

# STRATEGIC INVESTMENT

Making geopolitical  
sense of the EU's defence  
industrial policy

By  
Daniel Fiott



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## The EUISS Chaillot Paper series

The *Chaillot Paper* series, launched in 1991, takes its name from the Chaillot hill in the Trocadéro area of Paris, where the Institute's first premises were located in the building occupied by the Western European Union (WEU). The hill is particularly known for the Palais de Chaillot which was the site of the signing of the UN Universal Declaration of Human Rights in 1948, and housed NATO's provisional headquarters from 1952 until 1959.

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# EXECUTIVE SUMMARY

Growing economic and geopolitical competition is forcing the European Union to rethink its place in the world. The new European Commission President Ursula von der Leyen has called for a 'geopolitical Commission' and 'technological sovereignty' for the Union in strategic sectors. EU defence industrial strategy is likely to feature among such political ambitions, and the creation of a new Directorate General for Defence Industry and Space within the Commission – along with the financial resources endowed under the European Defence Fund (EDF) – will raise questions about how EU institutions will view and attempt to influence the European defence sector. Such soul-searching has to probe the ways in which the European defence market is still strategically relevant and whether EU member states are genuinely committed to building a European Defence Technological and Industrial Base (EDTIB) beyond a desire to protect national markets – to the extent that these markets exist on a national basis, of course.

Although the EDF has been mainly justified by the need to nurture the competitiveness of Europe's defence industry, political rationales such as *why* Europe needs an industry from a defence or strategic perspective are equally relevant. This *Chaillot Paper* pushes back against a largely economic interpretation of why the EU should invest in the European defence industry. In doing so, this paper asks three inter-related questions: (i) how can economic and political factors be balanced in EU defence industrial policy?; (ii) what strategic considerations are driving forward defence innovation investments at the EU level?; and (iii) how can Union institutions ensure that investments in defence innovation evolve into tangible capabilities for EU defence?

With these three questions in mind, this *Chaillot Paper* puts forward two general observations. First, it argues that treating the defence sector as a mere subset of Europe's economy is

an error and the geopolitical shifts underway make the EDTIB a vital component of the EU's overall strategic toolbox. This is especially the case given that military technology is increasingly seen as a power amplifier for countries such as the United States, China and Russia. The development and protection of military technologies by these powers is likely to raise questions for Europe with regard to security of supply and industrial competition. This trend may nudge the EU towards a more comprehensive understanding of the relationship between technology and defence, but it also gives the Union an opportunity to think – or perhaps re-think – how it sees its overall defence policy.

Second, the paper draws on the academic literature on defence research and procurement to outline some of the pitfalls associated with technology and capability development. Of course, the European Defence Fund and Permanent Structured Cooperation (PESCO) offer the Union's institutions the chance to exponentially improve their knowledge of the defence sector in ways not possible before. As the paper shows, however, getting defence innovation and development at the EU level right is both a technical and a political process that raises critical questions about the type of defence actor the EU would ultimately aim to become.

For those unfamiliar with the workings of the defence industry, parts of this paper may seem confusing or technical: the reader will be confronted with terms such as the 'valley of death', 'offset strategies', 'Augustine's Law' and 'disruptive technologies'. Fear not, however. The aim of this paper is to elucidate key concepts in defence industrial policy as clearly as possible, but the recompense for grappling with these concepts will hopefully be a clear account of how the defence sector is an increasingly essential part of Europe's broader economy and strategic autonomy.

# INTRODUCTION

One of the major policy legacies that former President Jean-Claude Juncker and the European Commission will leave behind after 2019 is the creation of the European Defence Fund (EDF). Breaking a long-standing taboo that held that the EU should not use the Union's budgetary resources to invest in military capabilities, the Juncker Commission sought to make a difference in European defence by financially incentivising cooperation. Given that the EU is far from achieving strategic autonomy in defence, and bearing in mind also the geopolitical competition underway between the US and China, one has to be realistic about what can be achieved by the Fund over the short term – not least because €13 billion has been earmarked for the Fund, which, while significant for the EU, pales in comparison to most yearly national defence budgets in Europe. Furthermore, there is no guarantee that this amount will be secured. In this respect, one of the key challenges facing the Commission is to adequately frame how its foray into defence relates to the 'bigger picture' of international politics. Countries like the US, China and Russia are currently expending an enormous amount of intellectual energy and money on naming strategic competitors, thinking about how future conflict and war might be fought and calibrating military and civil technological advances (e.g. robotics and artificial intelligence) to the needs of their armed forces. Although the EU may not want to necessarily replicate the US or Chinese experience, there is clearly a need for the Union to think about how its political and commercial tools can more effectively align so as to enhance the EU's overall strategic autonomy and defence posture.

Furthermore, the Commission is embarking on investments in defence innovation and capability development at a time when the costs of defence technologies, equipment and systems continue to rise. Augustine's notorious 'law' dictates that ever more sophisticated and costly military technology, equipment and systems will mean that governments will buy less.<sup>1</sup> Notwithstanding the fact that more sophisticated weapons systems can result in more 'bang for the buck' on the battlefield, lower numbers of units and capabilities can affect military mass and contribute to a hollowing out of forces as high-tech solutions are used to replace personnel. What is more, within the confines of Augustine's law increasing levels of defence spending in Europe might not in itself be an answer to address Europe's military capability shortfalls. In this sense, one of the promising aspects of the Fund and other initiatives such as Permanent Structured Cooperation (PESCO) is that they could help facilitate a rationalisation and prioritisation of capability priorities and encourage collaborative projects that can offset the escalating costs of military technology. Of course, a related aspect to achieving such aspirations is how efficiently and speedily new bureaucratic structures and processes can help produce capabilities, especially given the relative speed with which countries like the US, China and Russia are bringing military technologies and capabilities onstream.

Relatedly, the Commission will soon have to contend with a challenging aspect of defence industrial development that has bedevilled a number of states: how to ensure the seamless and efficient crossover from the EU's investments in defence research and defence capability development. Under a host of defence

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1 Norman R. Augustine, *Augustine's Laws and Major System Development Programs* (Reston, VA: American Institute of Aeronautics and Astronautics, 1984).

programmes across the world, the relationship between research and the development of capabilities is not a given and investments in the early stages of defence research can be costly and difficult to 'pull through' to the prototyping, testing and production phases of a programme. This so-called 'valley of death' – where defence research projects perish without further development – means that the EU has to plan for ways to improve the crossover from research to development. Of course, initial outlays on defence research projects come with a degree of risk anyway, but the fact that the defence fund will have limited resources to begin with means that the EU will likely try to avoid 'funding failure' or, in other words, research projects that will demonstrably find it difficult to move to the development phase – at least for the next few years as the Fund gets under way. The flipside of this challenge is that avoiding riskier defence innovation projects in order to make it easier to pull them through the 'valley of death' may result in less technologically sophisticated capabilities at the development stage. Getting the balance right between investment risk management and innovation is a formidable challenge in defence.

Beyond these geopolitical and economic challenges, however, it is also unclear how the Fund will empower the European Commission politically within the EU's institutional milieu. The Commission is evolving from an actor that has in the past largely relied on its legislative powers to try and regulate the European defence market, but with the introduction of the Fund it is now in the privileged position of having a far greater say over what defence capabilities the EU member states could jointly develop. In this endeavour it will be supported by the creation of a new Directorate General (DG) for Defence Industry and Space. Naturally, the birth of a new communitarian body for defence raises questions about how it can work alongside existing intergovernmental institutions such as the European Defence Agency (EDA) and the EU Military Committee (EUMC).

**Getting the balance right between investment risk management and innovation is a formidable challenge in defence.**

However, the Commission's enhanced role in defence is not just a question of institutional arrangements and remits. Rather, the presence of the Commission raises a fundamental question about the very soul of EU defence co-operation – should it proceed in an intergovernmental fashion as it has done in the past, or is a more communitarian approach desirable in order to break through intergovernmental deadlock? There is somewhat of a tension between communitarian and intergovernmental understandings of EU defence.

In fact, the legal basis that has allowed the Commission to roll out the Fund derives from a desire to enhance the Union's overall industrial competitiveness – thus, it is a new DG for 'defence industry and space' and not just 'defence and space'. Of course, this legal basis allows the Commission to work towards reducing market fragmentation, enhancing innovation, avoiding capability duplication and boosting the Union's strategic autonomy. Yet the paradox of working mainly towards defence industrial competitiveness is that this may not necessarily serve to fill capability gaps that have been identified by ministries of defence,

the EDA and/or the EUMC. In other words, there will be a need to balance a technology-driven approach to defence investments that supports industry with a more capability-driven strategy that takes on board the needs of armed forces and governments (the so-called 'end users'). Such a balance presumes that there is coordination between the Union's intergovernmental and supranational bodies and a sound calibration

of military and industrial needs. In this respect, it is legitimate to ask how the Fund (a communitarian tool) and PESCO (an intergovernmental structure) will be combined to produce capabilities given that each initiative engenders a different governance structure and way of organising EU defence cooperation. How defence capabilities will be prioritised at the EU level will be a test for how the Union's defence planning process evolves over time.

However, for all of the impressive efforts to stimulate EU security and defence since the EU Global Strategy, there remain challenges and important questions when it comes to defence industrial matters. Notwithstanding the fact that it is too early to assess the impact of the Fund and PESCO on defence capability development, EU defence initiatives are giving rise to a level of expectation that has not been witnessed before. We will see if these expectations can be truly met after the final negotiations for the Multi-Annual Financial Framework (MFF). Here, there is a question about how fast the Fund and PESCO can deliver capabilities to meet the growing and diverse list of security and defence challenges facing Europe. Geopolitical trends indicate that the EU will have to act far more rapidly and politically when it comes to defence. In particular, the transatlantic relationship is undergoing a profound change in areas such as trade, multilateralism, security and defence. The US has made no secret of its suspicion of the Union's defence efforts, especially where Washington believes they negatively affect US industrial interests.<sup>2</sup> Relatedly, the EU has over the past three years engaged in a reflection about its strategic autonomy in terms of how it will support the multilateral order, enhance European security and the ways in which it can become a more credible defence actor *vis-à-vis* its close international partners.<sup>3</sup>

Against this background, there is a need to analyse the new EU defence initiatives in light of the rapidly shifting geopolitical trends. Due to the fact that the European Defence Fund has been mainly justified by the need to nurture the competitiveness of Europe's defence industry, political rationales such as *why* Europe needs a defence industry from a military and/or strategic perspective have often been eclipsed. This

**EU defence initiatives are giving rise to a level of expectation that has not been witnessed before.**

*Chaillot Paper* challenges the notion that the EU should invest in the European defence industry primarily for economic reasons. In doing so, the paper asks three inter-related questions: (i) how can economic and political factors be balanced in EU defence industrial policy?; (ii) what strategic considerations are driving forward defence innovation investments at the EU level?; and (iii) how can the Union's institutions ensure that investments in defence innovation evolve into tangible capabilities for EU defence?

With a view to answering these three questions, the *Chaillot Paper* is divided into three chapters. Chapter one looks at the political and economic rationales for sustaining a European Defence Technological and Industrial Base (EDTIB) in light of changes in the nature of the global defence market. It is here that the paper focuses on how the EU prioritises defence capabilities and it comments on the governance of EU defence since the introduction of PESCO and the EDF. Building on this debate, chapter two zooms in on the rationales for sustaining an EDTIB from a military and/or strategic perspective and asks how the EU's strategy towards the EDTIB differs from that of the US, China or Russia. In light of the growth of defence offset strategies and the ways in which some governments seek to harness technologies in the civil and military domains to accentuate their military force, this chapter asks if the EU has its own offset strategy. Finally, chapter three assesses how the EU can ensure that its defence investments can cruise over the 'valley of death'. Given that the EU is preparing to fund both research and capability development, this chapter looks at the challenges of connecting the two under the defence fund.

2 Daniel Fiott, "The Poison Pill: EU Defence on US Terms?", *EUISS Brief*, no. 7, June 2019.

3 See for example, Daniel Fiott, "Strategic Autonomy: Towards 'European Sovereignty' in Defence?", *EUISS Brief*, no. 12, November 2018; Mark Leonard et al. "Redefining Europe's Economic Sovereignty", *Bruegel Policy Contribution*, no. 9, June 2019; Giovanni Grevi, "Strategic Autonomy for European Choices: The Key to Europe's Shaping Power", *European Policy Centre Discussion Paper*, July 19, 2019.

