTUs), as it has done with SESAR JU <sup>(81)</sup> or ECSEL JU <sup>(82)</sup> on the legal basis of Article 187 TFEU. This would be helpful in particular for rank 3, 4 and 5 companies, in particular SMEs and ETIs, which are used to working with national industrial prime contractors within a national logic and may be excluded of EDF-related projects as their traditional national partners reach out to other providers across borders. For these companies, it would be helpful to have access to fora where there could simultaneously be in contact with major **European integrators** and **be informed and oriented by public stakeholders** who would organise the 'master plans' for one or more clusters. JTUs for instance in the domain of space surveillance, could possibly **bring together all stakeholders of the defence community**: the EU, the Member States, and industry.

<sup>80</sup> [The future of EU Defence Research](#) Study for the European Parliament – Frédéric Mauro and Klaus Thoma – March 2016 p.61

<sup>81</sup> Single European Sky ATM [Air Traffic Management] Research Joint Undertaking

<sup>82</sup> Electronic Components and Systems for European Leadership Joint Undertaking

### 5.2.3 Increase the amount of the Fund or/and... the efficiency of expenditure

The growth curve of EU funding for defence research has been impressive. However, the reduction between the Commission's initial proposal (EUR 13 billion) and the final amount allocated (EUR 7.9 billion) shows that Member States – or at least a majority of them – rank defence at a lower level than the European Commission and the European Parliament. With **EUR 1.1 billion per year**, from the EU budget plus 7 billions coming from the Member States in a disorderly manner, **the EU as a whole will barely match the level of Russia** (estimated at around EUR 8 billion) – which has a highly focused and prioritised defence research agenda – far behind China (estimated EUR 20 billion budget) and very, very far behind the United States (EUR 96 billion), with which European industrialists are nonetheless confronted, due to the requirement for interoperability and standardisation of military equipment within NATO. Nevertheless, a lot can be done with little money. Israel does not benefit from such a budget for its homeland defence R&D, nor do Turkey and Iran, and yet all these countries have developed a sound defence drone industry, just to name one area. As is well-known, the problem is not that the Europeans do not spend enough money, but that they waste it.

## 6 Conclusion

The EDF is so far one of the most, if not the most promising initiative in terms of generating the industrial basis for Europe to achieve strategic autonomy in defence in the future.

Yet, making it a success will require EU Member States and the Commission to thread a fine line between **emulation and cooperation**, emulation that is needed to generate innovation and excellence, and maximise the efficiency of investments, and cooperation that is necessary to receive the backing of the largest possible number of Member States as well as industrial and research players.

EU stakeholders are very different in sizes, abilities, as well as interests and prejudices; some have a defence industry, others not; some are neutral or have a traditional reluctance to the use of armed force, others are convinced that it is in the European interest to fight threats outside the common fatherland... Will they find the will to cooperate for their own defence in the 21<sup>st</sup> century, or will national egoisms, ancestral resentments, perverse jealousies prevent them from pulling their strengths together?

The Fund will face yet other types of daunting challenges. In the space of seven years, new technologies will emerge that are probably unknown today. Member States and the Commission will have to marry the selection of bold R&T and R&D choices to underpin innovation with Union values that cannot be compromised on issues such as facial recognition or environmental protection.

Commissioner Thierry Breton likes to set the meta-objective of the Fund as an *affectio societatis* emerging among Europeans, based on a sense of common belonging and intent. Will Member States be able to form a 'defence community' – comparable in its heterogeneity to the 'community of the Ring' in Tolkien's famous book 'Lord of the Ring', but united by the same quest?

It is precisely the underlying mission of the EDF to help do so by bringing actors across industry, research, and governments from all EU Member States together, so as to gradually create a sense of **European defence ownership**, able, like the 'One ring', to 'rule them all, find them all and bring them all'.

## 7 Annexes

### 7.1 Abbreviations

ACT	Allied Command Transformation
CARD	Coordinated Annual Review for Defence
CDM	Capability Development Mechanism
CDP	Capability Development Plan
CJEF	Combined Joint Expeditionary Force
CSDP	Common Security and Defence Policy
DTIB	Defence and Technological Industrial Base
EDA	European Defence Agency
EDF	European Defence Fund
EDIP	European Defence Industrial Development Programme
EDTIB	European Defence and Technological Industrial Base
EEAS	European External Affairs Service
EU	European Union
EU DPP	European Union Defence Planning Process
EUGS	European Union Global Strategy
EUR	Euro
HLGP	Headline Goal Process
HR/VP	High Representative of the European Union for Foreign Affairs and Security Policy and Vice-President of the European Commission
IPSD	Implementation Plan on Security and Defence (relates to EUGS)
IAR	Implementing Act Regulation
IS	International Staff (relates to NATO)
ISE	Intermediate-Sized Enterprises
ISR	Intelligence, Surveillance and Reconnaissance
KSA	Key Strategic Activities
KET	Key Enabling Technologies
LoA	Level of Ambition
LoI	Letter of Intent
MFF	Multiannual Financial Framework
MS	Member States
NATO	North Atlantic Treaty Organisation

NDPP	NATO Defence Planning Process
OCCAR	Organisation conjointe de coopération en matière d'armement
PADR	Preparatory Action on Defence Research
PESCO	Permanent Structured Cooperation
PC	Programme Committee
RTO	Research and Technology Organisation
R&D	Research and Development
R&T	Research and Technology
SME	Small and Medium Enterprise
TEU	Treaty on European Union
TFEU	Treaty on the Functioning of the European Union
UK	United Kingdom
US	United States
WP	Working Programme

## 7.2 Interviews

The interviews were conducted in person or remotely. Members of the Cabinet of the President of the Council, as well as service members of the European Council declined invitations to be interviewed.

The services of the European Council provided the so-called 'Second Report on interactions, linkages and coherence among EU defence initiatives' only on 09 April 2021, on the eve of the expected delivery of this report, whereas it had been requested in January 2021. The document describes in a generic way the links between the different European initiatives (PESCO, CDP, CARD, EDF). A quick overview of its content provides no ground to revise the assessment made in this report.

Some of people interviewed have declined to appear on this list.

Françoise Grossetête	France – Former MEP (1994-2019) – Rapporteur for the EDIDP Regulation	25 March 2021
Timo Pesonnen	European Commission – DG DEFIS – Director General	12 March 2021
Pierre Delsaux	European commission – former Deputy Director General DG GROW	15 December 2020
François Arbault Emmanuel Germond Stella Oldenburger Guillaume Galtier	DG DEFIS – Director direction A Policy Officers	1 March 2021
Alain Alexis	DG DEFIS – Head of Unit European Defence Fund – Capability Development	16 December 2020
Guillaume de la Brosse	DG DEFIS – Policy Assistant to the Director-General Timo Pesonen	21 December 2020
Anne Fort	DG DEFIS – Head of Unit, Defence Industry and Market Policy at European Commission	11 January 2021
Laurent Tourbach	DG DEFIS – Defence Industry and Space Unit A3 - European Defence Fund – Capability development	12 January 2021
Michael Comnick	DG DEFIS – Unit A-1 Legal and Policy Officer	18 February 2021
Michalis Ketselidis	European commission - Secretariat-General Senior Expert, Secretariat General of the European Commission (Synergies Task Force)	17 December 2020
General Claudio Graziano Brig. Gen. Enrico Barduani Major Enrico della Gatta	EUMC – European Union Military Committee – Chairman Director of Cabinet  Strategic Communication Advisor	15 February 2021
Arnout Molenaar	EEAS – Head of Division of security and defence policy	27 January 2021



Brig. Gen. Georgios Bikakis	EUMS – Director Concepts and capabilities	8 March 2021
Colonel Luca Guaragno	EUMS – Force Capability Branch Chief - Concepts & Capability Directorate	23 December 2020
Major Massimiliano Amoruso		
Captain Lars Schumann	EUMS – Head of Division Concepts / Head of the PESCO task force	29 January 2021
Jiří Šedivý	European Defence Agency Chief Executive Policy Officer	15 January 2021
Jan-Joël Anderson	Chief Executive's Policy Office	
Emilio Fajardo	European Defence Agency Director of Industry Synergies & Enablers and Head of EDA's task force on EDF	20 January 2021
Dirk Tielburger	Deputy Director of Research, Technology & Innovation/ Head of Unit of EU-funded Defence Research task force	
Franck Desit	Deputy Director of Capability, Armament & Planning	
Pieter Taal	Head of Unit Industry Strategy and EU Policies	
Jan-Joël Anderson	Policy Officer, Chief Executive's Policy Office	
Philippe Léopold	EDA – Head of cooperation planning unit	11 March 2021
Admiral Matteo Bisceglia	OCCAr – Organisation Conjointe de Coopération en matière d'Armement - Executive Director	17 February 2021
Christophe-Alexandre Paillard	Policy advisor	
Colonel (GS) Johann Trummer	Austria – Federal Ministry of Defence – Austrian Military Representation Brussels Chief of Staff and Representative National Armament Director	19 January 2021
Colonel Alois Preineder	Deputy NAD Representative	
Colonel Bert van Opstal	Belgium – Deputy National Armament Director (NAD)	28 January 2021
Colonel Jean-Albert Legros	Assistant Deputy NAD for EU matters	
Lt. Col Baudouin Heunincks	future Deputy NAD	
Lt. Col Dirk Wauman	Assistant Deputy NAD for R&T	
Tuuli Voors	Estonia – Counsellor to NATO and the EU (NADREP) Estonian Delegation in Brussels	22 January 2021

Vice admiral Henri Schrieke	France – French Military Representative to NATO and the European Union, Brussels	15 January 2021
Thierry Carlier	France – (DGA) - International Development Director	9 March 2021
Yves Caleca Ronan Chipon Arnaud Giboin	France – French Military Representation to the EU and NATO – Armament attaché – DGA	18 December 2020
Brigadier General Cyril Carcy	France French Defence attaché Washington	12 January 2021
Colonel Benjamin Souberbielle	Air Attaché – French Embassy	
Brig. Gen. Heinz Krieb	Germany – Permanent Representation of the Federal Republic of Germany to the EU - Senior Political Military Advisor	10 December 2020
Colonel Saalow		
Bernd-Ulrich von Wegerer	Germany – Permanent Representation of the Federal Republic of Germany to the EU - Head Armaments Policy	15 December 2020
Matthias Grutza	Germany – Senior Expert International Industrial Policy and Market, German MoD - Central PoC EDF German Delegate to EDIDP Programme Committee - German Delegate to EDF Programme Committee (currently EDF Expert Group) - German Delegate to Council Working Group / Friends of the Presidency Group EDF	11 February 2021
Colonel Fotios Latrou	Greece – Nadrep and EDA point of contact	1 February 2021
Colonel Mario Toscano	Italy – Attaché and National Armaments Director Representative - Italian Permanent Representation to the European Union	11 January 2021
Jevgēnijs Rjaščenko-Šaraks	Latvia – Counsellor to NATO and the EU Ministry of Defence of the Republic of Latvia	22 January 2021
Aziliz Guérin	Luxembourg – National Delegate for the EDA and the EDF - as such member of Expert Group/EDF Programme Committee	15 March 2021
Commander Dario Pinto Moreira	Portugal – Permanent Representation or Portugal to the EU – Military Counsellor	5 February 2021
General Henrique Castanheira Macedo	Portugal – Chairman of the Board of Directors of idD – National Defence industries platform (2017–2020)	17 February 2021

Commander Carlos Monginho	Portugal – General Directorate of National Defence Resources Division of Armament and Equipment Services - EDF Expert	18 February 2021
Major Marco Pinto	Portugal – General Directorate of National Defence Resources Division of Armament and Equipment Services	19 February 2021
Colonel Francisco Veiga	Portugal – General Directorate of National Defence Resources - Head of the Standardisation and Cataloguing Division - Experts Group on EDF National Delegation for the European Defence Industry	25 February 2021
Colonel Juan Planet	Spain – Ministry of Defence – Spanish Military Representation Brussels	19 January 2021
Camille Grand	NATO – Assistant Secretary General for Defence Investment	14 January 2021
Brigadier General Frédéric Pesme (FRA)	NATO – International Military Staff Deputy Director Policy and Capabilities Division	5 February 2021
Brigadier General Philippe Boisgontier (FR A)	NATO – Allied Command for Transformation ACT - Director of the Staff Element Europe – Defence planning	12 March 2021
Marc Moutron (FR A)	Military Assistant to the Director	
Hervé Guillou	GICAN – Chair of the French naval industries Association	21 December 2020
Jean-Marie Dumon	Deputy Director – Defence and Security Director  AeroSpace and Defence Industries Association of Europe (ASD)	27 January 2021
<u>Industry representatives:</u>		
Pablo González Sánchez-Cantalejo,	INDRA	
André Hollander	Damen	
Frederic Naccache	MBDA Systems	
Andrea Barbagelata	Leonardo	
Desjeux, Isabelle	Safran	
Ranke, Lucas	Rheinmetall	
Nilsson, Anders	SAAB	
<u>ASD</u>		
Burkard Schmitt		

Alessandro Ungaro		
Isabelle Maelcamp		
Antoine Bouvier	AIRBUS – Head of Strategy, Mergers & Acquisitions and Public Affairs	27 January 2021
VADM (ret) Xavier Païtard	Strategy & Public Affairs Defence Advisor	
David Luengo	INDRA – Director for France & Benelux - Head of the Brussels Office	11 December 2020
Nathalie Errard	AIRBUS – Senior Vice President, Head of EU & NATO Affairs	16 December 2020
Patrick Rudloff	Vice President – Head of EU & NATO Affairs for Defence & Space	
Julien Feugier	Vice President – EU Public Affairs	
Jean-Marc Edenwald	KNDS/NEXTER Public Affairs Directorate Head of EU & NATO Affairs	17 December 2020
Charles Dijon	Rheinmetall Group Head of Business Development Europe (VVE)	14 January 2021
Renaud Bellais	MBDA Economist - Institutional relations advisor	11 January 2021
Didier Gondalier de Tugny	MBDA – Head of the Brussels office for EU and NATO affairs	10 February 2021
Charles BAZIN	BERTIN Technologies Strategic Marketing Manager	20 January 2021
Dr. Reinhard Marak	ARGE Sicherheit & Wirtschaft – Austrian Defence & Security Industry (Aerospace – SME) – CEO	26 February 2021
Jean-Xavier Chabane	CEA TECH (Commissariat à l'énergie atomique et aux énergies alternatives) Head of the Transverse Defence Programme Directorate of Technological Research	2 February 2021
Dr Giuseppe Morsillo	Centro Italiano Ricerche Aerospaziali (CIRA) (Italian Aerospace Research Centre) – Chairman	4 February 2021
Dr Dirk Zimper	Deutsches Zentrum für Luft und Raumfahrt (DLR) (German Aerospace Centre) Executive Board Representative Defence and Security Research	3 February 2021
Dr Daniel Hiller	Fraunhofer – Ernst-Mach Institut für Kurzzeitdynamik - Head of Business Unit Security & Resilience – Fraunhofer	9 February 2021

Erik Berglund	Coordinator EU-defence - EDRIN – European Defence Research and Innovation Network - co-chair	
	FOI – Swedish Defence Research Agency	19 January 2021
	Thomas Czirwitzky	Institut Saint Louis (ISL) – Franco-German
	Christian de Villemagne	Institute for Defence Research – co-directors
	Vivienne Gaskell	Head of Communications
Bruno Sainjon	ONERA – Chief Executive Officer of the French Aerospace lab (RTO)	21 December 2020
Dr Frans Kleyheeg	TNO – Research and Technology Organisation of the Netherland - Business Director International EDRIN – European Defence Research and Innovation Network – co-chair	8 February 2021
Dr. Anna-Mari Heikkilä	VTT – Technical Research Centre of Finland Ltd - Senior Scientist, Certified Project Manager IPMA (C) Risk and Reliability Management, Resilient Society	28 January 2021
Ellison Urban	US – DARPA - special assistant to the director	12 March 2021
Florian Guillermet	SESAR Joint Undertaking – Executive Director Chief Economist & Master Planning	9 February 2021
Alain Siebert		
André Loesekrug-Pietri	JEDI – Joint European Disruptive Initiative President & Scientific Director	15 March 2021
Benoît Chaucheprat	C&V consulting – Partners and Founders specialised in EU and NATO defence issues – advising stakeholders (SMEs and ISE) for EDIDP/EDF submissions	18 December 2020
Jean-Marc Vasco		
Jean-Georges Brevot	Project JANUS (EDIDP 2019)	14 January 2021
Bernard Clermont	Project MUGS (EDIP 2019) John Cokerill Defence – Director of the Innovation Department	28 January 2021
Dr Mathieu Le Breton	Project AIRDUST (EDIDP 2020) Geophysicist & Applied scientist – head of the project on behalf of Geolithe Innov	4 February 2021

## 7.3 Main milestones in European defence since 2009

boxes in light blue are directly related to defence research initiatives

boxes in pink are related to the European Defence planning process

<b>Member States initiatives, main NATO initiatives European Council decisions, EEAS and EDA</b>	<b>European Commission and European Parliament</b>
<p><b>1 December 2009</b></p> <p>Entry into force of the Lisbon Treaty</p> <p><b>2 November 2010</b></p> <p>Lancaster House treaties between France and the U.K. towards an integrated defence industrial policy (including nuclear facilities) and creating a 'Combined Joint Expeditionary Force'</p> <p><b>19-20 November 2010</b></p> <p>NATO Lisbon Summit - adoption of a new strategic concept – the third since the end of the cold war</p> <p><b>13 and 14 December 2012</b></p> <p>European Council puts emphasis on security and defence and refers the matter to the next Council in December 2013</p> <p><b>17 December 2012</b></p> <p>Initiative of the 'Joint Expeditionary Force' (JEF) between the U.K. and Nordic countries</p>	<p><b>Mid-2009 EU Defence Package</b></p> <p>06 May Intra-Community Transfer Directive 2009/43/EC and 13 July Defence Procurement Directive 2009/81/EC. Both directives stem from the Communication of the European Commission called 'Strategy for a more competitive European defence industry' adopted on 5 December 2007</p> <p><b>28 June 2013</b></p> <p>Communication from the European Commission 'Towards a more competitive and efficient defence and security sector'. The Commission considers for the first time 'launching a preparatory action for CSDP-related research focusing on those areas where EU defence capabilities are most needed. The words 'strategic autonomy' is used for the first time by the European Commission</p>



### **20 December 2013**

For the first time since the entry into force of the Lisbon Treaty, the European Council held a thematic debate on defence. It identifies priority actions for stronger cooperation. The words 'strategic autonomy' is also used by the Council. The declaration states: 'Defence matters'

### **17 May 2014**

In his election campaign for the presidency of the European Commission, Jean-Claude Juncker calls for the implementation of Permanent Structured Cooperation and asks for more cooperation between the Member States in defence procurement

### **4-5 September 2014**

NATO Wales Summit – Defence investment pledges – adoption of the 'Framework Nation concept'.  
Creation of the UK Joint Expeditionary Forces (UK, Denmark, Finland, Estonia, Latvia, Lithuania, the Netherlands, Sweden and Norway) and another framework nation under Germany's leadership with NL and 17 other countries

### **Autumn 2014**

Pilot project on defence research adopted at the initiative of the European Parliament in the 2015 budget for EUR 1,5 million

### **28 June 2016**

European Union Global Strategy (EUGS) presented by HR/VP Federica Mogherini - 'welcomed' by the European Council

### **Summer 2016**

8-9 July NATO Warsaw Summit – Decision to enhance cooperation with the EU

7 August - Joint Declaration by the President of the European Council, the President of the European Commission and the Secretary of the North Atlantic Treaty Organization on NATO-EU strategic partnership

### **14 November 2016**

Council conclusions on implementing the EUGS  
Member States agreed on a new Level of Ambition in security and defence

### **December 2016**

NATO foreign ministers endorsed a statement to which  
42 common measures to advance NATO-EU  
cooperation were annexed

#### **30 November 2016**

Communication from the European Commission  
'European Defence Action Plan'

#### **Autumn 2016**

A preparatory Action on Defence Research (PADR) is  
adopted in the 2017 budget for EUR 25 million (EUR 90  
million over three years 25/40/25) including its own  
regulation

#### **18 March 2017**

The Council endorses the modalities for a Coordinated  
Annual Review on Defence (CARD) and launch a trial  
run

#### **31 May 2017**

Delegation agreement Commission - EDA entrusting  
the latter with the management of the PADR for 2017-  
2018-2019

First PADR calls launched in June 2017

#### **7 June 2017**

Communication from the European Commission  
'Launching the European Defence Fund'

Proposal for a regulation establishing the European  
Defence Industrial Development Programme (EDIDP)  
aiming at supporting the competitiveness and  
innovative capacity of the EU defence industry –  
proposed budget EUR 500 million on two years 2019-  
2020

#### **7 June 2017**

Reflection paper presented by the Commission on the  
Future of European Defence

#### **November 2017**

Adoption by the Political and Security Committee (PSC)  
of the 'Requirement catalogue' [RC17] prepared by the  
European Union Military Staff  
(1/4 EU CDM = first step of four of EU capability  
defence mechanism)

#### **13 November 2017**

Notification on Permanent Structured Cooperation to the Council and to the HR/VP by 25 Members States

**5 December 2017**

NATO foreign ministers endorsed a statement with a new set of proposal (32) to enhance NATO-EU cooperation

**11 December 2017**

Council Decision establishing permanent structured cooperation (PESCO) and determining the list of participating Member States

**February 2018**

Adoption by the PSC of the 'Force Catalogue' ['FC17'] prepared by the EUMS (2/4 EU CDM)

**6 March 2018**

Council Decision establishing the list of projects to be developed under PESCO

**5 June 2018**

Adoption by the PSC of the 'Progress Catalogue' prepared by the EUMS (3/4 EU CDM) transmitted to EDA to feed the Capability Development Plan process

**13 June 2018**

Proposal from the European Commission for a regulation establishing the European Defence Fund

**18 June 2018**

Council decision establishing a common set of governance rules for PESCO projects

**25 June 2018**

Letter of intent between the defence ministers of seven Member States (BE, DK, EE, FR, DE, NL, PT, ES, UK) concerning the development of the European Intervention Initiative (EI2)

**28 June 2018**

Adoption by the EDA steering board of the Capability Development Plan

**10 July 2018**

In a joint declaration, NATO and the EU agree to focus on swift progress in the areas of military mobility, counterterrorism and strengthening resilience to chemical, biological, radiological and nuclear-related

risks as well as promoting the women, peace and security agenda

### **11-12 July 2018**

At the Brussels Summit, Allied leaders welcome the joint NATO-EU declaration and tangible results achieved since 2016. They recognise that the development of European defence capabilities, while ensuring coherence and complementarity and avoiding unnecessary duplication, is key in joint efforts to make the Euro-Atlantic area safer and contributes to transatlantic burden-sharing

### **18 July 2018**

Regulation (EU) 2018/1092 establishing the European Defence Industrial Development Programme (EDIDP) aiming at supporting the competitiveness and innovation capacity of the Union's defence industry

### **15 October 2018**

Council Recommendation concerning the sequencing of the fulfilment of the more binding commitments undertaken in the framework of PESCO and specifying more precise objectives to be revised in 2021

### **19 November 2018**

Council decision amending and updating the list of projects to be developed under PESCO

### **20 November 2018**

Coordinated Annual Review on Defence (CARD) Trial run report by the EDA

### **December 2018**

Approval of the Overarching Strategic Research Agenda and 139 Technological Building Blocks by EDA directors

### **17 January 2019**

Adoption by the Council of the EUMS High Impact Capability Goals (HICGs) (4/4 EU CDM)

### **22 January 2019**

Aachen Treaty between France and Germany. The two countries commit themselves to 'deepen their cooperation on foreign policy, defence, external and internal security and development, while striving to strengthen Europe's capacity for autonomous action (...) and invest jointly to fill its capability shortfalls,

thereby strengthening the European Union and the  
North Atlantic Alliance’

**19 March 2019**

Launch of the calls for the first tranche of the EDIDP – 9 categories of capabilities for EUR 205 million

**25 March 2019**

Adoption by the EDA’s Steering Board of the  
‘Overarching Strategic Research Agenda’

**27 June 2019**

Adoption by EDA’s Steering Board of the Strategic  
Context cases to ‘guide the practical implementation  
of the 11 Capability Development Priorities’

**20 September 2019**

Deadline to present the tenders for the first tranche of  
the EDIDP

**Autumn 2019**

Launch of the first full CARD cycle

**12 November 2019**

Council Decision amending and updating the 2018  
Decision establishing the list of projects to be  
developed under PESCO

**1 Janvier 2020**

Creation of a new DG – DG DEFIS – within the European  
Commission with competence on Defence, Industry  
and Space

**6 March 2020**

Summit of Zagreb – Launch of the Strategic Compass  
process (formally endorsed by the Council of the EU on  
17 June 2020)

**19 March 2020**

Launch of the calls for the second tranche of the EDIDP

**05 November 2020**

Council Decision establishing the general conditions  
under which third states could exceptionally be invited  
to participate in individual PESCO projects

**15 June 2020**

Publication of the results for the first tranche of the EDIP

Beginning of the talks on a possible working programme with the MS

**17 June 2020**

Decision of the Council of the European Union to launch the 'Strategic Compass' a reflection process understood as a 'comprehensive, 360 degrees analysis of the full range of threats and challenges' – first step – threat analysis (DE presidency) December 2020 (classified)

**20 November 2020**

First full CARD report

**20 November 2020**

The Council of the EU approves the outcomes of the PESCO strategic review

**1 December 2020**

Deadline to present the tenders for the second tranche of the EDIDP

**10 December 2020**

Political agreement between the European Parliament and the EU Member States on the EDF

**2021**

Maturation of the Strategic Compass reflection process – second step – 'strategic dialogue' (PT and SL presidencies)

**Spring 2021**

Publication of the results for the second tranche of the EDIDP

**26 May 2021**

Final adoption of the first EDF work programme

**June 2021**

Publication of the first calls for EDF

**Spring 2022**

Finalisation of the Strategic Compass – last step – priorities and Level of ambition (FR presidency)



## 7.4 Member States defence effort in budget terms

Table 1	Defence expenditure
Table 2	Defence expenditure in % of GDP
Table 3	Investment (equipment and R&D)
Table 4	Equipment (procurement expenditure)
Table 5	Collaborative equipment
Table 6	European collaborative equipment
Table 7	R&D expenditure
Table 8	R&T (subset of R&D)
Table 9	Collaborative R&T
Table 10	European collaborative R&T

**Disclaimer:** the figures below are based on data made available on the EDA website since 2005. However, the series published by the EDA are generally expressed in current prices. In order to support comparison more accurately, they have been reassessed here in constant 2019 prices, based on the same deflators as used by the EDA. At times, minor differences exist between the figures below and EDA figures, given that the classification or lack of data in some countries sometimes distorts calculations. Similarly, the use of deflators on a country-by-country or area-wide basis may produce slightly different results when comparing figures over the last year. The computation of the data as it appears below is under the sole responsibility of the authors.