## CHAPTER 1

# MARKET FORCES

## Generating competitiveness and capabilities

In the space of three years since 2016, the European Commission has invested €1.4 million in feasibility studies for unmanned swarm systems and sensor and data fusion to enhance combat situational awareness in an urban environment. It has used a further €90 million to develop maritime surveillance capacities, adaptive camouflage, soldier sensor and communication devices, ultralight body armour and a high-power laser effector. What is more, in 2019 the amount of €500 million has been earmarked for investment in unmanned ground systems, next generation ground-based precision strike capabilities, air combat capabilities, future naval platforms and more. This step forward does not just symbolise the Commission's new-found allure for defence technologies or money, however. In fact, with such investments the Commission has evolved from a legislative player into a major investor in the defence sector. Before the Fund, the Commission tried to shape the European defence market through two directives agreed in 2009 that were designed to open up the defence equipment market and ensure fairer practices in relation to the awarding of defence procurement contracts.<sup>1</sup> To put it more simply, the Commission has

traditionally tried to graft established single market rules onto the defence sector.<sup>2</sup>

Today, this traditional approach is up for debate. Although the legislative tools remain relevant as a way of shaping the defence market over the longer term, the introduction of the EDF means that the Commission can use EU investments to shape defence capability prioritisation and incentivise greater defence cooperation between EU member states. Moreover, the legal basis for the Fund is geared towards ensuring the economic competitiveness of the European defence industry. More specifically, Article 173 TFEU makes clear that the Commission's main objective is to support industry and Article 182 TFEU seeks to improve the scientific and technological base of the EU. However, investments in defence rarely ever solely address economic competitiveness and so it is necessary to assess how the Commission will balance economic and political considerations when structuring the Fund. For example, it is pertinent to ask whether the requirements of industry and those of the end-users of defence capabilities (i.e. governments and militaries) are compatible. There is quite clearly

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<sup>1</sup> Daniel Fiott, *Defence Industrial Cooperation in the European Union: The State, the Firm and Europe* (Oxon/New York: Routledge, 2019).

<sup>2</sup> One key way in which the Commission tried to shape the defence market in Europe was by challenging EU member states on their right to invoke Article 346 of the Treaty on the Functioning of the EU (TFEU). This treaty provision implies that member states can bypass EU internal market rules when it relates to defence, and when they feel that the disclosure of information or open procurement procedures would jeopardise their essential security interests. See European Commission, "Interpretative Communication on the Application of Article 296 of the Treaty in the Field of Defence Procurement", COM(2006) 779 final, Brussels, December 7, 2006. See also Gueorgui Ianakiev, "Defence Offsets: Regulation and Impact on the Integration of the European Defence Equipment Market", in Renaud Bellais (ed.) *The Evolving Boundaries of Defence: An Assessment of Recent Shifts in Defence Activities* (Bingley: Emerald, 2014), pp. 251–69.

also a need to probe whether the Commission's role in defence, and the communitarian method of integration it advances and embodies, will fundamentally alter the intergovernmental nature of defence at the EU level.

To this end, this chapter addresses our first research question: how can economic and political factors be balanced in EU defence industrial policy? Accordingly, this chapter is structured into two main parts. Part one looks at the Commission's role in defence and ponders the nature of the defence market in the context of greater geopolitical rivalry. Part two then assesses the way in which political and economic factors are managed by institutions such as the Commission and the EDA.

## **How much autonomy can be achieved in defence without creating unsustainable financial commitments or tanking the economy?**

dilemma' that was traditionally reserved for national governments. This 'dilemma' can be defined as follows: how much autonomy can be achieved in defence without creating unsustainable financial commitments or tanking the economy?<sup>4</sup> To maintain this balance, governments that seek to nurture their military power have maintained a defence industry to: (i) stimulate economic growth by producing spin-off technologies from military Research and Development (R&D); (ii) maintain scientific technology; (iii) safeguard industrial capacity; (iv) produce cutting-edge military technologies; (v) secure their political autonomy.<sup>5</sup>

Given this range of rationales for maintaining a defence industry, it will be necessary for the Commission to justify how money has been invested and how its programmes can simultaneously contribute to EU strategic autonomy, operational effectiveness and competitiveness. At the end of the next MFF in 2027, the Commission will have to return to the European Parliament and EU member state governments in the Council to make a case for future investments in EU defence – and potentially with a request for a larger financial envelope too. Of course, we do not know what the tenth legislature will look like in 2024 but the political composition of the Parliament at that time could have a dramatic effect on the future of the Fund post-2027. How the Commission will prioritise defence in the future and whether or how far it will try to increase the financial size of the Fund could symbolise a coming of age for the EU institutions in the area of defence.

## **BEYOND GROWTH**

The idea that the defence market is a unique sector is not a controversial point as far as defence industrial policy at the EU level is concerned. The defence market is a unique segment of the overall economy that designs, produces and sells weapons, systems and technologies. Countless documents produced by the Commission and the EDA have urged member states to cooperate on defence so as to generate capabilities, maintain skills, develop technologies and manage costs.<sup>3</sup> What is perhaps noteworthy, however, is that with the introduction of the Fund EU institutions will increasingly have to pay attention to the type of 'autarky-efficiency

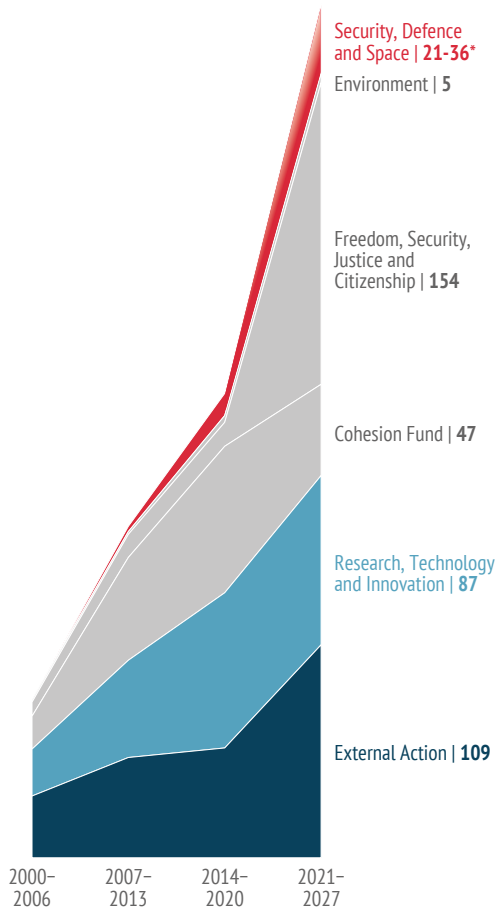
<sup>3</sup> For example, see European Defence Agency, "A Strategy for the European Defence Technological and Industrial Base", Brussels, May 14, 2007; European Commission, "European Defence Action Plan", COM(2016) 950 final, Brussels, November 30, 2016.

<sup>4</sup> Andrew Moravcsik, "Arms and Autarky in Modern European History", *Daedalus*, vol. 120, no. 4 (1991): pp. 23 and 38; David L.I. Kirkpatrick, "Trends in the Costs of Weapon Systems and the Consequences", *Defence and Peace Economics*, vol. 15, no. 3 (2004): pp. 259–73.

<sup>5</sup> Jeremy Black, *War and Technology* (Bloomington/Indianapolis: Indiana University Press, 2013).

**FIGURE 1 | The evolution of the Multi-annual Financial Framework**

2000–2027, current € billions



\* This amount includes Commission proposals for €6.5 billion for military mobility, €16 billion for the space programme and €13 billion for the European Defence Fund (calculated in current prices). In the 'negotiating boxes' set on 5 December 2019 by the Council of the EU, these amounts were considerably lower: €6 billion for the EDF, €2.5 billion for military mobility, €12.7 billion for the space programme (calculated in constant prices 2018).

Data: European Commission, 2018 and 2019

One of the key ways in which the Commission may have to justify further investments

in EU defence is how it has used the Fund over 2021–2027 to support small and medium-sized enterprises (SMEs) and 'mid-caps' and how this is done so in a geographically balanced manner.<sup>6</sup> Inevitably, governments and parliaments will enquire whether the Fund is reaching these areas of the defence sector in Europe. Some member state governments will be largely interested in ensuring that their firms profit from the Fund fairly, i.e. in a way that recoups national contributions to the Fund through the EU budget. Others, however, will keep in mind both economic and strategic considerations such as national security and whether the ED-TIB can pave the way for more strategic autonomy in European defence. Because defence markets are characterised by a higher degree of state intervention, governments – as the main customers of weapons systems and equipment and market regulators<sup>7</sup> – are keen to ensure that national DTIBs benefit from sometimes sparse investments. In this sense, compared to open markets the defence sector can be described as monopsonistic – a market with only a handful of buyers: governments.

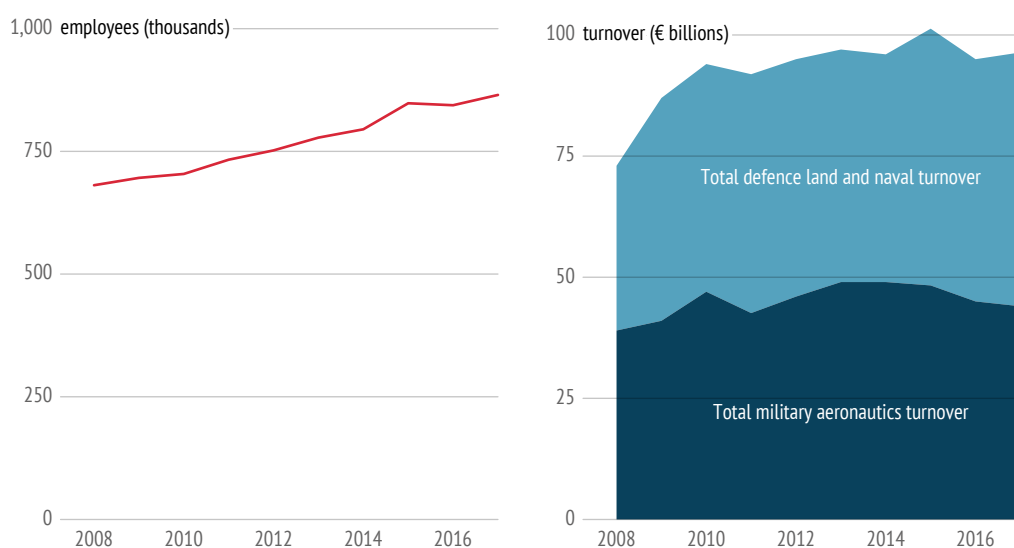
However, this logic will have to be broken for projects supported by the Fund because the Commission has clearly stated that 'projects with significant cross-border participation by small and medium-sized enterprises will be particularly encouraged. This will ensure that the Fund remains open to recipients from all member states, regardless of their size and location in the Union'.<sup>8</sup> While it would be wrong for governments and industry to interpret the Fund as merely a subsidy for national defence industries, the political case for the EU investments in defence will have to be continuously made in the face of national budgetary and defence discussions. This will not be so simple. Discussions about defence markets are notoriously prone to focusing on economic

<sup>6</sup> The European Commission defines a 'mid-cap' firm as an enterprise that has up to 3,000 employees and an 'SME' as one that has up to 250 staff with an annual turnover of less than €50 million. See: European Commission, "Proposal for a Regulation Establishing the European Defence Fund", COM(2018) 476 final, Brussels, June 13, 2018, p. 22; European Commission, "Recommendation concerning the definition of micro, small and medium-sized enterprises", C(2003) 1422, Brussels, May 6, 2003, p. 39.

<sup>7</sup> Henrik Heidenkamp, John Louth and Trevor Taylor, "The Defence Industrial Triptych: Government as Customer, Sponsor and Regulator", Whitehall Paper, no. 81 (2013), Royal United Services Institute, London.

<sup>8</sup> Op.Cit., "Proposal for a Regulation Establishing the European Defence Fund", p. 2.