Review of the Preparatory Action on Defence Research (PADR) and European Defence Industrial Development Programme (EDIDP): lessons for the implementation of the European Defence Fund (EDF)

DEFENCE EXPENDITURE	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	annual variation in % for the last year	annual variation in € millions for the last year
In millions euros	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019		
Belgium	4 066	4 250	4 359	4 797	4 575	4 402	4 384	4 444	4 226	4 169	3 984	4 071	4 051	4 171	4 303	+ 3,2	+ 132
Bulgaria		691	853	899	745	701	600	610	656	600	600	633	661	828	1 928	+ 132,7	+ 1 100
Croatia									686	645	633	588	845	832	895	+ 7,5	+ 62
Czech Rep.	2 244	2 293	2 294	2 407	2 557	2 246	2 002	1 792	1 713	1 590	1 825	1 764	2 003	2 338	2 586	+ 10,6	+ 248
Estonia	200	224	291	331	289	277	308	369	388	412	439	469	494	523	556	+ 6,4	+ 34
France	51 803	51 773	51 225	51 174	44 298	43 712	42 295	42 446	42 261	41 759	41 214	41 690	42 089	43 483	44 361	+ 2,0	+ 1
Germany	37 270	36 176	35 972	35 800	40 813	37 312	37 160	35 265	36 246	37 019	37 744	39 235	41 484	42 851	46 936	+ 9,5	+ 4 1
Greece	6 036	6 457	6 672	6 985	6 808	5 394	5 427	4 720	4 291	4 262	4 283	4 372	4 336	4 639	4 320	- 6,9	- 31
Hungary	1 536	1 253	1 502	1 450	1 207	1 139	1 100	1 117	978	971	1 073	1 216	1 562	1 392	1 832	+ 31,6	+ 4
Italy	32 841	31 727	24 218	25 530	24 805	24 104	23 915	22 360	21 541	19 631	18 549	21 106	21 807	22 076	21 143	- 4,2	- 9
Latvia	199	301	375	418	257	216	231	218	229	237	267	380	443	624	634	+ 1,5	+ 10
Lithuania	297	336	380	409	327	274	277	278	287	343	447	600	746	910	979	+ 7,6	+ 68
Luxembourg	239	242	242	165	165	209	183	181	189	203	236	223	297	306	346	+ 12,8	+ 40
Netherlands	9 370	9 704	9 705	9 576	9 870	9 438	8 972	8 756	8 263	8 297	8 218	8 592	8 797	9 579	10 860	+ 13,4	+ 1 2
Poland	5 651	5 829	6 710	6 739	6 135	7 122	7 212	7 331	7 210	8 060	10 037	8 870	9 089	10 220	10 559	+ 3,3	+ 329
Portugal	3 084	2 995	2 797	2 860	3 132	3 099	2 936	2 568	2 780	2 665	2 506	2 467	2 826	2 671	3 042	+ 13,9	+ 369
Romania		2 137	2 206	2 318	1 818	1 755	1 884	1 775	1 982	2 161	2 445	2 507	3 330	3 755	4 115	+ 9,6	+ 358
Slovakia	821	893	958	1 122	1 093	951	839	858	778	798	935	947	963	1 117	1 666	+ 49,1	+ 547
Slovenia	504	578	586	639	649	649	526	459	409	390	380	424	435	471	512	+ 8,7	+ 41
Spain	12 785	13 708	14 138	14 390	13 785	12 401	11 065	11 753	10 187	10 129	10 514	9 406	10 847	11 364	11 281	- 0,7	- 86
COMMON EDA NATO MS	168 947	171 569	165 482	168 010	163 328	155 399	151 318	147 299	145 300	144 341	146 331	149 558	157 104	164 151	172 853	+ 5,3	+ 8 7
Austria	2 631	2 507	2 969	2 886	2 713	2 707	2 698	2 693	2 609	2 654	2 527	2 853	2 882	2 920	2 920	+ 0,0	+ 0
Cyprus	362	369	341	340	384	402	380	351	311	287	311	299	356	388	433	+ 11,5	+ 45
Finland	2 691	2 718	2 999	2 778	3 036	3 016	2 919	3 101	3 071	2 891	3 347	3 348	3 281	3 370	3 673	+ 9,0	+ 304
Ireland	1 121	1 099	1 133	1 215	1 117	1 014	970	977	956	951	937	938	948	960	1 007	+ 4,9	+ 47
Malta	50	42	41	43	48	49	44	42	43	45	52	56	59	60	75	+ 24,3	+ 15
Sweden	5 399	5 117	5 239	4 541	3 967	4 752	4 764	5 027	5 014	5 019	4 870	4 887	4 779	4 652	4 982	+ 7,1	+ 330
EDA - NON NATO MS	12 255	11 852	12 722	11 803	11 265	11 941	11 775	12 192	12 004	11 848	12 045	12 381	12 306	12 349	13 090	+ 6,0	+ 741
TOTAL EDA 26	181 202	183 421	178 204	179 813	174 593	167 340	163 093	159 491	157 304	156 189	158 376	161 939	169 409	176 501	185 943	+ 5,4	+ 9 443
U.K	53 832	56 368	58 212	47 386	47 115	50 804	49 792	49 223	47 007	51 319	56 408	52 572	52 123	51 360			
TOTAL EDA 27	235 033	239 789	236 416	227 198	221 708	218 145	212 885	208 714	204 311	207 508	214 784	214 511	221 533	227 860			
Source EDA website - restated	not available										evolution 2014/2019 in % for EDA 26					19,1%	
Evolution	EDA 26	+ 1,2	- 2,8	+ 0,9	- 2,9	- 4,2	- 2,5	- 2,2	- 1,4	- 0,7	+ 1,4	+ 2,2	+ 4,6	+ 4,2	+ 5,4		
	UK	+ 4,7	+ 3,3	- 18,6	- 0,6	+ 7,8	- 2,0	- 1,1	- 4,5	+ 9,2	+ 9,9	- 6,8	- 0,9	- 1,5			
	EDA 27	+ 2,0	- 1,4	- 3,9	- 2,4	- 1,6	- 2,4	- 2,0	- 2,1	+ 1,6	+ 3,5	- 0,1	+ 3,3	+ 2,9			

DEFENCE EXPENDITURE ( as % of GDP )	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Belgium	1,1	1,1	1,1	1,2	1,2	1,1	1,1	1,1	1,0	1,0	0,9	0,9	0,9	0,9	0,9
Bulgaria		2,1	2,3	2,1	1,8	1,6	1,3	1,3	1,5	1,3	1,3	1,3	1,2	1,5	3,1
Croatia									1,5	1,4	1,4	1,2	1,7	1,6	1,6
Czech Rep.	1,7	1,6	1,4	1,3	1,5	1,3	1,1	1,0	1,0	1,0	1,0	1,0	1,0	1,1	1,2
Estonia	1,5	1,4	1,5	1,8	1,8	1,7	1,7	1,9	1,9	2,0	2,1	2,1	2,0	2,0	2,0
France	2,4	2,3	2,3	2,3	2,0	2,0	1,9	1,9	1,9	1,8	1,8	1,8	1,8	1,8	1,8
Germany	1,3	1,3	1,2	1,2	1,5	1,3	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,3	1,4
Greece	2,5	2,5	2,5	2,6	2,5	2,1	2,4	2,3	2,2	2,2	2,3	2,4	2,3	2,5	2,4
Hungary	1,4	1,1	1,3	1,2	1,1	1,0	1,0	1,0	0,9	0,9	0,9	1,0	1,2	1,0	1,3
Italy	1,8	1,7	1,3	1,4	1,4	1,3	1,3	1,3	1,3	1,1	1,1	1,2	1,2	1,2	1,2
Latvia	1,2	1,5	1,4	1,5	1,2	1,1	1,0	0,9	0,9	0,9	1,0	1,5	1,6	2,1	2,1
Lithuania	1,2	1,2	1,1	1,1	1,1	0,9	0,8	0,8	0,8	0,9	1,1	1,5	1,7	2,0	2,0
Luxembourg	0,7	0,6	0,6	0,4	0,4	0,5	0,4	0,4	0,4	0,4	0,4	0,4	0,5	0,5	0,5
Netherlands	1,4	1,4	1,4	1,3	1,4	1,3	1,3	1,3	1,2	1,2	1,1	1,2	1,2	1,2	1,3
Poland	1,9	1,8	1,8	1,6	1,7	1,8	1,7	1,7	1,7	1,8	2,2	2,0	1,9	2,0	2,0
Portugal	1,6	1,5	1,4	1,4	1,6	1,5	1,5	1,4	1,5	1,4	1,3	1,3	1,4	1,3	1,4
Romania		1,8	1,5	1,4	1,3	1,3	1,3	1,2	1,3	1,3	1,5	1,4	1,7	1,8	1,8
Slovakia	1,7	1,6	1,5	1,5	1,5	1,3	1,1	1,1	1,0	1,0	1,1	1,1	1,1	1,2	1,8
Slovenia	1,4	1,5	1,4	1,5	1,6	1,6	1,3	1,2	1,1	1,0	0,9	1,0	1,0	1,0	1,1
Spain	1,1	1,1	1,1	1,1	1,1	1,0	0,9	1,0	0,9	0,9	0,9	0,8	0,9	0,9	0,9

COMMON EDA NATO MS	1,5	1,5	1,5	1,5	1,5	1,4	1,3	1,3	1,2	1,2	1,3	1,3	1,4	1,4	1,6
--------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Austria	0,9	0,8	0,9	0,9	0,8	0,8	0,8	0,8	0,8	0,7	0,7	0,8	0,8	0,7	0,7
Cyprus	2,0	1,9	1,7	1,6	1,8	1,9	1,7	1,7	1,6	1,5	1,7	1,6	1,7	1,8	1,9
Finland	1,3	1,3	1,4	1,3	1,5	1,4	1,3	1,4	1,4	1,3	1,5	1,5	1,4	1,4	1,5
Ireland	0,5	0,5	0,5	0,6	0,6	0,5	0,5	0,5	0,5	0,5	0,3	0,3	0,3	0,3	0,3
Malta	0,8	0,7	0,6	0,6	0,7	0,7	0,6	0,5	0,5	0,5	0,5	0,5	0,5	0,5	1
Sweden	1,4	1,3	1,3	1,1	1,1	1,2	1,1	1,1	1,1	1,1	1,0	1,0	1,0	1,0	1

EDA - NON NATO MS	1,2	1,1	1,1	1,0	1,1	1,1	1,0	1,0	1,0	0,9	1,0	0,9	0,9	1,0	1,0
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TOTAL EDA 26	1,3	1,3	1,3	1,2	1,3	1,2	1,1	1,1	1,1	1,1	1,1	1,1	1,3	1,3	1,4
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U.K	2,2	2,2	2,2	2,1	2,4	2,5	2,4	2,2	2,1	2,1	2,1	2,1	2,1	2,1	
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TOTAL EDA 27	1,7	1,7	1,6	1,6	1,6	1,6	1,5	1,5	1,4	1,4	1,4	1,4	1,4	1,4	
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Source EDA website - restated not available

hypothetical 2 % def. exp. for EDA26 in MC	271 375	235 721	288 738	247 773	279 617	261 414	314 096	273 201	313 947	275 742	298 297	262 269	250 912	226 059	227 845
difference with real EDA26 def. exp. in MC	- 90 173	- 81 762	- 105 317	- 93 753	- 101 412	- 102 020	- 134 283	- 118 734	- 139 354	- 125 535	- 130 956	- 114 003	- 87 819	- 79 121	- 68 353

Review of the Preparatory Action on Defence Research (PADR) and European Defence Industrial Development Programme (EDIDP): lessons for the implementation of the European Defence Fund (EDF)

DEFENCE INVESTMENT (Equipment + R&D)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	annual variation in % for the last year	annual variation in € millions for the last year
In millions euros	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019		
Belgium				404	387	295	288	184	128	155	144	196	271	431	471	+ 9,3	+ 40
Bulgaria		90	200	192	104	108	44	24	34	6	21	58	54	84	1 157	+ 1 269,1	+ 1 072
Croatia									74	47	67	59	48	28	59	+ 109,2	+ 31
Czech Rep.	283	356	236	206	516	219	334	300	177	157	269	162	314	307	392	+ 27,6	+ 85
Estonia	24	50	52	75	77	65	71	109	111	93	58	85	98	90	81	- 10,2	- 9
France	11 051	12 030	11 199	10 761	11 953	13 204	11 917	12 977	12 977	10 331	10 319	10 189	10 172	10 290	10 846	+ 5,4	+ 556
Germany	5 461	5 639	5 561	7 340	7 105	7 924	7 549	6 941	6 460	4 930	4 636	4 927	5 034	5 466	7 113	+ 30,1	+ 1 648
Greece	1 844	1 787	1 975	2 414	2 411	1 279	320	356	517	343	445	588	499	527	533	+ 1,1	+ 6
Hungary	130	118	182	220	156	138	117	65	95	75	105	163	290	177	441	+ 149,0	+ 264
Italy	2 661	2 801	3 397	3 725	2 876	3 499	2 801	1 984	2 695	2 193	1 805	4 031	4 511	4 224	4 235	+ 0,3	+ 11
Latvia	18	36	31	63	13	27	23	20	25	17	36	72	66	195	154	- 21,1	- 41
Lithuania	46	69	84	74	55	29	32	32	30	70	112	191	236	337	291	- 13,6	- 46
Luxembourg	32	21	22	53	47	85	54	46	47	59	79	67	126	140	160	+ 14,2	+ 20
Netherlands	1 689	1 673	1 885	1 707	1 757	1 615	1 313	1 250	1 089	848	917	1 215	1 844	3 307	5 463	+ 65,2	+ 2 156
Poland	833	1 095	1 560	1 011	1 239	1 734	1 744	1 675	1 558	2 160	3 315	1 931	2 062	2 812	2 651	- 5,7	- 161
Portugal	280	187	240	390	411	330	335	277	279	368	221	248	320	264	480	+ 81,9	+ 216
Romania		507	307	396	172	135	143	76	214	342	483	514	1 117	1 273	1 097	- 13,9	- 176
Slovakia	121	139	157	165	162	94	61	82	58	89	171	145	171	255	699	+ 174,2	+ 444
Slovenia	53	136	86	67	68	126	31	6	6	3	9	9	18	28	36	+ 29,2	+ 8
Spain	2 872	3 031	3 059	3 216	2 496	1 590	828	2 749	1 319	1 420	1 638	701	2 285	2 588	2 443	- 5,6	- 146
COMMON EDA NATO MS	27 397	29 762	30 232	32 480	32 005	32 493	28 007	29 154	27 894	23 706	24 849	25 552	29 534	32 823	38 800	+ 18,2	+ 5 977
Austria	232	97	570	398	333	346	319	270	226	307	164	245	190	174	178	+ 2,2	+ 4
Cyprus	58	8	5	20	45	80	71	38	12	1	23	17	35	64	77	+ 21,4	+ 14
Finland	706	772	726	771	882	820	523	716	666	499	562	641	585	633	866	+ 36,9	+ 234
Ireland	115	102	112	106	69	94	77	69	73	92	80	92	81	72	70	- 2,5	- 2
Malta	10	0	0	0	0	2	0	0	3	2	3		7	4	19	+ 334,1	+ 14
Sweden	1 669	1 697	1 838	1 282	1 063	1 273	1 175	1 227	1 211	1 367	1 222	1 142	1 097	1 107	1 381	+ 24,8	+ 274
EDA - NON NATO MS	2 790	2 677	3 251	2 577	2 392	2 616	2 165	2 320	2 190	2 269	2 053	2 137	1 994	2 053	2 591	+ 26,2	+ 538
TOTAL EDA 26	30 187	32 439	33 483	35 057	34 397	35 110	30 172	31 474	30 084	25 974	26 903	27 689	31 528	34 876	41 391	+ 18,7	+ 6 515
U.K	12 610	13 730	14 778	12 324	11 813	12 631	11 996	10 826	10 203	10 979	12 662	12 135	12 581	11 627			
TOTAL EDA 27	43 074	46 426	48 484	47 381	46 210	47 741	42 168	42 300	40 288	36 954	39 565	39 824	44 109	46 503			
Source EDA website - restated	not available		classified									evolution 2014/2019 in % for EDA 26	59,4%				
% of def. Exp.	16,7%	17,7%	18,8%	19,5%	19,7%	21,0%	18,5%	19,7%	19,1%	16,6%	17,0%	17,1%	18,6%	19,8%	22,3%		
hypothetical 20 % of def. exp. of EDA 26 in MC	36 240	36 684	35 641	35 963	34 919	33 468	32 619	31 898	31 461	31 238	31 675	32 388	33 882	35 300	37 189		
difference with real EDA 26 in MC	- 6 053	- 4 245	- 2 158	- 906	- 522	1 641	- 2 446	- 81	- 424	- 1 376	- 5 263	- 4 773	- 4 699	- 2 354	- 424	4 202	

DEFENCE EQUIPEMENT PROCUREMENT EXPENDITURE	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	annual variation in % for the last year	annual variation in € millions for the last year
In millions euros	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019		
Belgium	271	237	211	393	377	285	279	175	119	147	137	190	264	424	464	+ 9,5	+ 40
Bulgaria		85	200	192	104	108	44	24	34	6	17	54	50	80	1 152	+ 1 341,2	+ 1 072
Croatia									73	47	67	59	48	28	58	+ 108,8	+ 30
Czech Rep.	260	317	215	181	492	196	316	283	160	140	251	146	296	290	376	+ 29,8	+ 86
Estonia	24	46	51	73	76	64	71	108	110	91	56	84	95	87	78	- 10,9	- 10
France	6 843	7 145	7 460	7 060	7 766	9 216	8 287	9 178	9 458	6 535	6 493	7 900	7 275	5 533	5 989	+ 8,2	+ 456
Germany	4 196	4 180	4 157	6 005	5 875	6 303	6 384	5 944	5 465	4 028	3 755	4 069	3 912	4 482	5 836	+ 30,2	+ 1 354
Greece	1 705	1 695	1 967	2 402	2 405	1 268	312	347	516	343	445	588	489	511	530	+ 3,6	+ 19
Hungary	128	111	181	217	152	137	117	65	95	75	104	162	290	176	436	+ 148,2	+ 261
Italy	2 580	2 372	3 003	3 441	2 719	3 427	2 605	1 884	2 535	2 084	1 722	3 978	4 463	4 165	4 169	+ 0,1	+ 4
Latvia	17	33	30	62	13	27	23	20	25	17	36	72	66	195	153	- 21,3	- 41
Lithuania	46	66	84	74	55	29	32	32	30	70	112	191	236	337	291	- 13,6	- 46
Luxembourg	32	20	22	53	46	84	54	46	47	59	79	67	125	138	156	+ 12,5	+ 17
Netherlands	1 480	1 460	1 761	1 589	1 638	1 531	1 236	1 173	1 025	784	852	1 155	1 785	3 237	5 273	+ 62,9	+ 2 036
Poland	772	996	1 497	953	1 138	1 599	1 560	1 519	1 457	1 929	3 150	1 786	1 975	2 761	2 391	- 13,4	- 370
Portugal	273	171	235	384	401	322	327	276	279	365	218	245	319	263	477	+ 81,2	+ 214
Romania		477	289	388	169	133	141	73	212	341	480	512	1 106	1 256	1 051	- 16,3	- 205
Slovakia	116	128	154	161	157	94	60	77	54	87	169	144	170	249	693	+ 178,7	+ 445
Slovenia	48	107	63	47	55	117	30	6	5	3	9	9	17	27	35	+ 28,3	+ 8
Spain	2 638	2 648	2 739	2 861	2 237	1 410	665	2 629	1 221	1 340	1 534	609	2 196	2 456	2 319	- 5,6	- 138
COMMON EDA NATO MS	21 427	22 293	24 318	26 537	25 876	26 349	22 543	23 860	22 924	18 490	19 688	22 019	25 178	26 694	31 926	+ 19,6	+ 5 233
Austria	224	91	568	397	325	345	317	268	224	306	162	243	187	171	171	+ 0,0	+ 0
Cyprus	58	8	5	20	45	80	71	38	12	1	23	17	35	63	77	+ 21,9	+ 14
Finland	656	698	675	739	832	778	503	676	630	462	502	581	543	587	818	+ 39,5	+ 232
Ireland	115	97	112	106	69	94	77	69	73	92	80	92	80	72	70	- 2,6	- 2
Malta	10	0	0	0	0	2	0	0	3	2	3		7	4	19	+ 334,1	+ 14
Sweden	1 482	1 309	1 492	1 017	892	1 154	1 063	1 134	1 084	1 255	1 107	1 025	1 035	1 044	1 315	+ 25,9	+ 271
EDA - NON NATO MS	2 546	2 202	2 852	2 279	2 163	2 453	2 031	2 185	2 026	2 117	1 877	1 957	1 887	1 941	2 470	+ 27,2	+ 529
TOTAL EDA 26	23 973	24 495	27 170	28 816	28 039	28 803	24 574	26 045	24 950	20 607	21 565	23 976	27 064	28 635	34 396	+ 20,1	+ 5 761
U.K	8 159	8 491	10 137	8 698	8 682	9 406	9 050	8 151	7 207	6 981	8 315	8 312	9 273	9 221			
TOTAL EDA 27	32 132	32 987	37 308	37 514	36 721	38 209	33 623	34 196	32 157	27 588	29 880	32 288	36 337	37 856			
Source EDA website - restated	not available			classified												evolution 2014/2019 in % for EDA 26	66,9%
Equip. in % of total Def Invest.	79,4%	75,5%	81,1%	82,2%	81,5%	82,0%	81,4%	82,8%	82,9%	79,3%	80,2%	86,6%	85,8%	82,1%	83,1%		

Review of the Preparatory Action on Defence Research (PADR) and European Defence Industrial Development Programme (EDIDP): lessons for the implementation of the European Defence Fund (EDF)

COLLABORATIVE DEFENCE EQUIPMENT PROCUREMENT EXPENDITURE	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	annual variation in % for the last year	annual variation in € millions for the last year
In millions euros	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019		
Belgium				69	91	76	74	89	77	71	89	114	260	403	418	+ 3,8	+ 15
Bulgaria																	
Croatia																	
Czech Rep.																	
Estonia					3	4	0			0	2	3			21		+ 21
France	1 453	1 953	1 370	2 033	2 481	2 058	1 447	1 481	1 218	2 165	1 641	1 878	1 741	1 842	1 740	- 5,5	- 102
Germany			875	873	901	897	2 701										
Greece					5												
Hungary	60	18															
Italy	603	473	2 254	2 841	2 378	1 558	1 742	762	1 009	833	1 374	2 643	2 476	2 178	2 297	+ 5,4	+ 118
Latvia													18	13	9	- 28,6	- 4
Lithuania			4	3	0								112	198	180	- 9,4	- 19
Luxembourg		7	6	6	6	2	6	6	0	31	25	24	99	20	104	+ 410,7	+ 83
Netherlands					232												
Poland										47	16	13	1 975	2 761	2 391	- 13,4	- 370
Portugal	1	5	26	10	2	11	18	0									
Romania																	
Slovakia																	
Slovenia												1					
Spain	1 461	1 426	1 086	1 055	815	783	328	1 843	645	864	707	151	1 444	869	823	- 5,3	- 46
COMMON EDA NATO MS	3 578	3 881	5 621	6 889	6 914	5 389	6 316	4 181	2 949	4 011	3 854	4 827	8 126	8 285	7 981	- 3,7	- 304
Austria																	
Cyprus																	
Finland	28		40	37	37	33											
Ireland																	
Malta																	
Sweden		48	46	46	72	74	27	86	75	108	98	140	32	76		- 100,0	- 76
EDA - NON NATO MS	28	48	87	83	109	108	27	86	75	108	98	140	32	76		- 100,0	- 76
TOTAL EDA 26	3 606	3 929	5 707	6 972	7 023	5 497	6 343	4 267	3 024	4 119	3 952	4 967	8 158	8 361	7 981	- 4,5	- 380
U.K	1 022	3 081	2 162	2 134	2 283	3 075	2 361	2 245	2 077	1 982	2 194	1 948	1 872				
TOTAL EDA 27	5 780	7 941	7 920	9 106	9 306	8 572	8 704	6 512	5 101	6 101	6 594	7 582	10 031				