FIGURE 2 | Turnover and employment in the European defence sector  
2008–2017



All figures are provided by 26 ASD Europe association members (approximately 3,000 companies) and one must be cautious about the reporting of general figures per year. The data nevertheless give us an indication of the main trend lines.

Data: ASD Europe, 2012–2018

competitiveness and protectionism. On the one hand, some believe that the European defence market should be governed by the principles of free market procurement and open competition.<sup>9</sup> On the other hand, others argue that a more market intervention approach (or an ‘industrial strategy’) is needed that safeguards supply chains, protects European jobs and skills and ensures that European firms can maintain and extend their business.<sup>10</sup>

Getting this balance right in the context of defence globalisation is crucial for the EU. It is certainly true that ‘global capital flows, greater scientific and industrial collaboration, faster and more efficient forms of transportation and, above all,

the information revolution’ have hastened the globalisation of defence.<sup>11</sup> Globalisation has greatly supported the European defence industry, but in a strange manner. In fact, firms have used global markets to export arms and equipment to foreign governments, but only because domestic demand on the back of decades of decreasing defence budgets has up until recently been in chronic decline in Europe. Yet we should not take the importance of defence globalisation too far. The reality is that, as it starts to invest in defence technologies and capabilities, the Union will need to think more strategically about how it balances market openness and strategic and industrial autonomy. While many European firms profit

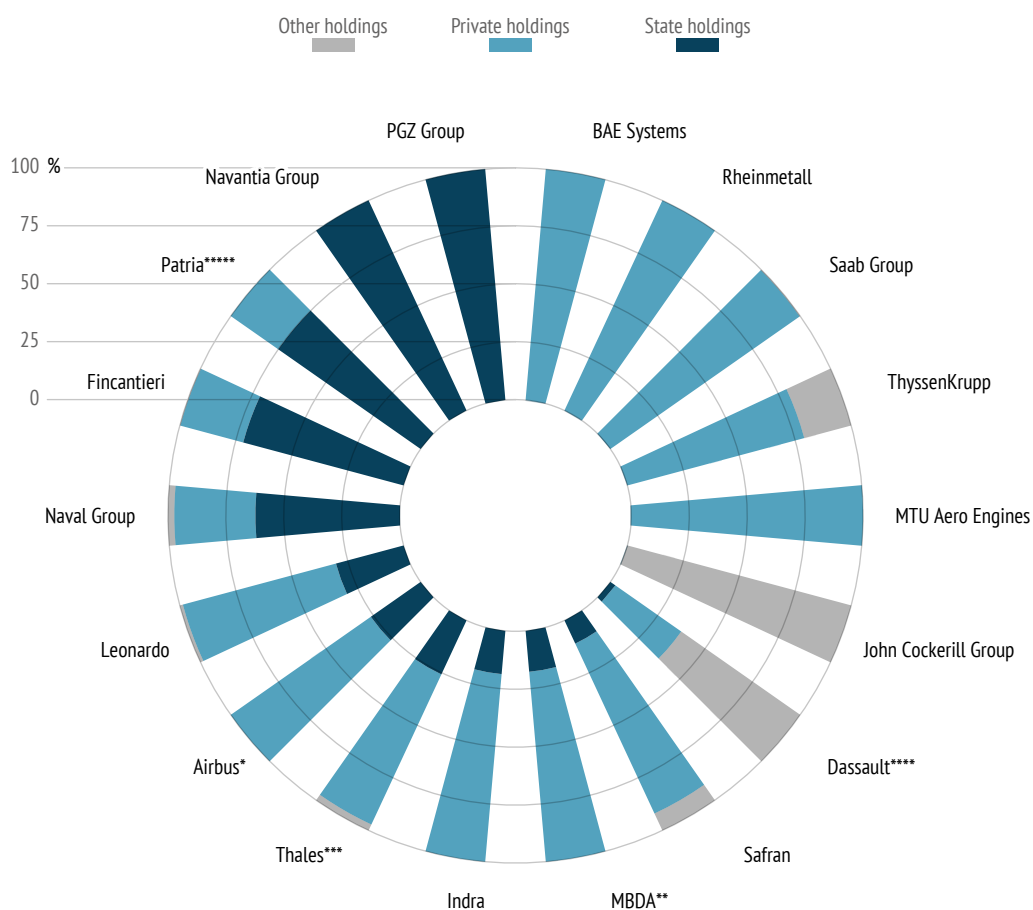
**The Union will need to think more strategically about how it balances market openness and strategic and industrial autonomy.**

<sup>9</sup> Keith Hartley, *The Economics of Defence Policy* (London: Brassey's, 1991), p. 105.

<sup>10</sup> Ibid., p. 31.

<sup>11</sup> Renaud Bellais, Martial Foucault and Jean-Michel Oudot, *Économie de la défense* (Paris: La Découverte, 2014), p. 21.

**FIGURE 3 | Shareholdings in European defence firms**  
2017–2018



\* 73.8% of Airbus shares are privately held through free floated shares. The 26.2% of state holdings are divided between France (SOGEPa 11%), Germany (GZBV 11%) and Spain (SEPI 4.2%)  
 \*\* MBDA is a joint venture between Airbus (37.5% shareholding), BAE Systems (37.5%) and Leonardo (25%). Taken together these three companies represent government shareholdings of 17.7% (Airbus 9.9% and Leonardo 7.8%) and 82.3% in private shareholdings (Leonardo 17%, BAE Systems 37.5% and Airbus 27.7%).  
 \*\*\* Dassault Aviation has a 24.63% stake in Thales.  
 \*\*\*\* 9.9% of Dassault's shares are held by Airbus. 2.6% of this share is held by the French, German and Spanish governments and the remaining 7.3% by private holders.  
 \*\*\*\*\* Patria is 50.1% owned by the Finnish state. The remaining 49.9% is held by Kongsberg Defence and Aerospace AS, but this company is owned by Kongsberg Gruppen ASA (which is 50.001% owned by the Norwegian state).

Data: Various sources, 2018 and 2019

greatly from open markets, a range of considerations such as strategic defence exports, supply chain security and the foreign ownership of EU defence firms come into play. What looms on the horizon for the EU are answers to questions about what defence technologies the Union should be autonomous in, and whether member states have the appetite to ensure strategic autonomy in European defence.

Such considerations obviously require more than just an economic assessment of what is best for individual national interests in the short term. Just as the Commission is coming of age as a defence actor, its responsibilities for weighing up economic and political factors when investing in defence come at a time when the relationship between technology and political power is under the spotlight. The recent controversy over the security vulnerabilities that may arise when buying technologies such

as 5G from Huawei (a Chinese company) highlights that technology cannot be disassociated from political issues like trade dependencies and strategic autonomy. Although Europe needs to up its investments in key technology areas, there is a need to analyse the ways in which the procurement of defence technologies and/or components from certain foreign sources can lead to harmful dependencies. As one paper puts it, the ‘EU’s ability to defend and promote its interests, as well as its credibility as a strong foreign policy actor, will largely be a function of its cyber resilience and technological command’.<sup>12</sup>

While initiatives such as the 2019 Regulation on EU investment screening<sup>13</sup> are evidence of progress in the way the Commission thinks about critical technologies, with the increasing digitalisation of defence comes the need to ensure that the vulnerabilities inherent in civilian technologies adapted for defence (e.g. chipboards, sensors, software, control systems, microelectronics, etc) are managed as and when they are integrated into defence platforms or systems. Clearly, managing the inherent vulnerabilities of dual-use or defence technologies that are susceptible to harmful external shocks, manipulation and dependencies is a critical element of any notion of strategic autonomy and this type of reflection surely goes well beyond the idea of competitiveness. As one European Commissioner recently put it, ‘the reality is that European countries are increasingly vulnerable to external pressure that prevents them from exercising their sovereignty – especially in the technological domain.’ As the EU feels

## **A**ddressing the broader relationship between geopolitics and technology is not an easy one for the EU.

its way into a ‘geotech world’, it needs to ‘address the interlinked security and economic challenges that other actors present to [the Union]’.<sup>14</sup> Such a debate will clearly mean focusing on the key strategic technology areas in which the EU could become autonomous.

However, addressing the broader relationship between geopolitics and technology is not an easy one for the EU. In fact, countries such as the US, China and Russia – while embodying different types of market economy – have little compunction about regulating and intervening in key industrial and technology sectors.

This is most clearly seen in the context of trade policy, where a ‘geopoliticisation of trade’ is underway between Washington and Beijing. Tit-for-tat trade disputes between these two actors provide further evidence of the way in which some states are testing the established international consensus on free trade, multilateralism and open competition. This is not to say that free trade is in peril. The

EU, for example, has established (or is seeking to establish) its own network of free trade agreements with likeminded actors such as Australia, Canada, Indonesia, Japan and Singapore.<sup>15</sup> Nevertheless, what is compelling about the US’s, China’s and Russia’s trade, industrial and military strategies is how much emphasis they place on developing and protecting key technologies on a domestic basis. The US currently stresses its faith in free markets and innovation, but only to the extent that American business can thrive.<sup>16</sup> China, which imposes more trade and investment barriers to its domestic market than any other country, is

12 “Rethinking Strategic Autonomy in the Digital Age”, *EPSC Strategic Notes*, no. 30 (July 2019), European Political Strategy Centre, p. 1.

13 European Parliament and Council of the EU, “Regulation Establishing a Framework for the Screening of Foreign Direct Investments into the Union”, *Regulation 2019/452*, Brussels, March 19, 2019.

14 “Commissioner King’s remarks at the 2019 Digital Resilience Summit of the Lisbon Council”, September 24, 2019, [https://ec.europa.eu/commission/commissioners/2014-2019/king/announcements/commissioner-kings-remarks-2019-digital-resilience-summit-lisbon-council\\_en](https://ec.europa.eu/commission/commissioners/2014-2019/king/announcements/commissioner-kings-remarks-2019-digital-resilience-summit-lisbon-council_en).

15 Sophie Meunier and Kalypso Nicolaidis, “The Geopoliticization of European Trade and Investment Policy”, *Journal of Common Market Studies*, vol. 57, no. no. S1 (2019), pp. 103–13.

16 Office of Science and Technology Policy, “America Will Dominate the Industries of the Future”, February 7, 2019, <https://www.whitehouse.gov/briefings-statements/america-will-dominate-industries-future/>.

also currently championing its 'Made in China 2025' industrial policy to support domestic industry and technological development.<sup>17</sup>

As far as Europe is concerned, free markets and competitiveness are norms that are hardwired into the EU single market. It is, therefore, difficult at the EU level to speak about 'industrial policy', and what more the Union can do to actively support European firms and technology sectors, without leading to accusations of protectionism. EU member states do not necessarily see eye-to-eye with the European Commission on the balance between industrial policy and open competition. For example, when the Commission prohibited the planned merger between Siemens and Alstom in February 2019 they did so under the rationale that it would have harmed competition in the railway market and resulted in higher prices for consumers.<sup>18</sup> The French and German governments were not pleased with this decision because they argued that it precluded the creation of a 'European champion' able to withstand international competition from China and other countries.<sup>19</sup> The tension between openness and protection will be a key challenge for the Union over the next five years, and the defence industry is not immune to these debates. In particular, as the Fund embeds itself in the EU defence policy

landscape there will inevitably be questions about whether the potential emergence of 'European champions' in the defence market will fall foul of EU competition rules too.

The inherent tension between openness and protection, and how the Union should balance

## **The tension between openness and protection will be a key challenge for the Union over the next five years.**

competition and industrial policy in the coming years, is made all the more complicated by the continued fusion of civil and defence technologies. Space and defence is one such area. This is why the Union's Space Strategy speaks of space's strategic relevance,<sup>20</sup> and why the EU Global Strategy calls for the Union to 'promote the autonomy and security of [its] space-based

services' as part of a set of full-spectrum capabilities in defence.<sup>21</sup> Today, and increasingly in the future, space will be the theatre of cyberattacks and the use of weapon systems potentially endowed with directed energy and hypersonic capabilities.<sup>22</sup> The EU clearly has a vested interest in protecting Galileo and Copernicus, but future European defence programmes such as the Future Combat Aircraft System (FCAS) are also likely to rely on secure space assets for sensing, positioning and communication. While the EU is already investing in space under the Fund and PESCO,<sup>23</sup> the fact that the next MFF (2021–2027) could see a total budget allocation of €29 billion for the EU space programme and

17 Martina F. Ferracane and Hosuk Lee-Makiyama, "China's Technology Protectionism and its Non-Negotiable Rationales", European Centre for International Policy Economy, 2017, p. 3, [https://ecipe.org/wp-content/uploads/2017/06/DTE\\_China\\_TWP\\_REVIEWED.pdf](https://ecipe.org/wp-content/uploads/2017/06/DTE_China_TWP_REVIEWED.pdf).