Source EDA website - restated not available classified

EUROPEAN COLLABORATIVE DEFENCE EQUIPMENT PROCUREMENT EXPENDITURE	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	annual variation in % for the last year	annual variation in € millions for the last year
In millions euros	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019		
Belgium				69	91	76	74	89	77	71	89	114	239	235	223	-5,3	-12
Bulgaria																	
Croatia																	
Czech Rep.																	
Estonia					3	4	0			0	2	3			21		+21
France	1 453	1 953	1 364	2 033	2 481	2 058	1 447	1 481	1 218	2 165	1 641	1 878	1 741	1 842	1 740	-5,5	-102
Germany			787	785	810	808	2 655										
Greece																	
Hungary	54																
Italy	598	330	1 542	2 257	1 552	1 533	1 635	752	962	718	865	2 177	1 733	1 366	1 489	+9,0	+123
Latvia													18	13	9	-28,6	-4
Lithuania			4	3	0								112	198	180	-9,4	-19
Luxembourg		7	6	6	6	2	6	6	0	31	25	24	99	20	104	+410,7	+83
Netherlands					191												
Poland										47	16	13	1 975	2 761	2 391	-13,4	-370
Portugal		5	26	10	2	11	18	0									
Romania																	
Slovakia																	
Slovenia																	
Spain	1 447	1 426	1 086	1 055	815	783	328	1 843	645	864	707	151	1 444	869	823	-5,3	-46
COMMON EDA NATO MS	3 552	3 720	4 814	6 217	5 951	5 275	6 163	4 170	2 902	3 896	3 345	4 359	7 362	7 306	6 979	-4,5	-327
Austria																	
Cyprus																	
Finland	28		40	37	37	33											
Ireland																	
Malta																	
Sweden						52	26	85	57	107	97	72	31	29		-100,0	-29
EDA - NON NATO MS	28		40	37	37	85	26	85	57	107	97	72	31	29		-100,0	-29
TOTAL EDA 26	3 581	3 720	4 855	6 254	5 988	5 360	6 188	4 255	2 959	4 002	3 441	4 431	7 393	7 334	6 979	-4,8	-356
U.K	526	2 693	2 160	1 720	2 086	2 757	1 883	1 967	1 866	1 475	1 632	1 449	1 393				
TOTAL EDA 27	5 142	7 246	7 066	7 974	8 075	8 117	8 072	6 222	4 824	5 477	5 521	6 547	8 786				
Source EDA website - restated		not available		classified												evolution 2014/2019 in % for EDA 26	74,4%
sp. Collab. Equip in % of Def. Equip	14,9%	15,2%	17,9%	21,7%	21,4%	18,6%	25,2%	16,3%	11,9%	19,4%	16,0%	18,5%	27,3%	25,6%	20,3%		
hypothetical 35 % in € millions	6 889	7 585	8 219	8 940	8 682	9 049	7 819	8 398	8 139	6 770	7 179	8 042	9 194	9 853	12 039		
difference with real EDA 26	-3 308	-3 865	-3 364	-2 687	-2 694	-3 689	-1 631	-4 143	-5 181	-2 768	-3 737	-3 610	-1 801	-2 518	-5 060		



Review of the Preparatory Action on Defence Research (PADR) and European Defence Industrial Development Programme (EDIDP): lessons for the implementation of the European Defence Fund (EDF)

Defence Research and Development (R&D) Expenditure	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	annual variation in % for the last year	annual variation in € millions for the last year
In millions euros	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019		
Belgium				11	10	10	9	8	8	9	7	7	7	7	7	-3,7	-0,1
Bulgaria		1	0	0						0	4	4	4	5	5	+3,5	+0,1
Croatia									1	0	0	0	0	0	0	+165,1	+0,1
Czech Rep.	23	22	21	25	23	22	18	18	17	17	18	16	18	17	16	-7,9	-1,1
Estonia	1	1	1	2	0	1	0	1	0	2	2	1	3	3	3	+12,1	+0,1
France	4 208	4 500	3 738	3 701	4 187	3 988	3 630	3 799	3 519	3 796	3 826	2 290	2 897	4 757	4 857	+2,1	+100,0
Germany	1 265	1 233	1 404	1 335	1 230	1 621	1 165	997	995	901	881	858	1 122	984	1 277	+29,8	+294,0
Greece	139	0	9	12	5	12	9	8	1				10	16	3	-81,2	-13,1
Hungary	1	1	1	3	4	0	0	1	0	0	1	0	1	1	5	+258,7	+3,1
Italy	80	300	395	284	158	72	196	100	160	110	82	53	47	59	66	+12,3	+7,1
Latvia	0	1	0	0	0	0								0	1	+51,7	+0,1
Lithuania	0																
Luxembourg					1	0	0		0	0	0	0	1	1	4	+181,9	+3,1
Netherlands	210	133	124	118	119	83	76	77	63	63	65	60	59	70	190	+172,0	+120,1
Poland	62	45	62	59	101	135	184	156	101	231	165	145	87	51	260	+409,4	+209,1
Portugal	7	7	5	7	10	8	9	1	1	3	2	2	0	0	3	+485,5	+2,1
Romania		4	18	8	3	2	2	2	2	1	3	1	11	18	46	+157,3	+28,1
Slovakia	6	5	3	4	6	0	1	5	4	2	2	1	0	6	6	-9,4	-1,1
Slovenia	5	23	22	20	13	9	1	1	1		0	0	0	1	1	+65,2	+0,1
Spain	234	240	320	355	259	181	163	119	97	80	104	92	89	132	124	-6,2	-8,1
	234																
COMMON EDA NATO MS	6 242	6 515	6 125	5 944	6 129	6 144	5 465	5 294	4 970	5 216	5 161	3 532	4 357	6 129	6 874	+12,1	+745,1
	6 242																
Austria	8	1	1	1	8	1	1	2	1	2	2	2	3	3	7	+125,5	+4,1
Cyprus														0	0	-93,4	-0,1
Finland	49	37	51	31	50	43	20	40	36	37	60	61	42	46	48	+4,4	+2,1
Ireland													0	0	0	+45,3	+0,1
Malta																	
Sweden	186	318	346	265	171	119	113	93	127	112	115	117	62	63	66	+5,3	+3,1
EDA - NON NATO MS	244	355	398	297	229	163	134	135	164	151	177	180	107	112	121	+8,0	+9,1
TOTAL EDA 26	6 485	6 870	6 523	6 241	6 358	6 307	5 598	5 429	5 134	5 367	5 338	3 713	4 464	6 241	6 995	+12,1	+754,1
U.K	4 451	4 780	4 641	3 626	3 131	3 225	2 947	2 675	2 997	3 998	4 347	3 823	3 309	2 406			
TOTAL EDA 27	10 942	11 658	11 176	9 868	9 489	9 532	8 545	8 104	8 131	9 365	9 685	7 535	7 772	8 648			
Source EDA website - restated		not available															
			</														

Defence Research and Technology (R&T) Expenditure (subset of R&D)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	annual variation in % for the last year	annual variation in € millions for the last year
In millions euros	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019		
Belgium				10,5	10,0	9,5	8,7	7,9	8,3	2,7	2,7	2,8	6,9	7,2	7,0	-3,7	-0,3
Bulgaria		0,3	0,3	0,0										4,0		-100,0	-4,0
Croatia													0,4	0,1		-100,0	-0,1
Czech Rep.	16,0	15,2	7,5	5,5	8,0	8,1	7,3	7,6	7,4	7,0	7,0	7,4	6,8	17,4	16,1	-7,9	-1,4
Estonia	0,6		1,0	1,8	0,3	0,7				1,6	1,8	1,4	0,6	0,6	0,4	-29,6	-0,2
France	846,5	907,6	941,8	942,0	1 021,8	913,5	880,6	847,2	962,0	923,9	561,4	518,2	598,7	600,5	620,7	+3,4	+20,2
Germany	493,3	621,9	527,0	530,4	458,9	438,9	452,1	453,8	581,5	514,4			633,6	511,7	623,0	+21,8	+111,3
Greece	1,3	0,1	0,0	9,1	4,1	3,3			0,6				10,3	16,0	3,0	-81,2	-13,0
Hungary	0,3	0,7	0,2	0,6	0,8	0,1	0,1	0,1				0,1	0,1		0,2	+0,2	
Italy	20,3	41,7	56,5	66,6	58,2	66,5	65,7	63,2	63,7	46,4	29,9	48,1	47,3	58,8	53,0	-9,8	-5,8
Latvia	0,3																
Lithuania	0,1																
Luxembourg													1,2	1,4	4,0	+181,9	+2,6
Netherlands	134,0	133,4	123,8	118,5	118,7	83,3	76,4	76,7	63,5	63,3	64,8	59,7	58,6	68,3	72,5	+6,2	+4,2
Poland	15,1	27,4	57,1	58,8	14,4	15,4	129,8	92,6	10,7	11,0	53,2	81,4	58,1	33,7	59,3	+76,0	+25,6
Portugal	7,2	6,7	5,4	6,0	10,2	7,8	2,5	0,6	0,9	1,7	1,7	1,7	0,3	0,5	1,5	+213,7	+1,0
Romania		0,5	1,5	1,4	0,4	2,4	2,1	2,2	1,8	1,2	2,5	1,4	11,2	17,9	46,2	+157,3	+28,2
Slovakia	2,7	3,2	2,9	1,8	2,7	0,1	0,7	0,3		0,1							
Slovenia	1,5	16,2	16,9	17,5	9,8	6,3	0,9	0,8	0,3		0,1	0,1	0,1	0,3	0,3	+23,4	+0,1
Spain	103,9	124,3	124,7	140,0	113,3	91,0	89,5	69,0	57,5	44,8	56,2	54,4	54,8	56,8	56,5	-0,5	-0,3
COMMON EDA NATO MS	1 643,0	1 899,1	1 866,7	1 910,5	1 831,5	1 646,9	1 716,2	1 621,9	1 758,3	1 618,1	781,2	776,6	1 488,9	1 395,1	1 563,6	+12,1	+168,5
Austria	7,9	1,0	1,2	0,1	7,9	1,1	1,2	1,9	1,1	1,6	1,9	2,1	2,1	2,0	2,0	-1,7	-0,0
Cyprus														0,0	0,0	-52,7	-0,0
Finland	39,0	23,8	16,4	28,8	14,1	18,8	6,6	31,5	27,5	26,3	59,6	60,7	9,6	14,3	33,6	+135,4	+19,3
Ireland																	
Malta																	
Sweden	182,7	167,1	149,3	134,5	104,1	95,7	85,3	86,2	69,2	65,1	70,6	67,9	62,0	63,0	66,3	+5,3	+3,4
EDA - NON NATO MS	229,6	191,9	166,9	163,3	126,1	115,6	93,1	119,6	97,7	93,0	132,1	130,7	73,7	79,3	102,0	+28,5	+22,6
TOTAL EDA 26	1 872,6	2 091,0	2 033,6	2 073,8	1 957,6	1 762,5	1 809,4	1 741,5	1 856,1	1 711,1	913,2	907,3	1 562,6	1 474,4	1 665,6	+13,0	+191,2
U.K	796,3	1 071,3	896,6	731,8	594,6	553,8	597,6	563,6	543,2	525,6	615,5	442,4	425,1	490,6			
TOTAL EDA 27	2 681,5	3 170,1	2 940,6	2 805,5	2 552,2	2 316,3	2 407,0	2 305,1	2 399,3	2 236,7	1 528,7	1 349,7	1 987,6	1 965,0		-368,1	
Source EDA website - restated		not available		classified		non significant					evolution 2014/2019 in % for EDA 26				-2,7%		
											Taking into account PADR:				25 40 25		
											1 587,6 1 514,4 1 690,6				-343,1		
											evolution 2014/2019 in % for EDA 26 with PADR				-1,2%		
hypothetical 2 % EDA 26 in € millions	3 624	3 668	3 564	3 596	3 492	3 347	3 262	3 190	3 146	3 124	3 168	3 239	3 388	3 530	3 719		
difference with real EDA 26 R&T	-1 751	-1 577	-1 530	-1 522	-1 534	-1 584	-1 452	-1 448	-1 290	-1 413	-2 254	-2 331	-1 826	-2 056	-2 053		

Review of the Preparatory Action on Defence Research (PADR) and European Defence Industrial Development Programme (EDIDP): lessons for the implementation of the European Defence Fund (EDF)