18 European Commission, "Mergers: Commission prohibits Siemens' proposed acquisition of Alstom", *Press Release IP/19/881*, February 6, 2019, [https://europa.eu/rapid/press-release\\_IP-19-881\\_en.htm](https://europa.eu/rapid/press-release_IP-19-881_en.htm). See also European Political Strategy Centre, "EU Industrial Policy after Siemens-Alstom: Finding a New Balance between Openness and Protection", March 18, 2019, [https://ec.europa.eu/epsc/sites/epsc/files/epsc\\_industrial-policy.pdf](https://ec.europa.eu/epsc/sites/epsc/files/epsc_industrial-policy.pdf).

19 Konstantinos Efstathiou, "The Alstom-Siemens Merger and the Need for European Champions", *Bruegel Blog Post*, March 11, 2019, <https://bruegel.org/2019/03/the-alstom-siemens-merger-and-the-need-for-european-champions/>.

20 European Commission, "Space Strategy for Europe", *COM(2016) 705 final*, Brussels, October 26, 2016.

21 High Representative of the Union for Foreign Affairs and Security Policy, "Shared Vision, Common Action: A Stronger Europe – A Global Strategy for the European Union's Foreign and Security Policy", Brussels, June 2016, p. 42.

22 Countries such as France have recently announced their intention to create a military space command and to launch armed surveillance satellites from 2023 to protect French satellites in orbit. Florence Parly, "Présentation de la stratégie spatiale de défense", Lyon, July 25, 2019, [https://www.defense.gouv.fr/salle-de-presse/discours/discours-de-florence-parly/discours-de-florence-parly\\_presentation-de-la-strategie-spatiale-de-defense](https://www.defense.gouv.fr/salle-de-presse/discours/discours-de-florence-parly/discours-de-florence-parly_presentation-de-la-strategie-spatiale-de-defense).

23 The two projects are: (i) EU Radio Navigation Solution (EURAS) which specifically promotes an EU military positioning, navigation and timing capability that takes advantage of Galileo; and (ii) European Military Space Surveillance Awareness Network (EU-SSA-N) which focuses on developing an autonomous capability to protect European space assets and services from natural and man-made threats.

the Fund means there is greater scope to outline how the EU can combine its civil and defence investments in key strategic areas.

## THE POLITICS OF PRIORITISATION

In addition to the requirement to balance the host of political and economic considerations involved in EU defence investments, comes a need to reflect upon the overall governance of the EDF and how the Fund connects to initiatives such as PESCO. In essence, the introduction of new EU defence initiatives has not done away with long-standing debates about intergovernmentalism and supranationalism – if anything, the new initiatives may actually accentuate the relationship between the two ‘isms’. On the one hand, scholars have pointed out that intergovernmentalism is essentially about member state governments staying in control of the pace and direction of EU defence integration.<sup>24</sup> On the other hand, certain analysts have suggested that increasing levels of supranationalism could lead to a fundamental re-shaping of EU defence without the traditional barriers imposed by governments.<sup>25</sup> While others have pointed to an increased blurring of lines between the two ‘isms’ in defence,<sup>26</sup> it can be observed that the Fund and PESCO at least hold out the possibility of two distinct – albeit potentially complementary – forms of EU defence cooperation that cannot be so easily discounted.

Of course, it is logical that EU institutions have stressed the rightful need to guarantee complementarity between the Union’s new defence initiatives. The ultimate goal is to ensure that financial support under the Fund can feed into PESCO projects as seamlessly as possible, and that duplication between the two initiatives is avoided at all costs. Institutions and member states have a vested interest here, especially because it is foreseen that PESCO projects could benefit from increased financial resources if supported by the Fund.<sup>27</sup> What is unclear, however, is how the individual governance structures of the EDF and PESCO will be interpreted by member state governments. On the one hand, the Fund is governed through the comitology procedure,<sup>28</sup> which gives the Commission the key role in mediating between member state preferences and, ultimately, deciding which defence capability programmes to fund. On the other, PESCO projects are selected by the unanimity principle and by the EDA and EEAS (the ‘PESCO Secretariat’) helping to generate consensus among member states for projects. Although all PESCO members have committed to using the new and existing EU defence instruments in a complementary fashion under the PESCO binding commitments, there is no sanctioning mechanism to compel member states to simultaneously use PESCO and the EDF all of the time.

When the two initiatives and governance structures are carefully compared, a series of questions arise. Firstly, we need to ask what governance structure will take precedence when PESCO projects are supported by the Fund. Here it is unclear whether supranational institutions have a greater influence over the capability programmes selected in PESCO

24 Daniel Fiott, “Patriotism, Preferences and Serendipity: Understanding the Adoption of the Defence Transfers Directive”, *Journal of Common Market Studies*, vol. 55, no. 5 (2017), pp. 1045–61.

25 Pierre Haroche, “Supranationalism Strikes Back: A Neofunctionalist Account of the European Defence Fund”, *Journal of European Public Policy*, (early online view) doi: 10.1080/13501763.2019.1609570.

26 Jolyon Howorth, “Decision-making in Security and Defence Policy: Towards Supranational Intergovernmentalism?”, *Cooperation and Conflict*, vol. 47, no. 4 (2012), pp. 433–53.

27 The Fund will support prototype development by up to 20% of eligible costs but for PESCO projects supported by the EDF this ceiling could rise to 30%.

28 ‘Comitology’ refers to a specific procedure whereby the Commission has been granted implementing powers that allow it to adopt decisions through a committee composed of EU member states. Each member state has a vote on a particular decision in the committees and the implication is that such committees are not just a source of technical expertise but also empower the Commission to reach a decision without necessarily being hampered by intergovernmental deadlock or consensus. Under Article 28 of the proposed Regulation for the EDF, a committee will be established and intergovernmental bodies such as the EDA and EEAS will only be invited as observers.

or whether EDF programmes will be subject to intergovernmental management via PESCO. Secondly, over the longer term it is important to assess how member states will view both initiatives in terms of their own national defence industrial preferences. In essence, PESCO could be used as a way to assert intergovernmental control over the nascent EU defence planning architecture, even if this leads to the familiar deadlock that has been experienced by purely intergovernmental approaches to EU defence cooperation in the past. Alternatively, those member states that are impatient or dissatisfied with the drawbacks of intergovernmentalism might prefer to launch capability programmes only under the Fund without relying on PESCO's intergovernmental governance structure. This strategy would assume that member states are willing to empower the Commission to play a lead role in prioritising defence capabilities, even if it means that their defence industry may not always benefit from EDF investments. Such considerations are likely to continue to inform debates about the complementarity of the Fund and Permanent Structured Cooperation.

In order to manage the potential tension between supranational and intergovernmental governance models in defence, the EU treaties single out the High Representative of the Union for Foreign and Security Policy and Vice-President of the European Commission (HR/VP) as the individual or institution responsible for ensuring coordination between the EU's supranational and intergovernmental bodies, structures and policy tools as they pertain to the EU's external action (see Article 18 Treaty on European Union (TEU)). The recent mission letter from European Commission President von der Leyen to HR/VP Josep Borrell has underlined this role by stressing that he is responsible for ensuring 'that all of [the Commission's] work linked to defence is

coherent and consistent'.<sup>29</sup> This follows a May 2019 report by the former HR/VP Mogherini on the coherence and interlinkages between EU defence initiatives. This report stresses the need to ensure that existing policy initiatives fit together sequentially, so that, for example, the Coordinated Annual Review on Defence (CARD) process of identifying avenues for cooperation on defence projects is completed before EDF or PESCO projects are initiated. Beyond timing, however, the report also emphasises the need to embed EU processes in national defence planning to enhance member state ownership and to link capability needs more closely with the requirements of the Common Security and Defence Policy (CSDP).<sup>30</sup>

To enhance capability prioritisation, a specific initiative is being pioneered by the EDA with the blessing of the Council in the form of the Strategic Context Cases (SCCs). Although the Agency has long presided over the Capability Development Plan (CDP), the Plan has been subject to criticism on the basis that the 11 capability priority areas<sup>31</sup> that it covers are too broad and are not specific enough to allow for concrete priority projects to be identified. Despite the fact that CDP priority areas encompass Europe's wider capability development efforts (e.g. the CDP priorities can be taken up by member states outside of EU structures too), the SCCs are the Agency's response to the broad nature of the CDP. In essence, the SCCs document in detail how the member states can collectively fill a capability shortfall over short (up to 2024), medium (2025–2034) and long-term (2035 and beyond) timeframes. The Agency is in the process of drafting an SCC for each CDP priority area, which will detail avenues of approach to cooperation and allow member states to perceive the potential obstacles to developing a particular capability together. For example, if a group of member states wants to address

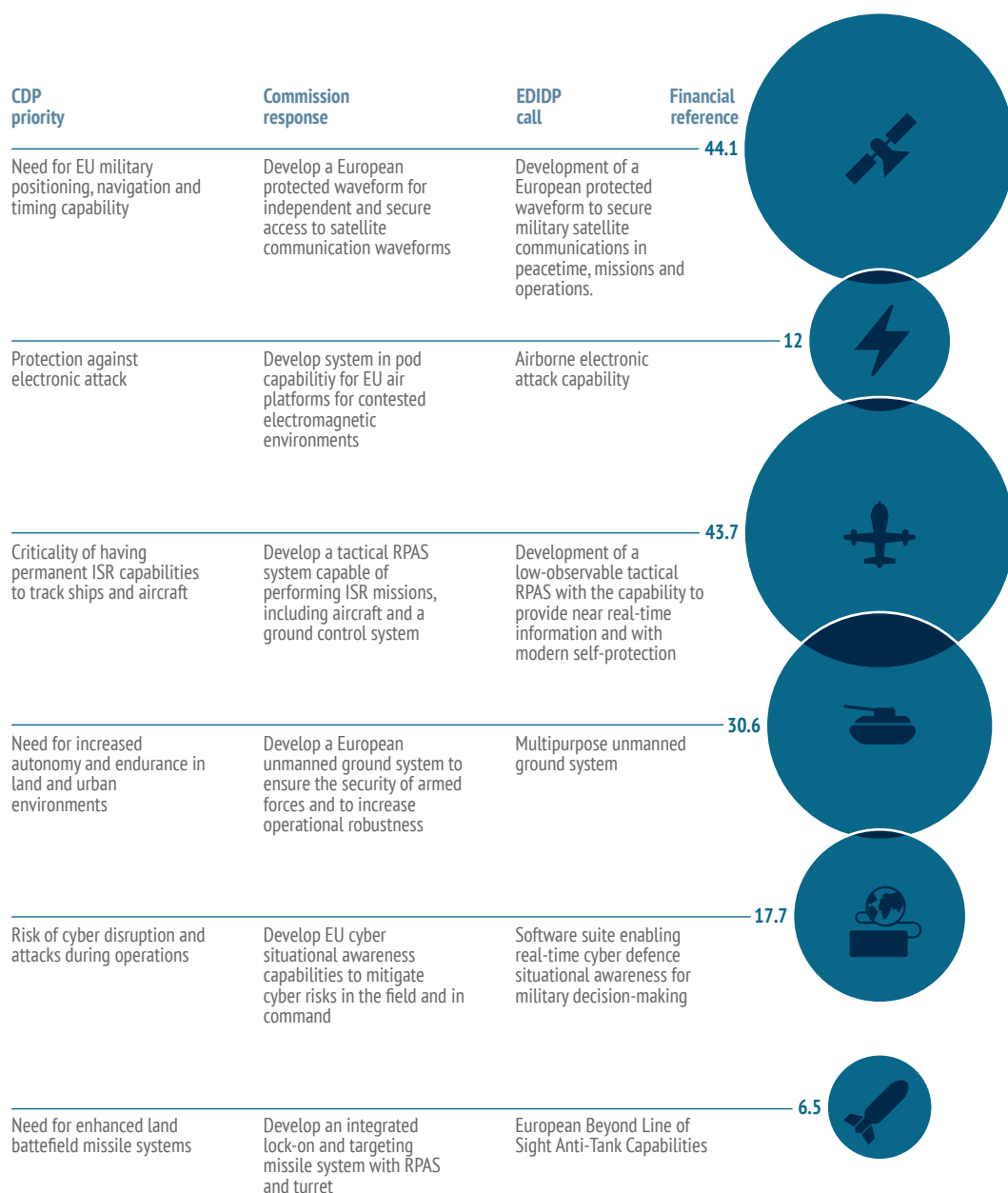
<sup>29</sup> European Commission, "Mission Letter to Josep Borrell", Brussels, September 10, 2019, p. 5, [https://ec.europa.eu/commission/sites/beta-political/files/mission-letter-josep-borrell-2019\\_en.pdf](https://ec.europa.eu/commission/sites/beta-political/files/mission-letter-josep-borrell-2019_en.pdf).