Collaborative Defence R&T Expenditure	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	annual variation in % for the last year	annual variation in € millions for the last year
In millions euros	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019		
Belgium				6,1	6,2	2,2	2,2	2,2	2,1	2,1	2,1	2,1	1,0	1,0		-100,0	-1,0
Bulgaria																	
Croatia																	
Czech Rep.		1,3	1,1	1,1	1,3	1,1	0,6	0,6	0,6	0,5	0,6	0,6	0,6	0,6	0,5	-14,2	-0,1
Estonia	0,0		0,2	0,2	0,2					0,2	0,3	0,3		0,6	0,4	-29,6	-0,2
France	108,4	140,9	153,9	172,6	167,3	159,3	159,5	142,8	152,3	138,5	123,0	106,4	115,4	113,9	114,0	+0,1	+0,1
Germany			105,9	122,0	24,2	15,5											
Greece	1,0			8,9	3,0	3,1											
Hungary		0,2	0,2	0,3	0,1	0,0							0,1				
Italy	14,1	11,9	26,9	16,0	27,8	22,7	4,6	9,5	6,3	8,1	7,1	5,1	10,3	9,2	14,0	+52,9	+4,8
Latvia																	
Lithuania																	
Luxembourg															0,2		+0,2
Netherlands	19,5	22,6	25,5	28,2	28,3	4,5	4,7	5,3	3,7	5,9	4,2	4,0					
Poland	0,3	0,4	3,6	20,6	3,5	2,2	3,4	1,8	3,8	2,0	3,4	6,8	5,4	2,2	4,0	+85,1	+1,8
Portugal	1,3	1,0	0,8	0,5	0,4	0,2	0,2	0,4	0,6	0,6	1,7	1,7	0,3		0,3		+0,3
Romania		0,1	0,2	0,0	0,2		0,1	0,4	0,2								
Slovakia				0,8	1,2	0,0	0,1										
Slovenia		0,2	1,1	0,5	0,3	0,8								0,3	0,1	-62,6	-0,2
Spain	41,5	49,7	64,8	90,2	60,7	42,7	60,4	34,5	29,3	22,1	16,9	15,6	14,7	20,5	18,7	-8,7	-1,8
COMMON EDA NATO MS	186,1	228,5	384,1	468,1	324,6	254,4	235,7	197,5	198,9	180,1	159,2	142,6	147,9	148,2	152,3	+2,7	+4,1
Austria	0,6					0,1		1,6	0,1	0,2	0,6	0,2		0,5	0,6	+0,1	+0,0
Cyprus														0,0		-100,0	-0,0
Finland	2,8	1,1	1,5	4,6	3,7	3,6	4,9	3,3	2,5	1,3	1,0	0,5	0,8	0,9	0,6	-29,9	-0,3
Ireland																	
Malta																	
Sweden		36,2	29,3	30,6	28,5	30,3	23,8	19,6	15,9	14,3	12,3	12,4	11,1	9,2		-100,0	-9,2
EDA - NON NATO MS	3,4	37,2	30,9	35,2	32,2	34,1	28,6	24,4	18,5	15,8	13,9	13,1	11,9	10,7	1,2	-89,1	-9,5
TOTAL EDA 26	189,5	265,8	415,0	503,3	356,8	288,5	264,3	221,9	217,4	195,9	173,1	155,7	159,7	158,9	153,5	-3,4	-5,5
U.K	39,8				7,1	3,3			0,7	0,9	0,6	0,5	0,5				
TOTAL EDA 27	332	458	437	510	364	292	339	224	218	197	174	156	160	159			

Source EDA website - restated

not available

classified

evolution 2014/2019 in % for EDA 26 -21,7%

Collaborative Defence R&T Expenditure	2005		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	annual variation in % for the last year	annual variation in € millions for the last year
In millions euros	Current prices	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019	Constant prices 2019		
Belgium					5	5	1	1	1	1	1	1	1	1	1		-100,0	-1,0
Bulgaria																		
Croatia																		
Czech Rep.			1	1	1	1	1	1	1	1	1	1	1	1	1	1	-13,7	-0,1
Estonia				0	0	0						0	0	0	1	0	-29,6	-0,2
France	81	99	131	150	169	158	150	145	78	119	131	120	104	114	113	114	+1,0	+1,1
Germany				101,2	116,5	11,8	10,8											
Greece	###	0,6			8,9	3,0	3,1											
Hungary			0,2	0,2	0,3	0,1	0,0											
Italy	###	14,1	9,9	26,9	16,0	27,8	22,7	4,3	6,2	5,7	8,1	7,1	5,1	7,2	1,4	1,7	+20,1	+0,3
Latvia																		
Lithuania																		
Luxembourg																0,2	+0,2	
Netherlands					15,8	22,6	3,4	4,2	4,5	3,2	5,9	4,2	4,0					
Poland	###	0,3	0,4	3,6	9,5			3,4	1,8	3,8	2,0	3,4	6,8	5,4	2,2	4,0	+85,1	+1,8
Portugal	###	0,9	0,8	0,6	0,5	0,4	0,2	0,2	0,4	0,6	0,6	0,8	0,8	0,3		0,3	+0,3	
Romania						0,2		0,1	0,4	0,2								
Slovakia					0,8	1,2	0,0	0,1										
Slovenia			0,2	1,1	0,5	0,3	0,6								0,3	0,1	-62,6	-0,2
Spain	###	41,5	49,7	61,8	83,0	58,0	41,8	59,4	33,4	28,5	22,1	16,9	15,6	14,7	20,5	18,7	-8,7	-1,8
COMMON EDA NATO MS	###	156,1	193,6	347,1	427,3	290,1	235,3	218,5	126,3	162,7	171,5	154,1	138,6	143,7	139,4	140,0	+0,4	+0,5
Austria	0	0,1					0,1		1,6	0,1	0,2	0,6	0,2		0,5	0,6	+0,1	+0,0
Cyprus																		
Finland	2	2,8	1,1	1,5	4,6	3,7	3,6	4,7	3,1	2,4	1,3	1,0	0,5	0,8	0,9	0,6	-29,9	-0,3
Ireland																		
Malta																		
Sweden						26,6	29,3	22,3	18,2	14,1	9,7	8,1	8,4	7,5	5,7		-100,0	-5,7
EDA - NON NATO MS	2	2,9	1,1	1,5	4,6	30,3	33,1	27,0	22,9	16,6	11,3	9,8	9,2	8,2	7,2	1,2	-83,6	-6,0
TOTAL EDA 26	###	159,0	194,7	348,7	431,9	320,5	268,4	245,6	149,2	179,3	182,7	163,9	147,8	151,9	146,6	141,1	-3,7	-5,5
U.K	14	17,1				7,3	3,4			0,7	0,9	0,6	0,5	0,5				
TOTAL EDA 27	###	252,2	302,8	385,0	465,0	327,8	271,8	285,6	151,7	180,0	183,6	164,5	148,2	152,4	146,6			
Source EDA website - restated		not available			classified							evolution 2014/2019 in % for EDA 26				-22,8%		
												Taking into account PADR:				25	40	25
																176,9	186,6	166,1
												evolution 2014/2019 in % for EDA 26 with PADR				-9,1%		
												taking PADR into account:				11,3%	12,7%	10,0%
Europ. Collab R&T as a % R&T		8,5%	9,3%	17,1%	20,8%	16,4%	15,2%	13,6%	8,6%	9,7%	10,7%	17,9%	16,3%	9,7%	9,9%	8,5%		
hypothetical 20 % EDA 26 in MC		374,5	418,2	406,7	414,8	391,5	352,5	361,9	348,3	371,2	342,2	182,6	181,5	312,5	294,9	333,1		
difference with real EDA 26 R&T in MC		-216	-224	-58	17	-71	-84	-116	-199	-192	-159	-19	-34	-161	-148	-192		

## 7.5 PESCO projects

		IT	FR	ES	EL	DE	RO	BE	PT	HU	NL	PL	CZ	CY	SK	BG	FI	HR	LT	AT	SE	LV	SI	LU	EE	IE	participants	adopted	
1	European Training Certification Center for European Armies																										2	6/03/18	
2	Helicopter Hot and High training (H3T)																										3	19/03/18	
3	Joint EU Intelligence School (JEIS)																										2	19/03/18	
4	EU Test and Evaluation Centres																										4	19/03/18	
5	Integrated Central European joint training and simulation Center (EUROSIM)																										5	12/11/19	
6	EU Cyber Academia and Innovation Hub (EU CAIH)																										2	12/11/19	
7	SOF Medical Training Centre (SMTC)																										2	12/11/19	
8	CBRN Defence Training Range (CBRNDTR)																										3	12/11/19	
9	EU Network of Diving Centre (EUNDC)																										3	12/11/19	
1	Deployable Military Disaster Relief Capability Package																										5	6/03/18	
2	Armoured Infantry Fighting Vehicle/Amphibious Assault Vehicle/Light Armoured Vehicle																										3	6/03/18	
3	Indirect Fire Support (EuroArtillery)																										3	6/03/18	
4	EUFOR Crisis Response Operation Core (EUFOR CROC)																										5	6/03/18	
5	Integrated Unmanned Ground System (UGS)																										11	19/03/18	
6	EU Beyond Land of Sight (BLOS) Land Battlefield Missile System																										3	19/03/18	
1	Maritime (semi-) Autonomous Systems for Countermeasures (MAS MCM)																										7	6/03/18	
2	Harbour & Maritime Surveillance and Protection (HARMSPRO)																										4	6/03/18	
3	Up grade of Maritime Surveillance (UMS)																										7	6/03/18	
4	Deployable Modular Underwater Intervention Capabiliyt Package (DIVEPACK)																										3	19/03/18	
5	Maritime Unmaned Anti-Submarine System (MUSAS)																										4	12/11/19	
6	European Patrol Corvette (EPC)																										3	12/11/19	
1	European MALE RPAS (Eurodrone)																										5	19/03/18	
2	European Attack Helicopter TIGER Mark III																										3	19/03/18	
3	C-UAS Counter Unmanned Aerial System																										2	19/03/18	
4	Airborne Electronic Attack AEA																										3	12/11/19	
1	European Secure Software defined Radio (ESSOR)																										9	6/03/18	
2	Cyber Threats and Incident Response Information Sharing Platform (CTIRISP)																										7	6/03/18	
3	Cyber Rapid Response Teams and Mutual Assitance in Cyber Security (CRRT)																										7	6/03/18	
4	Strategic Command & Control System for CSDP Missions and Operations (ESC2)																										6	6/03/18	
5	European High Atmosphere Airship Platform (EHAAP) Persistent Intelligence, Surveillance																										2	19/03/18	
6	One Deployable SOF Tactical Command Post (SOCC)																										2	19/03/18	
7	Electronic Warfare Capability and Interoperability Programme for Future JISR																										2	12/11/19	
8	Cyber and Information Domain Coordination Centre (CIDCC)																										5	12/11/19	
1	European Medical Command (EMC)																										17	16/11/20	
2	Network of logistics hubs in Europe and support to Operations (NetLogHubs)																										15	6/03/18	
3	Military Mobility																										24	6/03/18	
4	Energy Operational Function (EOF)																										4	6/03/18	
5	Chemical, Biological, Radiological and Nuclear (CBRN) Surveillance as a Service (CBRN S																										5	19/03/18	
6	Co-basing																										6	19/03/18	
7	Geo-meteorological and Oceanographic (GeoMETOC) Support Coordination Element																										6	19/03/18	
8	Timely Warning and Interception with Space-based TheaTER surveillance (TWISTER)																										6	12/11/19	
9	Materials and components for technological EU competitiveness (MAC-EU)																										4	12/11/19	
10	EU Collaborative Warfare Capabilities (ECoWAR)																										6	12/11/19	
11	European Global RPAS Insertion Architecture System																										3	12/11/19	
1	EU Radio Navigation Solution (EURAS)																										6	19/03/18	
2	European Military Space Surveillance Awareness Network (EU-SSA-N)																										2	19/03/18	
46 Total participations:		28	26	25	16	15	11	11	11	11	10	9	8	8	6	6	6	6	6	5	5	5	3	3	3	3	1	5,2	average
Positions as lead country		7	12	1	6	6	2	1	1	1	1	1	1	1	1	1	1	1	2	1						1	46		

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participation in % 57 54 35 33 24 24 24 24 22 20 17 17 13 13 13 13 11 11 11 7 7 7 7 2

Projects delivering Full Operational Capability (FOC) before the end of 2025 26

Projects delivering FOC after 2025 20

NB EUTMCC (EU Training Mission Competence Center) has been closed

Training, Facilities 20%

Land, Formations, systems 13%

Maritime 13%

Air, Systems 9%

Cyber, C4ISR 17%

Enabling, Joint 24%

Space 4%

## 7.6 High Impact Capability Goals

Unclassified version published with the authorisation of EUMS

**Table 1 - List of short-term High Impact Capability Goals**

(Underlined headings are both short and medium term HICGs)

Cap Area	HICG20	Description
Prepare	Standardised Training	Language Skills
	Interoperability in Support of Operations	Common Regulations for Military Movement and Deployment
	<u>Readiness</u>	Increase in operational readiness of a broader range of capabilities
Project	<u>Strategic Air and Sea Transport</u>	Medium container and Roll On-Roll Off vessels
	<u>Logistic Support for Deployment</u>	Reception, Staging, Onwards Movement capabilities, Deployable Air Field modules, increase of EU infrastructure for deployment
Engage	<u>Maritime Power Projection</u>	Amphibious forces and aircraft carriers
	Maritime engagement incl. anti-submarine warfare	Maritime Patrol and Reconnaissance, rotary wing and anti-surface warfare
	Air Precision Strike - Unmanned	Long Range Joint Precision Strike capabilities, unmanned
	Indirect Fire Support	Division/Corps Multiple Rocket Launch Systems
Sustain	<u>Military Engineering</u>	MILENG C2, well drilling capabilities
	<u>Medical Support</u>	Role 2 Enhanced and Role 3 medical capabilities
	Air to Air Refuelling	Air to Air Refuelling aircraft
	Tactical Transport Helicopters	Heavy Tactical Transport helicopters
C3	<u>Joint C2</u>	Maritime C2 and Joint Logistics Support Group Headquarters
Protect	<u>Surface based Air and Missile Defence</u>	Land and sea based Ballistic Missile Defence and Long Range Surface to Air Missiles
	C-IED	Route clearance, Advanced Search and Countering Improvised Explosive Device capabilities
Inform	<u>Joint ISR</u>	Naval ISR, Space Situational Awareness and Image Collection
	<u>Electronic Warfare</u>	Airborne electronic attack

**Table 2 - List of medium-term High Impact Capability Goals**

(Underlined headings are both short and medium term HICGs)

Cap Area	HICG20	Description
Prepare	Standardised Training	Language Skills
	Interoperability in Support of Operations	Common Regulations for Military Movement and Deployment
	<u>Readiness</u>	Increase in operational readiness of a broader range of capabilities
Project	<u>Strategic Air and Sea Transport</u>	Medium container and Roll On-Roll Off vessels
	<u>Logistic Support for Deployment</u>	Reception, Staging, Onwards Movement capabilities, Deployable Air Field modules, increase of EU infrastructure for deployment
Engage	<u>Maritime Power Projection</u>	Amphibious forces and aircraft carriers
	Maritime engagement incl. anti-submarine warfare	Maritime Patrol and Reconnaissance, rotary wing and anti-surface warfare
	Air Precision Strike - Unmanned	Long Range Joint Precision Strike capabilities, unmanned
	Indirect Fire Support	Division/Corps Multiple Rocket Launch Systems
Sustain	<u>Military Engineering</u>	MILENG C2, well drilling capabilities
	<u>Medical Support</u>	Role 2 Enhanced and Role 3 medical capabilities
	Air to Air Refuelling	Air to Air Refuelling aircraft
	Tactical Transport Helicopters	Heavy Tactical Transport helicopters
C3	Joint C2	Maritime C2 and Joint Logistics Support Group Headquarters
Protect	<u>Surface based Air and Missile Defence</u>	Land and sea based Ballistic Missile Defence and Long Range Surface to Air Missiles
	C-IED	Route clearance, Advanced Search and Countering Improvised Explosive Device capabilities
Inform	<u>Joint ISR</u>	Naval ISR, Space Situational Awareness and Image Collection
	<u>Electronic Warfare</u>	Airborne electronic attack



## 7.7 EDA CDP full list of agreed priorities and modules

### 1. Enabling capabilities for cyber responsive operation

1. Cyber cooperation and synergies
2. Cyber R&T
3. Systems engineering framework for cyber operations
4. Cyber education and training
5. Specific cyber defence challenges in the air, space maritime and land domain

### 2. Ground combat capabilities

6. Upgrade, modernise and develop land platforms (manned/unmanned vehicles, precision strike)
7. Enhance protection of forces (CBRN, CIED, individual soldier equipment)

### 3. Underwater control contributing to resilience at sea

8. Mine warfare
9. Anti-submarine warfare
10. Harbour protection

### 4. Integration of military air capabilities in a changing aviation sector

11. Military access to airspace
12. Ability to protect confidentiality of mission critical information
13. Coordination with civilian aviation authorities
14. Adaptation of military air/space C2 capability

### 5. Space-based information and communication services

15. Earth observation
16. Positioning, navigation and timing
17. Space situational awareness
18. Satellite communication

### 6. Enhanced logistic and medical supporting Information superiority

19. Military mobility
20. Enhanced logistics
21. Medical support

### 7. Air superiority

22. Air combat capability
23. Air ISR platforms
24. Anti-Access Area Denial (A2/AD) capability
25. Air-to-air refuelling

26. Ballistic Missile Defence (BMD)

**8. Cross-domain capabilities contributing to achieve the EU's level of ambition**

- 27. Innovative technologies for enhanced future military capabilities
- 28. Autonomous EU capacity to test and to qualify EU developed capabilities
- 29. Enabling capabilities to operate autonomously within EU's LoA

**9. Information superiority**

- 30. Radio spectrum management
- 31. Tactical CIS
- 32. Information management
- 33. Intelligence, Surveillance and Reconnaissance (ISR) capabilities

**10. Naval manoeuvrability**

- 34. Maritime situational awareness
- 35. Surface superiority
- 36. Power projection

**11. Air Mobility**

- 37. Strategic air transport
- 38. Tactical air transport including air medical evacuation

## 7.8 The Objectives of the Fund – comparative table on the successive versions

### PART A.- European Defence Industrial Development Programme (EDIDP)

Proposal from the Commission <sup>83</sup> (7 June 2017)	General approach from the Council <sup>84</sup> (8 December 2017)	Legislative act from the European Parliament and the Council <sup>85</sup> (5 July 2018) and final regulation (7 August 2018)
<p>Article 2</p> <p>Objectives</p> <p>The Programme shall have the following objectives:</p> <p>(a) to foster the competitiveness and innovation capacity of the Union defence industry by supporting actions in their development phase;</p> <p>(b) to support and leverage the cooperation between undertakings, including small and medium-sized enterprises, in the development of technologies or products in line with defence capability priorities commonly agreed by Member States within the Union;</p>	<p>Article 2</p> <p>Objectives</p> <p>The Programme shall have the following objectives:</p> <p>(a) to foster the competitiveness and innovation capacity of the <b>Union defence industry throughout the Union which contributes to European strategic autonomy by supporting actions in their development phase;</b></p> <p>(b) to support and leverage <b>collaboration between Member States and cross-border cooperation between undertakings throughout the Union, including SMEs and Mid-caps</b>, in the development of technologies or products consistent with defence capability priorities commonly agreed by Member States within the framework of the Common Foreign and Security Policy, while improving the agility of supply chains. Where appropriate, regional and international actions, initiatives and priorities, including those in</p>	<p>Article 3</p> <p>Objectives</p> <p>The Programme shall have the following objectives:</p> <p>(a) to foster the competitiveness, efficiency and innovation capacity of the defence industry throughout the Union, which contributes to <b>the Union's strategic autonomy</b>, by supporting actions in their development phase;</p> <p>(b) to support and leverage <b>cooperation, including across borders, between undertakings, including SMEs and mid-caps, throughout the Union, and collaboration between Member States</b>, in the development of <b>defence</b> products or technologies, <b>while strengthening and improving the agility of defence supply and value chains, and fostering the standardisation of defence systems and their interoperability.</b></p> <p><b>Such cooperation shall take place in line with defence</b></p>

<sup>83</sup> Brussels, COM(2017) 294 final 2017/0125 (COD) Proposal for a regulation establishing the European Defence Industrial Development Programme aiming at supporting the competitiveness and innovative capacity of the EU defence industry

<sup>84</sup> Brussels, General Secretariat of the Council - 15536/17 - Interinstitutional File: 2017/0125 (COD) General approach establishing the European Defence Industrial Development Programme aiming at supporting the competitiveness and innovative capacity of the EU defence industry

<sup>85</sup> Brussels, PE-CONS 28/18 - 2017/0125 (COD) and Official Journal of the European Union 7.8.2018 L 200/30 EN Regulation establishing the European Defence Industrial Development Programme aiming at supporting the competitiveness and innovative capacity of the EU defence industry

<p>(c) To foster better exploitation of the results of defence research and contribute to closing the gaps between research and development.</p>	<p>the NATO context, when they serve the Union's security and defence interests as determined under the Common Foreign and Security Policy and taking into account the need to avoid unnecessary duplication, may also be taken into account in this regard whenever they do not exclude the possibility of participation of any Member State;</p> <p>(c) to foster better exploitation of the results of defence research and contribute <b>to development after the research phase and thus, to support the competitiveness of the European defence industry on the internal market and the global marketplace, including by consolidation, where appropriate.</b></p>	<p><b>capability priorities agreed by Member States within the framework of the Common Foreign and Security Policy and particularly in the context of the Capability Development Plan.</b></p> <p><b>In that context, regional and international priorities, when they serve the Union's security and defence interests as determined under the Common Foreign and Security Policy, and taking into account the need to avoid unnecessary duplication, may also be taken into account, where appropriate, whenever they do not exclude the possibility of participation of any Member State;</b></p> <p>(c) to foster better exploitation of the results of defence research and contribute to development after the research phase, <b>thereby</b> supporting the competitiveness of the European defence industry on the internal market and the global marketplace, including by consolidation, where appropriate.</p>
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**PART B.- European Defence Fund (EDF)**

<b>Proposal from the Commission<sup>86</sup> (13 June 2018)</b>	<b>European Parliament legislative resolution<sup>87</sup> (18 April 2019)</b>	<b>Provisional agreement resulting from interinstitutional negotiations<sup>88</sup> (21 December 2020)</b>
<p style="text-align: center;">Article 3</p> <p style="text-align: center;">Objectives of the Fund</p> <p>1. The general objective of the Fund is to foster the competitiveness, efficiency and innovation capacity of the European defence industry, by supporting collaborative actions and cross- border cooperation between legal entities throughout the Union, including SMEs and mid- caps as well as fostering the better exploitation of the industrial potential of innovation, research and technological development, at each stage of the industrial life cycle, thus contributing to the Union strategic autonomy. The Fund should also contribute to the freedom of action of the Union and its autonomy, in particular in technological and industrial terms.</p> <p>2. The Fund shall have the following specific objectives:</p> <p>(a) support collaborative research projects that could significantly boost the performance of future capabilities, aiming at maximising innovation and introducing new defence products and technologies, including disruptive ones;</p>	<p style="text-align: center;">Article 3</p> <p style="text-align: center;">Objectives of the Fund</p> <p>1. The general objective of the Fund is to foster the competitiveness, efficiency and innovation capacity of the European defence <b>technological and industrial base throughout the Union, which contributes to the Union strategic autonomy and its freedom of action</b>, by supporting collaborative actions and cross- border cooperation between legal entities throughout the Union, <b>in particular</b> SMEs and mid-caps as well as <b>strengthening and improving the agility of both defence supply and value chains, widening cross-border cooperation between legal entities</b> and fostering the better exploitation of the industrial potential of innovation, research and technological development, at each stage of the industrial life cycle of defence products and technologies.</p> <p>2. The Fund shall have the following specific objectives:</p> <p>(a) support collaborative research <b>that could significantly boost the performance of future capabilities throughout the Union</b>, aiming at maximising innovation and introducing new defence products and technologies, including disruptive ones, <b>and at the most efficient use of defence research spending in the Union;</b></p>	<p style="text-align: center;">Article 3</p> <p style="text-align: center;">Objectives of the Fund</p> <p>1. The general objective of the Fund is to foster the competitiveness, efficiency and innovation capacity of the European defence technological and industrial base throughout the Union, which contributes to the Union strategic autonomy and its freedom of action, by supporting collaborative actions and cross- border cooperation between legal entities throughout the Union, in particular SMEs and mid-caps, as well as strengthening and improving the agility of both defence supply and value chains, widening cross-border cooperation between legal entities and fostering the better exploitation of the industrial potential of innovation, research and technological development, at each stage of the industrial life cycle of defence products and technologies.</p> <p>2. The Fund shall have the following specific objectives:</p> <p>(a) support collaborative research that could significantly boost the performance of future capabilities throughout the Union, aiming at maximising innovation and introducing new defence products and technologies, including disruptive ones, and at the most efficient use of defence research spending in the Union;</p>

<sup>86</sup> Brussels, COM(2018) 476 final 2018/0254 (COD) Proposal for a regulation establishing the European Defence Fund

<sup>87</sup> P8\_TA(2019)0430 European Parliament legislative resolution of 18 April 2019 on the proposal for a regulation of the European Parliament and of the Council establishing the European Defence Fund (COM(2018)0476 – C8-0268/2018 – 2018/0254(COD))

<sup>88</sup> [14285/20 – C9 xxxxx/2020 - 2018/0254 \(COD\)](#)

<p>(b) support collaborative development projects of defence products and technologies consistent with defence capability priorities commonly agreed by Member States within the framework of the Common Foreign and Security Policy, thus contributing to greater efficiency of defence spending within the Union, achieving greater economies of scale, reducing the risk of unnecessary duplication and as such</p> <p>reducing the fragmentation of defence products and technologies throughout the Union. Ultimately, the Fund will lead to greater interoperability between Member States' capabilities.</p>	<p>(b) support collaborative development of defence products and technologies, thus contributing to greater efficiency of defence spending within the Union, achieving greater economies of scale, reducing the risk of unnecessary duplication and as such <b>incentivising the market uptake of European products and technologies</b> and reducing the fragmentation of defence products and technologies throughout the Union. Ultimately, the Fund will lead to <b>an increase in the standardisation of defence systems and greater interoperability between Member States' capabilities.</b></p> <p><b>Such cooperation shall be consistent with defence capability priorities commonly agreed by Member States within the framework of the Common Foreign and Security Policy and particularly in the context of the Capability Development Plan.</b></p> <p><b>In this regard, regional and international priorities, when they serve the Union's security and defence interests as determined under the Common Foreign and Security Policy, and taking into account the need to avoid unnecessary duplication, may also be taken into account, where appropriate, wherever they do not exclude the possibility of participation of any Member State or associated country.</b></p>	<p>(b) support collaborative development of defence products and technologies, thus contributing to greater efficiency of defence spending within the Union, achieving greater economies of scale, reducing the risk of unnecessary duplication and as such incentivising the market uptake of European products and technologies and reducing the fragmentation of defence products and technologies throughout the Union. Ultimately, the Fund will lead to an increase in the standardisation of defence systems and greater interoperability between Member States' capabilities.</p> <p>Such cooperation shall be consistent with defence capability priorities commonly agreed by Member States within the framework of the Common Foreign and Security Policy and particularly in the context of the Capability Development Plan.</p> <p>In this regard, regional and international priorities, when they serve the Union's security and defence interests as determined under the Common Foreign and Security Policy, and taking into account the need to avoid unnecessary duplication, may also be taken into account, where appropriate, wherever they do not exclude the possibility of participation of any Member State or associated country.</p>
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## 7.9 The 'Valley of Death'

The term 'valley of death' is sometimes used to refer to the juncture between R&T and R&D. In fact, this concept was much used at the turn of the 2000s in relation to new economy start-ups to characterise a situation of entrepreneurship in which the investments to be made are massive (as in defence), the technological risks are substantial (as in defence) and generally the companies are little or undercapitalised (a situation that varies in the defence sector depending on whether one speaks of 'prime' or subcontractor).