<sup>30</sup> European External Action Service, "Report by the HR/VP on Interactions, Linkages and Coherence among EU Defence Initiatives", 9825/19, Brussels, May 29, 2019.

<sup>31</sup> The areas include: ground combat capabilities, enhanced logistic and medical support, air mobility, air superiority, integration of military air capabilities, naval manoeuvrability, underwater control, space-based information and communication services, information superiority, cyber responsive operations and cross-domain capabilities contributing to the EU's military level of ambition.

FIGURE 4 | The 2019 EDIDP Call for Proposals

6 capability areas



Data: European Commission, 2019

Europe's shortfalls in anti-submarine warfare capabilities (as listed in the CDP), the SCC for this capability will pinpoint the technologies needed and the industrial strategies and trade-offs that will apply. In this regard, the CDP is becoming more granular in nature and other EDA initiatives such as the Overarching

Strategic Research Agenda (OSRA) can help to better link R&T strategies with long-term capability development.

Despite these efforts to enhance coordination in EU defence, however, there remain a number of unanswered questions. Firstly, there will be

a need to balance technology-driven approaches to defence equipment and systems with a capability-driven outlook. This means that it is inevitable that projects that mainly address industrial needs may sometimes be prioritised over those identified by military end-users and vice versa. Governments at the national level struggle with this balancing act and there is no reason to assume that the EU will perfect it. Thus, the question becomes one where the EDF and PESCO must strive to ensure the prioritisation of capabilities that can meet the needs of industry and armed forces. Secondly, if there is to be a better link between EU investments in defence research and capability development with EU external action, then it is perhaps necessary to rethink how the Union conceives of the CSDP. In fact, one of the problems with linking capability prioritisation with CSDP is that the policy is far too narrowly defined in terms of crisis management – this paradigm does not necessarily justify investment in high-end capabilities that sit at the edge of technological excellence.

Short of Treaty change, however, there may be a window of opportunity to more clearly define the level of ambition in defence and how it relates more broadly to the EU's foreign policy goals. Repeated calls for an EU 'White Book' on defence may assist with this,<sup>32</sup> but so too may plans for a 'Strategic Compass' that could more clearly show how the Union conceives of defence in an era of burgeoning geopolitical competition. Keeping in mind that any document and process of this kind may reflect the inter-governmental and communitarian dynamics mentioned above, there remain questions about how the EU can bring together its identified *ends* (the EU Global Strategy, the European Council's Strategic Agenda and the Treaties), *means* (the EDF, PESCO, CARD, CDP leading to capabilities) and *ways*. In this regard, there is

## **There will be a need to balance technology-driven approaches to defence equipment and systems with a capability-driven outlook.**

undoubtedly scope to now focus on the ways the EU might prepare for certain crises and conflicts, how will it deal with the defence-related

aspects of the vulnerabilities associated with economic interdependencies and what geographical areas the Union might cover based on available and future capabilities. What is more, the EU needs to reflect on how emerging technologies will affect its ability to deploy CSDP missions and operations. Regardless of any potential future EU initiatives, however, what remains unclear is how individual EU member states will view

EU defence within the context of intergovernmentalism and supranationalism and how they will buy in to future discussions on the Union's military level of ambition (but this is examined in more detail in chapter two).

## **'IT'S NOT JUST THE ECONOMY, STUPID'**

Let us return to our initial question: how can economic and political factors be balanced in EU defence industrial policy? This short answer is that it will not be easy. Indeed, with the introduction of the EDF and PESCO institutions and member states will have to collectively find a way to balance commercial and political considerations when it comes to defence innovation and capability development. Sometimes technology-driven capabilities will be given preference over the established needs of armed forces and ministries of defence. So long as these industrial needs do not consistently and overwhelmingly subsume the Union's capability requirements, it should be possible to ensure that a balance between industrial and capability needs is struck. A fact of life, however, is that

<sup>32</sup> Frédéric Mauro, "EU Defence: The White Book Implementation Process", Report for the European Parliament's sub-Committee on Security and Defence, December, 2018, [http://www.europarl.europa.eu/RegData/etudes/STUD/2018/603871/EXPO\\_STU\(2018\)603871\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2018/603871/EXPO_STU(2018)603871_EN.pdf).

the Commission has emerged as an important actor in defence. Beyond its new DG for Defence Industry and Space, it will be interesting to see how groups of member states gradually shift – if at all – from a predominantly intergovernmental approach to EU defence cooperation to a more communitarian path. Beyond this dichotomy, however, clearly the point about sequencing CDP, CARD, PESCO and EDF is correct and it is also true that if these initiatives are not embedded in national defence planning systems it will be harder to ensure national buy-in over time in the EU. Clearly, the EU's newly created defence initiatives need time and work to gain credibility and strike roots in national defence ministries.

Finally, this chapter has shown that beyond the economic considerations that underlie the Fund there is an opportunity to think through how defence technologies and capability development can contribute to the Union's broader external action. Clearly, if the Union is to act more autonomously in the world then it needs a competitive defence industry and

capabilities. Yet this is not enough of a strategy. As this chapter has outlined, the growing weaponisation of technology by geopolitical players such as the US, China and Russia should give the EU pause for thought about how it sees the CSDP and its own defence. Over the next five years, the Union will need to do more to safeguard and develop key strategic technology areas so as to lower its dependencies and vulnerabilities. As part of this conversation, the Union needs to be clearer about its role in the world and

how it wants to sit alongside Washington and Beijing – for this the EU needs to develop connective tissue between its defence investments and its broader geopolitical strategy. As will be discussed in the next chapter, this will not be easy but it is not an impossible task either. Within the remit of the EU treaties, it is certainly worth unpacking how the Union goes about connecting its defence technology and capability assumptions and plans with its overall conceptualisation of defence.

**The EU needs to develop connective tissue between its defence investments and its broader geopolitical strategy.**

## CHAPTER 2

# INSTRUMENTS OF INNOVATION

## Offsetting asymmetry and adversaries?

Anyone familiar with Bruno Latour's novel *Aramis, or the Love of Technology* will recall the reason given for the abortive introduction of an experimental automated half-car, half-metro system intended for Paris in the 1980s: government planners, engineers and company representatives 'believed in the autonomy of technology' and they failed to recognise that the ways in which humans want to employ technology has a great bearing on how (and indeed if) technologies are developed and commercialised. Aramis failed because its creators could not agree on its purpose or functions.<sup>1</sup> This feature of design and development is still prevalent today in discussions about military technology. For all the interesting things we can read about aircraft carrier-busting hypersonic missiles and upward falling payloads, the development of military technology is at its heart a political act where technical possibilities react with (and sometimes against) strategic needs. In many respects, advances in military technology are an empirical reflection of international politics and anarchy and the

development of sophisticated weapons systems is designed to defend a state but also create and reinforce the inequality of power between states<sup>2</sup> – this is otherwise known as strategic 'offsetting'.<sup>3</sup> We should, therefore, be cautious about solely attributing offset strategies to the inexorable emergence of new technologies. Indeed, 'neither arms racing nor technological development occur in a vacuum; a political impetus behind weapons production must exist'.<sup>4</sup>

The US, China and Russia are currently involved in developing 'offset strategies' and each is seeking to ensure that they end up as winners of the technological race. Each actor is seeking to harness the power of emerging technologies such as autonomous systems, quantum computing, robotics, nano- and bio-technologies, artificial intelligence, big data and cyber capabilities for their defence. In particular, China is catching up with the US by heavily investing in Precision Guided Munitions (PGMs), electronic warfare capabilities and anti-satellite capabilities.<sup>5</sup> For its part, Russia cannot really

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1 Bruno Latour, *Aramis, or the Love of Technology* (Cambridge, MA/London: Harvard University Press, 1996), p. 292 (Translated by Catherine Porter).

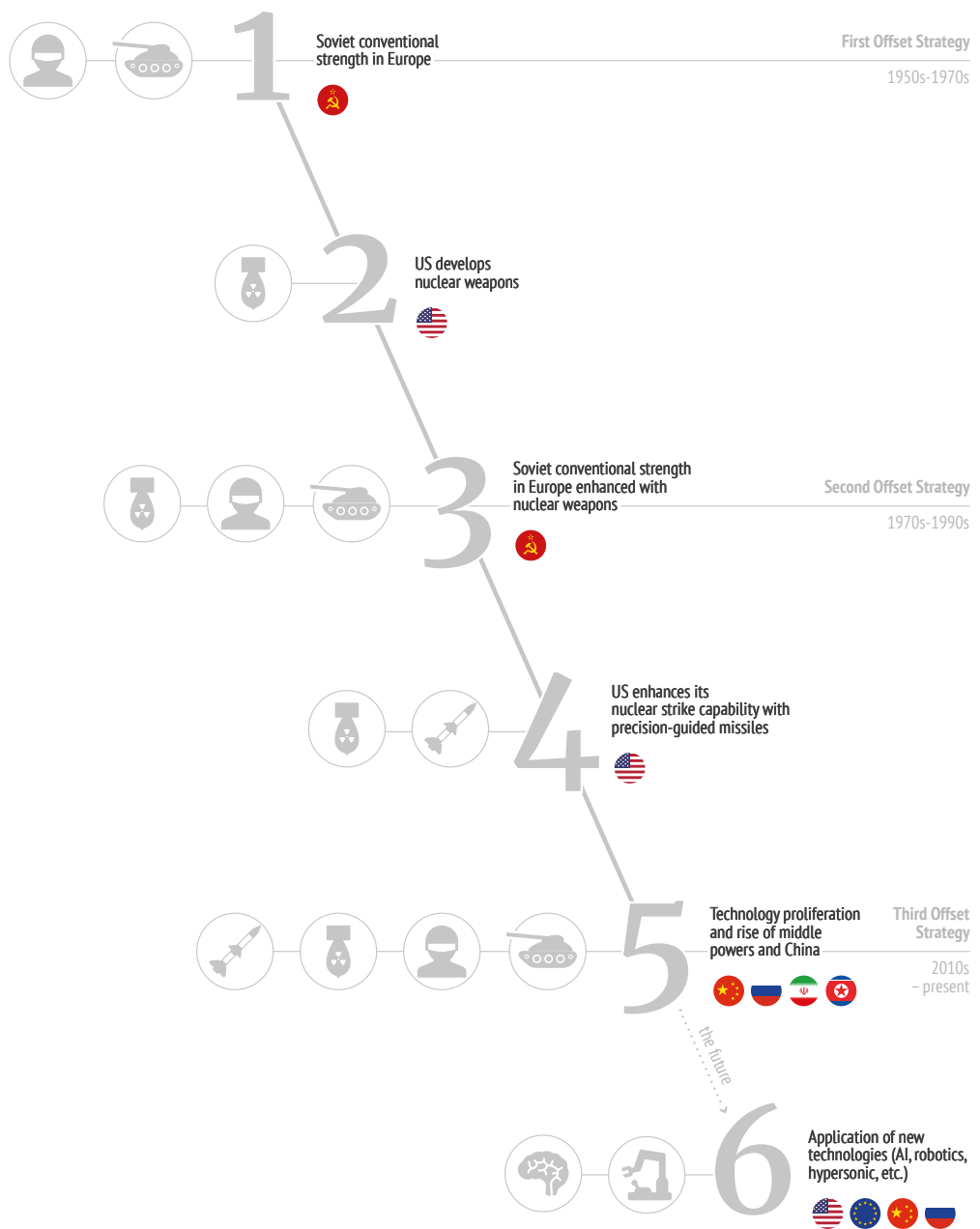
2 Beatrice Heuser, *The Evolution of Strategy: Thinking War from Antiquity to the Present* (Cambridge: Cambridge University Press, 2010), p. 40.

3 Here, 'offset' should not be confused with industrial offsets which are payoffs for purchases or work share agreements for weapons systems. For our purposes, 'offset' refers to a process of overmatching or leapfrogging over the military-technology status of the nearest rival or adversaries.

4 Jonathan D. Caverley, "United States Hegemony and the New Economics of Defence", *Security Studies*, vol. 16, no. 4 (2007), p. 603.

5 Michael S. Chase, Cristina L. Garafola and Nathan Beauchamp-Mustafaga, "Chinese Perceptions of and Responses to US Conventional Military Power", *Asian Security*, vol. 14, no. 2 (2018), p. 143.

FIGURE 5 | **Offset strategies**  
in stages



be counted in the same military-technological league as the US or China because its structural economic challenges render its ability to innovate sluggish and dependent on foreign innovations. However, this is not to say that Moscow is failing to test new technologies such as hypersonic assisted or nuclear-powered cruise missiles in a post-INF Treaty context.<sup>6</sup>

Where does all of this leave the EU? In what ways is the Union – if it is doing so at all – also investing in these types of technology, and, as the tale of Aramis suggests, what strategic rationale is underlying the EU's investments in defence technology? Clearly, the US and China both have the objective of surpassing each other as the dominant military-technology power, but is the EU part of this game and if it is not then why is it adamant on investing in defence technology? Building on the previous chapter's discussion about the interplay between economic and political rationales for EU defence-industrial cooperation, this chapter asks the second of our three research questions: what strategic considerations are driving forward defence innovation investments at the EU level? To this end, this chapter first looks at how the EU justifies investments in military technology in official documentation before then exploring the ways in which the Union can sustain and legitimise its new-found focus on defence innovation.

## THE EU'S COUNTER-REVOLUTION IN MILITARY AFFAIRS?

There is a need to assess whether the EU has the appetite or capacity to think or act like the US, China or Russia when it comes to military technology. Despite clear differences in spending levels between these three actors, it is legitimate to ask whether the EU should even attempt to define its investments in defence technology and capabilities in the same way that Washington or Beijing presently do. Conversely, if the EU is not going to follow the US model for its own defence investments then there is perhaps some merit in unpicking the rationale underpinning the EDF and PESCO. In this respect, it is worth reading the 2017 Council Decision on the establishment of PESCO because it states that the purpose of deeper EU defence cooperation is to have the capabilities necessary 'with a view to the most demanding missions, and contributing to the fulfilment of the Union level of ambition'.<sup>7</sup> Yet it takes further reading to understand what this means. First, PESCO binding commitment 12 refers mainly to the availability and deployability of forces and not military technologies, and commitments 15, 17 and 19 speak mainly about the need to plug capability shortfalls and industrial competitiveness.<sup>8</sup> Anyone looking for offset-like language in the decision on PESCO will be disappointed because the document overtly addresses the need to improve the Union's crisis management capabilities.

Second, although the Council Decision on PESCO speaks of the need for the EU to enhance

<sup>6</sup> Dara Massicot, "Anticipating a New Russian Military Doctrine in 2020: What it Might Contain and Why it Matters", *War on the Rocks*, September 9, 2019, <https://warontherocks.com/2019/09/anticipating-a-new-russian-military-doctrine-in-2020-what-it-might-contain-and-why-it-matters/>.

<sup>7</sup> Council of the EU, "Council Decision establishing permanent structured cooperation (PESCO) and determining the list of participating Member States", (CFSP) 2017/2315, December 11, 2017.

<sup>8</sup> Commitment 12 refers to the need to 'take concrete measures to enhance the availability, interoperability, flexibility and deployability of their forces, in particular by identifying common objectives regarding the commitment of forces'; Commitment 15 states 'Help to overcome capability shortcomings identified under the CDP and CARD. These capability projects shall increase Europe's strategic autonomy and strengthen the EDTIB'; Commitment 17 states 'Take part in at least one project under PESCO which develops or provides capabilities identified as strategically relevant by Member States'; and Commitment 19 reads 'Ensure that all projects with regard to capabilities led by participating Member States make the European defence industry more competitive via an appropriate industrial policy which avoids unnecessary overlap'.

its strategic autonomy and industry it does not clearly tell us what the EU's level of ambition on defence is. This definition can instead be found in the Council of the EU's conclusions of 14 November 2016, which reiterate the EU's crisis management approach rather than the more geopolitical or power-based lens through which the US, China and Russia see the world. Indeed, the conclusions set out the EU's three-pronged level of ambition of: (i) responding to external conflicts and crises; (ii) engaging in the capacity building of partners; and (iii) protecting the Union and its citizens.<sup>9</sup> While it is true that the Conclusions specifically refer to the need for the EU to invest in key enablers such as Intelligence, Surveillance and Reconnaissance (ISR), Remotely Piloted Aircraft Systems (RPAS), satellite communications and high-end military capabilities, we have to consult the Implementation Plan on Security and Defence (IPSD) – published by HR/VP Mogherini in parallel to the Council Conclusions on 14 November – to read about the need for a 'wider Innovation Initiative on managing potentially disruptive technologies'.<sup>10</sup> Despite this call, PESCO and the multiple Council Conclusions largely reiterate the need for the EU to enhance its role as a crisis manager *rather* than a geopolitical player.

For the Commission, the rationale for EU-level investment in defence is multifarious despite the specific legal bases of the Fund. Not only does the Commission stress the costs that result from duplication and a lack of EU co-operation, plus the need to safeguard the competitiveness of the European defence industry, but it also tries to take into consideration the prevailing military and strategic landscape. For example, it recognises that the 'return of more

conventional challenges'<sup>11</sup> has dramatically changed the EU's geopolitical context and that a lack of defence innovation can pose a threat to troops who, when deployed, 'often face new or unexpected threats which call for a quick generation of innovative solutions'.<sup>12</sup> On this basis, and rather pointedly, the Commission states that because of the lack of collaborative investments 'Europe's capacity to develop and produce high-tech systems needed for its defence is thus threatened'.<sup>13</sup> In this regard, while the Fund aims to enhance industrial competitiveness the Commission is also clear that the Union requires military capabilities to ensure its autonomy and security – beyond a crisis management paradigm, if necessary.

## WELCOME TO THE WORLD OF TECHNO-POLITIK

One key difference between the EU, the US, China and Russia, therefore, is that the Union is reluctant to name an adversary as the basis for its own defence technological efforts. In essence, the EU largely defines 'offset' as the need to have the defence capabilities and industrial and technological capacity to protect European interests and ensure that the Union can undertake crisis management missions and operations effectively and autonomously under the CSDP.<sup>14</sup> As the TEU clearly states, military assets brought together under the CSDP are for use 'on missions outside the Union for peace-keeping, conflict prevention and

9 Council of the EU, "Council conclusions on implementing the EU Global Strategy in the area of Security and Defence", 14149/16, Brussels, November 14, 2016.

10 The Council Conclusions omit reference to the 'wider innovation initiative'. See "Implementation Plan on Security and Defence", 14392/16, November 14, 2016, Brussels, p. 23.

11 European Commission, "Staff Working Document accompanying the Proposal for a Regulation Establishing the European Defence Fund", SWD(2018) 345 final, Brussels, June 13, 2018, p. 2.

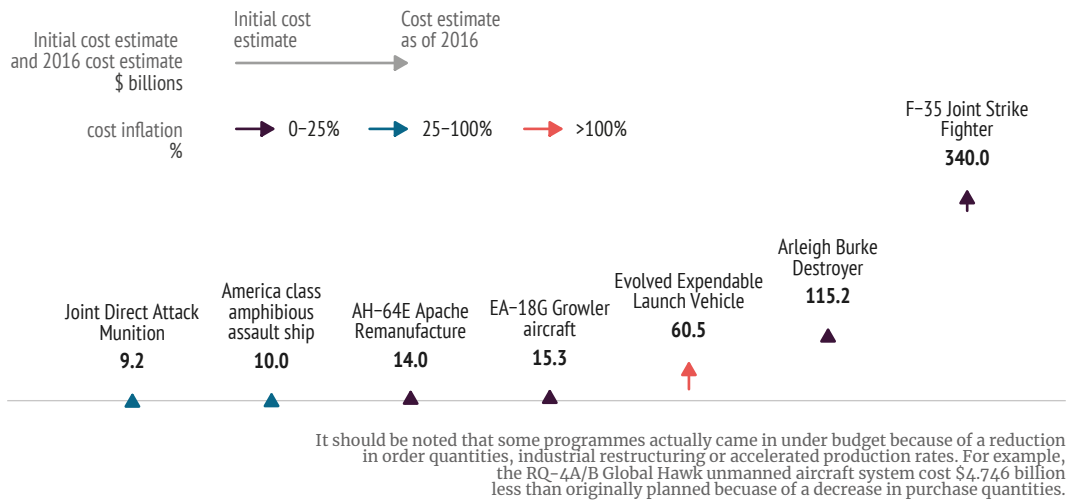
12 Ibid., p. 13.

13 Ibid., p. 17.

14 Op.Cit., "Strategic Autonomy: Towards 'European Sovereignty'".

## FIGURE 6 | Cost inflation

The American experience: initial and actual costs



Data: Deloitte, 2016

strengthening international security'.<sup>15</sup> This is not to say that crisis management is not intense or that high-tech capabilities are not needed. For example, certain missions *outside* the Union are still challenging from a capability standpoint, especially the protection of overseas territories or policing the global commons and sea lanes of communication. What is more, military CSDP missions and operations are being conditioned by higher risk environments in the near and wider neighbourhood because of the presence of third powers and terrorist groups and the increased use of electronic warfare and anti-access/area denial capabilities by them. As the Council has remarked, the EU should be able to conduct 'joint crisis management operations in situations of high security risk in the regions surrounding the EU'.<sup>16</sup>

**Even if Europe moves to a single variant of a particular defence system in the future it will be expensive to develop and lower unit numbers will likely be procured overall.**

Nevertheless, the crisis management paradigm limits the extent to which the Union can justify investments in high-end military technologies: after all, why would you need stealth fighter jets to deal with pirates? This is not to say that the Union should import American, Chinese or Russian strategic conceptions of offset without question – not least because the financial and strategic implications of doing so are huge. However, even if the EU rejects the power politics that underlie traditional offset strategies, any attempts to link defence innovation with broader strategic objectives are still challenging – not least because investments in defence technology are increasingly risky. As Norman Augustine states, the growth in defence budgets will over time not be able to keep pace with the costs of sophisticated weapons systems and technologies.<sup>17</sup> The point Augustine was attempting to make

<sup>15</sup> See Article 42.1 of the Treaty on European Union.

<sup>16</sup> Op.Cit., Council Conclusions, 14149/16, 'Annex to the Annex', p. 15.