In concrete terms, the term relates to the period between the end of technological development and the placing of a product on the market (see diagram below). It refers to the financing difficulties that companies encounter at the end of research and development work in financing the technologies available in order to design, develop, qualify, produce and introduce a product on the market. This affects a high number of start-ups which, despite the promise of the technologies at their disposal, are unable to raise sufficient funds to bring them to the market.

Upstream of the design of the product as it will be proposed to the market, i.e., up to TRL 6 or even TRL 7 (see diagram below), cost is not a deterrent to risk as companies can benefit from public support in various forms (subsidies, innovation tax credit...), and/or there are enough 'venture capitalists' interested in assuming the risk in return for the expectation of a future gain. Downstream, once the product is commercialised, the company will be able to finance itself from the proceeds of sales and, if its business plan is sound, it will have no difficulty raising funds on the markets.

In-between, the company has to deal with the most important financing needs: final design and validation (TRL 7 and 8), production tool, marketing, setting up support for customers, etc. The more innovative the product, the higher the cost, due to the novelty. And public support at that stage is highly uncertain, apart from the fact that the amounts are significant, they can only be granted if a market failure is established and justified.

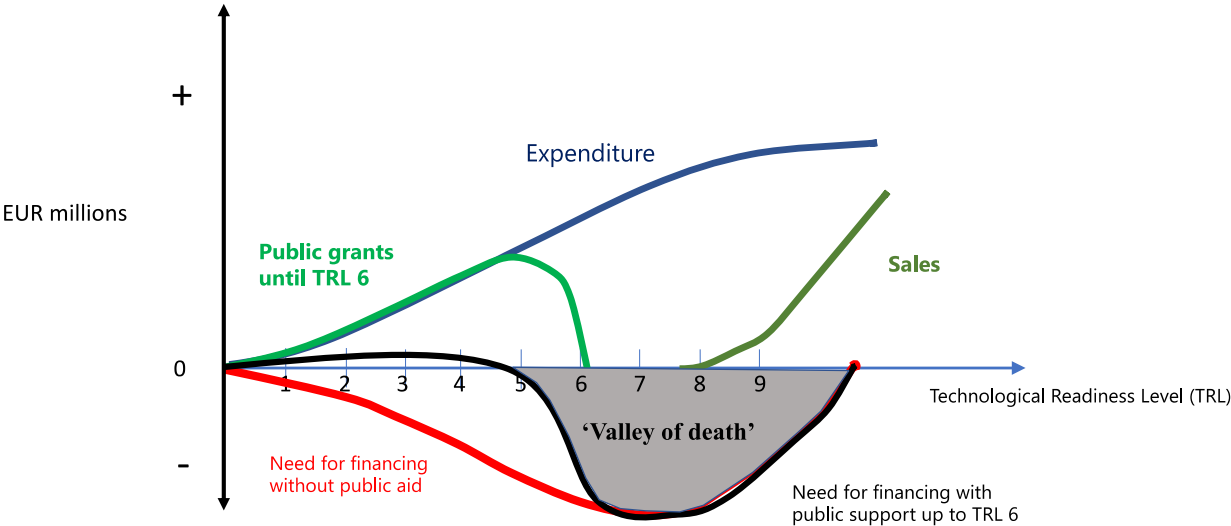
The initial under-capitalisation of start-ups or the discouragement of initial investors when the first cost overruns and delays have to be faced deprives in a very large number of cases the companies of the means to continue; hence the 'valley of death' effect.

In the defence sector, this effect does not apply to the major prime contractors, since, in those cases, the programme is funded from public money in its entirety and the market is guaranteed, or the contractor (generally well capitalised) takes a part of the risk on a transitional basis, based on promising export prospects for example.

However, it applies to SMEs in technological sectors, which do not have the government as a direct client. Even if the prime contractor may need them, they are reluctant to finance them because they consider that this is not their responsibility but rather, that of public authorities. However, unless strategic autonomy is at stake, governments are not always willing to do so as the work of SMEs often combines civil and military technologies.



# The gaps between Research and Development



Frédéric Mauro © 2021

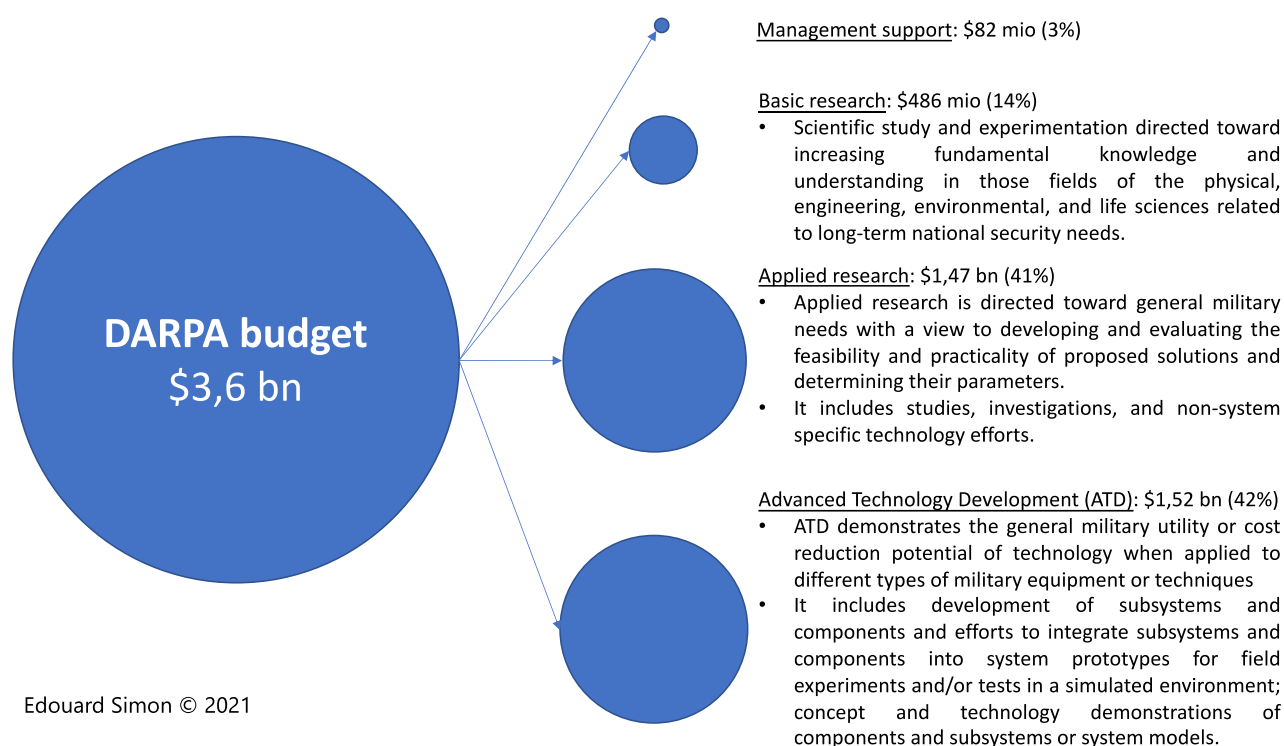
## 7.10 Lessons learned from DARPA

Following the launch of Sputnik by the USSR in 1957, the US Department of Defence (DoD) created 'an Agency for the direction and performance of certain advanced and research and development projects'. DARPA (Defence Advanced Research Projects Agency) was born in February 1958. Since then, the focus of DARPA has been to perform 'pivotal investments in breakthrough technologies for national security'.

### A consequent budget for transformational change

In 2020, DARPA had a budget of \$3.6 billion, more than threefold the EDF's € 1 billion annual budget, of which only € 45 to 90 million will be dedicated to disruptive technologies, i.e., a ratio of 40 to 1 in favour of DARPA in the best-case scenario for the EDF.

The focus of DARPA is to fund 'transformational change', i.e., to demonstrate the feasibility of technologies with very high impact. The expected output is therefore not a product but rather a transformation in the way people – in particular militaries – think. DARPA's support goes up to TRL 5 or 6. As a consequence, the structure of the DARPA budget is as follow:



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Source: US DoD 2020 budget estimates, March 2019, unclassified

## **An investment strategy focused on high-risk projects supported by highly skilled programme managers**

Unlike the EDF, DARPA is not based on calls for proposals but relies critically on its Programme managers. It focuses on people and ideas. The recruitment of these programme managers is not based on position ads, but on a more proactive approach. DARPA identifies academics working on potentially ground-breaking technologies. Once identified, future programme managers have to demonstrate 'how they will change the world'. This demonstration is first and foremost based on the 'Heilmeier catechism' – named after former DARPA director Georges Heilmeier who crafted the recruitment questionnaire. Answers have to be expressed with simple words but a high degree of precision. If DARPA recruiters are convinced, the candidate is hired.

### **'Heilmeier Catechism'**

Here are the 9 questions Programme Manager are required to answer in order to see their programme selected.

1. What are you trying to do? Articulate your objectives, using absolutely no jargon.
2. How is it done today, and what are the limits of current practice?
3. What's new in your approach and why do you think it will be successful?
4. Who cares?
5. If you're successful, what difference will it make?
6. What are the risks and the payoffs?
7. How much will it cost?
8. How long will it take?
9. What are the midterm and final 'exams' to check for success?

DARPA programmes shall be aggressive and entail a significant degree of risk. For each programme, metrics are defined, according to which improvements brought by the innovation shall be significant. DARPA has developed a strong culture of risk and failures are considered as being part of the innovation process. In practice, successes appear to slightly outnumber failures.

DARPA's attractiveness is based on several factors. Its reputation, first, is probably its main asset. Second, DARPA offers the possibility to programme managers to work on a very significant project, on which they probably could not have worked anywhere else. For some applicants, third, due to its link with US national security and defence, entering DARPA can be considered as a patriotic act. Fourth, working as a programme manager at DARPA generally outweighs the advantages – in terms of salary or location – provided by the private sector, including by the new information technology giants. Finally, experience as a DARPA programme manager is generally a significant career booster.

Programme managers are hired for a maximum of four years. They have 3 to 4 months to work on their idea and present it to a selection board. Once the programme is approved, the search for research and industrial partners is advertised, generally at global level. Non-US organisations can submit proposals as long as they comply with the required nondisclosure agreements, security regulations, export control laws,

and other potentially applicable provisions. In addition, country-to-country agreements may simplify the participation of foreign entities. This process is organised on a rolling basis and new programmes start every Monday.

### **Change at the service of defence, but also of the economy and society**

The ultimate objective of DARPA is to make transformational technologies available to the US army. However, it is not capability-driven. Documents such as the US National Security Strategy or the US National Defence Strategy are considered, but DARPA is not bound by them nor by any US defence planning process.

Instead, DARPA programme managers involve potential end-users from the very beginning of the programme. These end-users must be identified precisely at the 'Heilmeier Catechism' step. The objective is to have them contribute to the programme by giving feedback and opinions. However, their interest is not a prerequisite for the launch of a programme. For instance, the concept of stealth aircrafts was dismissed by the US air force at the beginning of the programme because the development of such a technology would have provoked a slight decrease in aircrafts performance. Eventually, the programme convinced them that the advantages significantly outweighed the disadvantages.

DARPA also encourages the commercial exploitation of results stemming from its unclassified programmes. Funded companies are free to commercially exploit these results. The high interest shown by certain Chinese Venture Capital funds in such innovations have led DARPA to develop an incubator to accompany their growth.

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