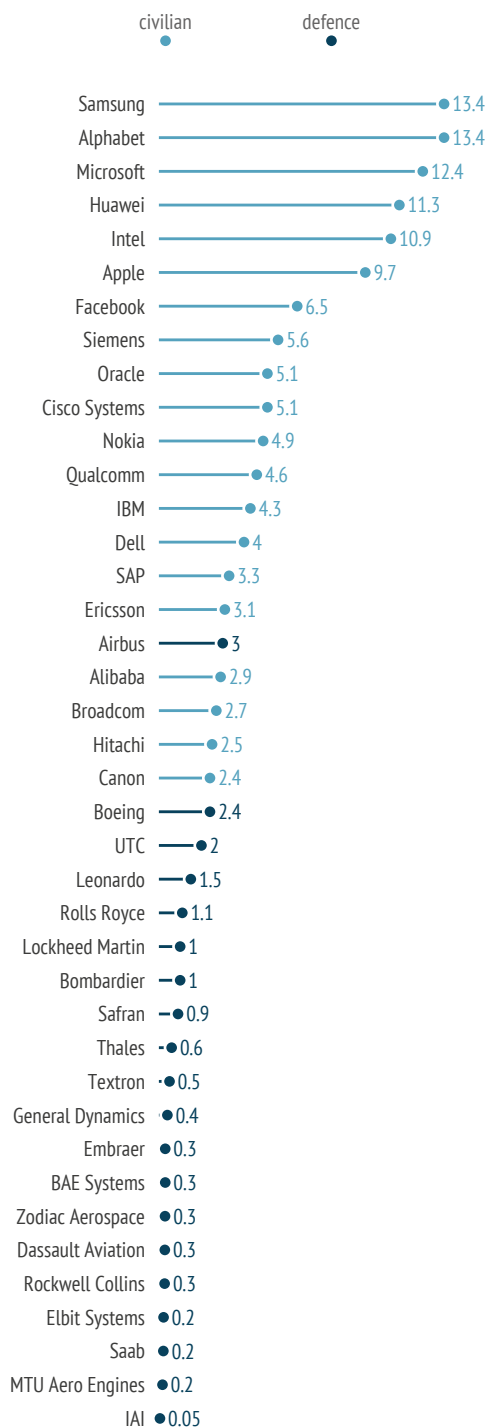
<sup>17</sup> Op.Cit., Augustine's Laws and Major System Development, p. 48.

was that the more and more sophisticated defence technologies become, the less and less units governments will be able to ultimately procure. For Europe, this implies that decades of duplicating military systems such as tanks, aircraft and naval vessels along national lines is no longer sustainable, but, what is more, even if Europe moves to a single variant of a particular defence system in the future it will be expensive to develop and lower unit numbers will likely be procured overall. Without sufficient European demand for any new defence systems in the future, it will be necessary to rely on more exports to ensure an economy of scale.

Since ‘Augustine’s Laws’ of 1984, however, leading European defence economists such as Bellais claim that the defence sector is heading towards a technology plateau where it will be extremely costly and counter-productive to rely solely on the defence sector for technological innovation.<sup>18</sup> For such economists, relying on a technology-driven defence industry will ultimately lead to serious limitations in defence innovation. Indeed, whereas the twentieth century was replete with new technological developments such as the tank, fighter aircraft and PGMs, today there is a limit or plateau to systems that can truly be classed as being ‘disruptive technologies’. In fact, what is evident is that while there are certainly areas of continuity between defence systems in terms of design and technology, the room for real innovation appears to have plateaued for the time being – although this may change with the rise of Artificial Intelligence and bio/nano-technologies. For example, we tend to think of drones as an innovative or disruptive technology but most engineering and aerodynamic advances in this area have derived from past aeronautical R&D and development programmes. Accordingly, if defence firms are simply transferring and improving technological applications between generations of systems then increasing amounts of investment into defence R&D is

**FIGURE 7 | Top 20 R&D spending by tech and defence firms**

2017–2018, € billions



<sup>18</sup> Renaud Bellais, “Technology and the Defense Industry: Real Threats, Bad Habits, or New (Market) Opportunities?”, *Journal of Innovation, Economics and Management*, vol. 12, no. 2 (2013), pp. 59–78.

unlikely to yield huge leaps forward in technology. Better, the argument goes, to harness the innovative power of civilian R&D too.

In the EU, meagre levels of government investment in defence R&D have contributed to the erosion of the EU's defence innovation potential, even if the EDF is designed to help reverse this trend. Although defence spending as a whole has been on the increase in the EU since 2013, this has not been reflected in the levels of investment in defence R&D spending. EDA data for the period 2005 to 2017 shows us that while there was an overall increase in defence spending of €15 billion between 2013 and 2016, defence R&D investment remained static at around €8 billion during the same period.<sup>19</sup> Normally, in times of economic downturn overall defence expenditure is decreased as a share of overall government spending, but within the defence budget innovation usually takes the biggest hit in terms of investment and it can take a prolonged period of time to recover from periods of under-investment. For the EU, therefore, the challenge is not only unlocking the potential for civil-defence innovation but also ensuring healthy levels of investment.

The lessons derived from 'Augustine's Law' or the debate about technology plateaus are revealing for the EU as it ventures into defence innovation. While the Union has understood that the Fund can assist – but not replace – national investments into defence R&D, the Commission in particular has an opportunity to think about how it invests in 'disruptive technologies'. Of course, devotees of Clayton Christensen's work would urge people to use the term in its proper context. For example, when the Commission speaks about investing 4–8% of the Fund into 'disruptive innovation' it is mainly referring to

technologies that could change the technology landscape, even if it is careful not to prejudice what technologies could be supported by the EDF. Yet, this understanding of the term is not exactly what Christensen had in mind: for him, disruptive technologies are less about the products developed and more about those innovations that emerge at the bottom of the market and have a wider consumer base than just a select few customers at the top of the market that are willing to pay more for technologies. Examples include how cellular phones disrupted the fixed line telephone market or how discount retailers disrupted the department store market.<sup>20</sup>

Obviously, in the defence sector Christensen's 'democratisation of innovation' is not always beneficial because it would mean that a multitude of actors and governments could have access to once restricted defence technologies or systems. Therefore, we need to be careful about how we use the term 'disruptive innovation' in defence in the EU. While the Commission should be applauded for putting disruptive technologies on the agenda and making this element a key aspect of the Fund, the point here is not just about the accuracy of language or calling for some sort of Christensen-ian orthodoxy. Rather, any strategy designed to fund defence innovation needs to focus less on the specific technologies being selected for financial support and more on the general effect that the technology will have on the defence sector and on Europe's armed forces. Of course, financing technologies that do not yet exist will inevitably invite potential failures or experimentation that can lead to a technology cul-de-sac. Beyond the mere act of financing such projects, however, there is a need for a 'disruptive culture' to take root in institutions such as the Commission and the EDA to ensure that the next big innovation drive is not

## **The challenge is not only unlocking the potential for civil-defence innovation but also ensuring healthy levels of investment.**

<sup>19</sup> European Defence Agency, "Defence Data 2016–2017: Key Findings and Analysis", 2018, p. 4 and p.10, [https://www.eda.europa.eu/docs/default-source/brochures/eda\\_defencedata\\_a4\\_](https://www.eda.europa.eu/docs/default-source/brochures/eda_defencedata_a4_).

<sup>20</sup> See Clayton Christensen, 'Disruptive Innovation', <http://claytonchristensen.com/key-concepts/>.

overlooked if and when it comes along.<sup>21</sup> Short of ideas such as creating a 'European DARPA',<sup>22</sup> an innovation culture has to take root in the EDA and the new DG for Defence Industry and Space. The EDF is already funding strategic foresight capacities in defence,<sup>23</sup> but in reality work programme managers need to become technology scouts in their everyday working habits and duties.

Yet the EU's investments in defence innovation will not be able to avoid the challenges already being experienced in places like the US. One of the chief issues is being able to harness technologies that are being developed in the civilian sector. Of course, there is nothing new about defence ministries and firms looking to the civil sector for cutting-edge technologies because civilian firms have led the way in areas such as communications and information technologies that have been integrated into defence systems.<sup>24</sup> On this basis, there has been a gradual shift in the relationship between *spin-off* and *spin-in* technologies.<sup>25</sup> In the past, military R&D funded *spin-off* developments in computer technology, touch screens, global positioning systems, freeze dried foods, duct type, wrist watches and even microwave ovens. Today, however, the defence development and procurement process has become extraordinarily

complex and interconnected and civilian firms in the high-tech sector are of importance given their pioneering work on *spin-in* technology areas such as artificial intelligence, robotics, miniaturisation and additive manufacturing.

However, it is not always easy for defence ministries to work with civilian firms owing to the fact that companies want to protect their im-

age and perceived reputation. In fact, some employees at companies such as Google have already orchestrated walk-outs in protest at the firm's work on military aerial drone software and artificial intelligence contracts.<sup>26</sup> Another disincentive for civilian firms to work closely with defence actors relates to Intellectual Property Rights (IPR) and civilian firms do not want to lost IPR after having

invested millions in initial R&D. What is more, civilian firms fear that governments may seize or restrict the use of technologies on national security grounds.<sup>27</sup> The reality is that innovation and knowledge do not move easily between the civil and the defence sectors.<sup>28</sup> This is an issue that needs consideration at the EU level as the EDF gets underway. Indeed, the perceived benefits of the Fund and the ingenuity of civilian firms should not serve as an excuse to under-invest in defence R&D budgets at the national level. A lack of European cooperation and

**The reality is that innovation and knowledge do not move easily between the civil and the defence sectors.**

21 See, for example, Jon Freeman et al. "Innovation Models: Enabling New Defence Solutions and Enhanced Benefits from Science and Technology", RAND Europe Report, 2015, [https://www.rand.org/content/dam/rand/pubs/research\\_reports/RR800/RR840/RAND\\_RR840.pdf](https://www.rand.org/content/dam/rand/pubs/research_reports/RR800/RR840/RAND_RR840.pdf).

22 DARPA stands for the Defense Advanced Research Projects Agency. See: Paul-Jasper Dittrich and Philipp Ständer, "How to bring Macron's vision of a European innovation agency to life", *Science Business*, December 14, 2017.

23 For example, the 'Pythia' project is funded under the Preparatory Action for Defence Research and it is developing a predictive methodology for intelligent defence technology analysis. See: <http://www.pythia-padr.eu>.

24 Sylvain Moura, "The US Defence Industry since 1945: Globalization Refused", in Bernard Jullien and Andy Smith (eds.) *Industries and Globalization: The Political Causality of Difference* (Basingstoke: Palgrave Macmillan, 2008), p. 132; and Eugene Gholz, "The RMA and the Defense Industry", in Harvey M. Sapolsky, Benjamin H. Friedman and Brendan Rittenhouse (eds.) *US Military Innovation since the Cold War: Creation without Destruction* (Oxon/New York: Routledge, 2009), p. 176.

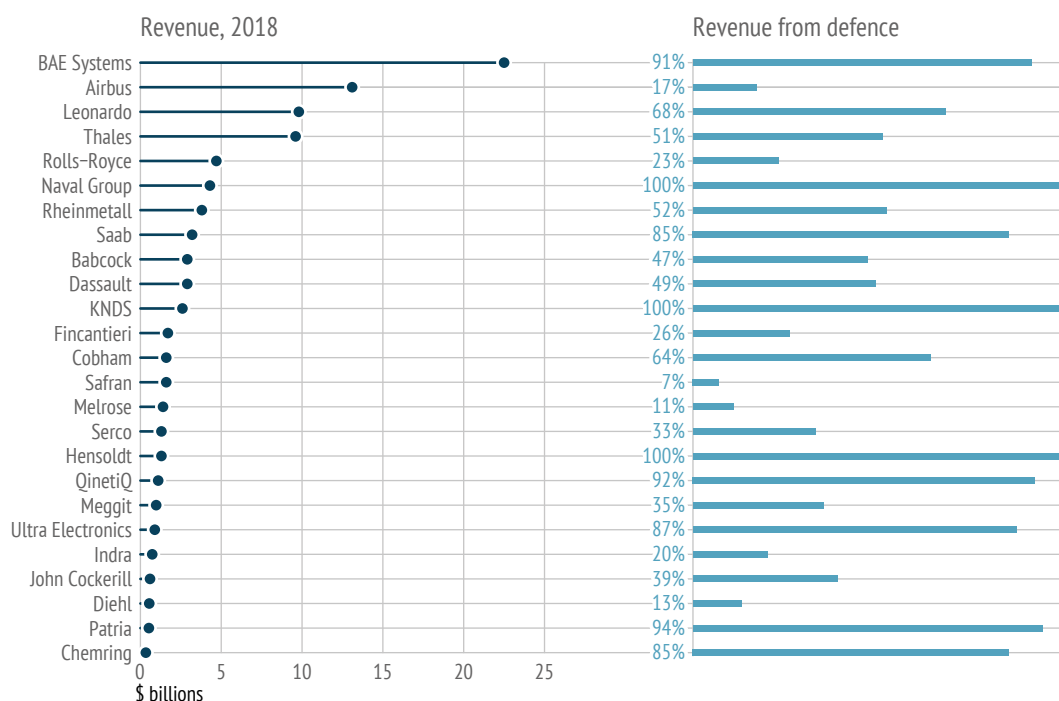
25 'Spin-off' denotes technologies that were developed by military R&D but which eventually found civilian applications (e.g. Global Positioning System), and 'spin-in' refers to technologies produced through civilian R&D that have military application (e.g. computer chips).

26 "Google employees quit over controversial Pentagon work", *New York Post*, May 14, 2018.

27 Maaike Verbruggen, "The Role of Civilian Innovation in the Development of Lethal Autonomous Weapons Systems", *Global Policy*, vol. 10, no. 3 (2019), pp. 338–42.

28 François-Xavier Meunier and Renaud Bellais, "Technical Systems and Cross-Sector Knowledge Diffusion: An Illustration with Drones", *Technology Analysis & Strategic Management*, vol. 31, no. 4 (2019), pp. 433–46.

FIGURE 8 | European firm revenues from defence



These European firms are listed among 75 other firms from across the world. They are ranked according to overall revenues.

Data: DefenseNews, 2019

short-sightedness on investment has already ‘resulted in a budgetary myopia that is truly detrimental to defence innovation’ in Europe.<sup>29</sup> The Fund is a response to this myopia but governments should not cut R&D budgets as part of efforts to manage defence costs.

## TOWARDS AN EU-STYLE OFFSET STRATEGY?

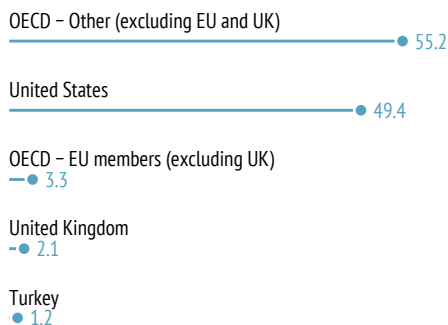
Given the prevailing crisis management rationale for EU security and defence, and the geopolitical and military technological shifts

outlined above, what strategic considerations are driving forward defence innovation investments at the EU level? First, a shift in the way the Union conceives of its security and defence is required. Although CSDP is still the policy and legal framework under which member states organise their collective defence efforts at the EU level, a closer look at the treaties can take us beyond the parameters set by Article 43.1. For example, if we consult Article 222 (the ‘Solidarity Clause’) of the TFEU there are grounds to believe that the context in which EU defence innovation and capability development occurs is wider than crisis management outside the Union. It is instructive to learn that the Solidarity Clause calls on EU institutions and member states to ‘act jointly in a spirit of solidarity if a Member State is the object of a terrorist attack or the victim of a natural or *man-made* disaster.

<sup>29</sup> Renaud Bellais, “The Economic Imperative of Europeanizing Defense Innovation”, in Nikolaos Karampekios, Iraklis Oikonomou and Elias G. Carayannis (eds.) *The Emergence of EU Defense Research Policy: From Innovation to Militarization* (Cham: Springer, 2018), p. 103.

## FIGURE 9 | Defence budget R&D investments

2017, \$ 2010 billions



Data: Organisation for Economic Cooperation and Development, 2018

The Union shall mobilise all the instruments at its disposal, including the *military resources* made available by the Member States' [author's own emphasis]. Quite how we define the term 'man-made' in the context of Article 222 is unclear,<sup>30</sup> but it does potentially open the door to tasks such as the protection of territory should a member state invoke the Solidarity Clause.

A similar possibility for broadening CSDP can be found in Article 42.7 in the TEU (the so-called 'Mutual Assistance Clause'), which also underlines that in case of armed aggression on any member state's territory the others shall have 'an obligation of aid and assistance by all means in their power' [author's own emphasis]. The Mutual Assistance Clause has already been invoked – this was by France in 2015 following the Paris terrorist attacks. Article 42.7 differs from Article 222 in the sense that that it presumes a request for bilateral aid and assistance from other EU member states, but it does not necessarily require (but equally does not exclude) any institutional coordination on the part of EU bodies (e.g. the Council of the

EU through the Integrated Political Crisis Response (IPCR), the Commission and the EEAS). In fact, in 2015 member states did not directly assist France with its own internal security through the CSDP or other EU mechanisms, but rather through the bilateral provision of material support to the country in theatres where the French military were engaged (e.g. the Sahel).

Unlike Article 222, the Mutual Assistance Clause arguably contains greater political flexibility during times of crisis. For example, the 2014 Council Decision on the Solidarity Clause states that governments may only invoke the clause if the crisis they are suffering 'clearly overwhelms the response capabilities available to it' (see Article 4.1).<sup>31</sup> This assumes that a government is unable to deal with a crisis on its own and it could imply that a member state has effectively lost sovereign control of its territory. This arguably poses a limitation in that not all crises that may come to affect member states will overwhelm them. For smaller member states, a crisis might be overwhelming to the degree that the Solidarity Clause might apply. Yet, rather absurdly, larger member states with greater resources would be unable to invoke Article 222 until they are overwhelmed – and this situation may likely never happen. Article 42.7 is not bound by any provision on the state of a country's response mechanisms. Nevertheless, any future invocation of Article 42.7 need not result in a similar response to that witnessed in 2015. In this case, and as underlined recently in Council Conclusions on security and defence,<sup>32</sup> it is necessary to discuss the lessons learned and implications that the Mutual Assistance Clause may have on European security and defence.

These types of treaty provisions and the shifting geopolitical environment have already contributed to capability prioritisation discussions at

<sup>30</sup> The 2014 Council Decision on the 'Solidarity Clause' defines the meaning of the words 'disaster', 'terrorist attack', 'crisis' and 'response' (see Article 3) but not 'man-made'. Nevertheless, 'disaster' is still seen as '*any situation which has or may have a severe impact on people, the environment or property, including cultural heritage*' [author's emphasis]. Again, the term 'any situation' is open to interpretation. See: Council of the EU, "Council Decision on the Arrangements for the Implementation by the Union of the Solidarity Clause", 2014/415/EU, Brussels, June 24, 2014.

<sup>31</sup> Ibid.

<sup>32</sup> Council of the EU, "Conclusions on Security and Defence in the Context of the EU Global Strategy", 10048/19, Brussels, June 17, 2019, p. 13.

the EU level. Clearly, military capabilities such as main battle tanks, stealth fighters, missile defence and submarines are almost uniquely crafted for territorial and littoral protection, conventional war and deterrence rather than crisis management. It is these types of military capability that are perhaps better suited to the strategic assumptions underlying both the solidary and mutual assistance clauses. In this sense, it is instructive to learn that both the EDF and PESCO stress that capabilities produced at the EU level will still require member states to decide how and where they use these capabilities. This is an interesting dynamic of both defence initiatives which is also shared by the prioritisation assumptions of the CDP – the Plan focuses on Europe's entire capability landscape rather than just CSDP. This means that when member states prioritise capabilities at the EU level they can collectively propose projects that are broader in scope than the capabilities required for CSDP contingencies. Under PESCO and the EDF we can already observe capability projects that do this.

Therefore, one way in which EU defence innovation efforts can be rationalised is by upholding intergovernmentally agreed treaty provisions like Article 42.7 and Article 222 that require the development of high-end military capabilities. Without naming strategic adversaries in the way the US, China and Russia do, this foundation still presumes that the Union must look at military technologies that are being developed by Washington, Beijing, Moscow and elsewhere – otherwise, how else can the EU plan to keep up with the technology curve? For example, artificial intelligence and robotics were not of great importance when drafting the original treaty articles on the CSDP but they form the basis of all present thinking on military technology development and the EU cannot afford not to develop emerging technologies.<sup>33</sup> Accordingly, any 'EU Offset Strategy'

should identify what technological areas the Union wants to be 'autonomous' or 'sovereign' in in combination with carefully defined strategic objectives. Such areas need to be discussed as soon as possible at the EU level but defence, space, cyber and cellular network technology seem like obvious candidates for areas where EU member states may want to lower their dependencies. In this sense, the EU can rationalise its defence innovation efforts on the basis of 'technological autonomy'.

Basing any EU strategy on a need to uphold technological autonomy can also serve an important political rationale. With geopolitical giants such as the US and China squaring off on trade, there is no guarantee for Europeans that a conventional conflict between Washington and Beijing will not occur. If Europeans do not want to be embroiled in a structural conflagration of this sort, then it needs the political, economic and military means to assert its 'geopolitical agnosticism' and to protect any interests that could be affected by such a structural conflict. From this perspective, it would make sense to base an EU offset strategy on the Union's core geopolitical interests rather than adversaries. When thinking about the connectivity and global spread of its energy and raw materials, trade routes, data networks, digital infrastructure, space assets and more, the Union has to ensure that the supply nodes and connectors that are vital to its prosperity and strategic interests are safeguarded. The Union has already flagged the importance of 'flow security' in its strategy on EU-Asia Connectivity,<sup>34</sup> but most of the EU's economic interests are dependent upon safe and secure connections within and beyond the Union. We can already see this logic of 'flow security' being developed under the EU's Coordinated Maritime Presences (CMP) initiative, which would use the presence of national naval assets on the seas in certain areas of strategic interest to the

<sup>33</sup> Daniel Fiott and Gustav Lindstrom, "Artificial Intelligence: What Implications for EU Security and Defence?", *EUISS Brief*, no. 10, November 8, 2018.

<sup>34</sup> European Commission and High Representative of the Union for Foreign Affairs and Security Policy, "Joint Communication on Connecting Europe and Asia – Building Blocks for an EU Strategy", *JOIN(2018) 31 final*, Brussels, September 19, 2018, p. 4.

Union to coordinate naval efforts.<sup>35</sup> There is an important technological aspect to this as well. With the development of cyber weapons, autonomous systems (air, land and sea-based) and hypersonic munitions by military technology powers around the world, the EU cannot afford to fall behind the technology race lest its ability to protect its interests is greatly diminished.

Therefore, there are already two rationales that could be mobilised in support of an ‘EU Offset Strategy’ which would allow the EU to side-step the need to name an adversary. Of course, EU institutions are themselves rethinking their strategic relationships with countries such as China and Russia. Concerning China, an EU joint communication from March 2019 simultaneously labels the country a partner, a competitor and a systemic rival.<sup>36</sup> The Union has also called Russia ‘a key strategic challenge’.<sup>37</sup> Yet, among EU member states it is extremely difficult to arrive at a consensus on who the Union’s adversaries are. Owing to geographical proximity, for example,

**Not naming an adversary is not the same thing as not having one.**

some EU governments would have no hesitation in naming Moscow an adversary but others would disagree for other reasons. In this context, it is difficult for the EU institutions to develop capability and defence innovation strategies based on an adversarial approach to international politics. However, not naming an adversary is not the same thing as not having one. Rightly or wrongly, the key point about naming adversaries is that it helps put every lever of economic, political and military power to the task of containing and outmatching hostile states. In lieu of a consensus on who the Union’s adversary is (or adversaries are), instruments like the EDF, PESCO and the CDP will have to prioritise defence innovation and capabilities on a threat-centric rather than actor-centric basis. With increasing threats to Europe’s territorial security, and with the US’s strategic focus shifting, time will tell if this approach pays off.

<sup>35</sup> “Remarks by High Representative/Vice-President Federica Mogherini at the press conference following the Informal Meeting of EU Defence Ministers”, Helsinki, August 29, 2019, [https://eeas.europa.eu/headquarters/headquarters-homepage/66784/remarks-high-representativevice-president-federica-mogherini-press-conference-following\\_en](https://eeas.europa.eu/headquarters/headquarters-homepage/66784/remarks-high-representativevice-president-federica-mogherini-press-conference-following_en).

<sup>36</sup> European Commission and the High Representative of the Union for Foreign Affairs and Security Policy, “Joint Communication: EU-China – A Strategic Outlook”, *JOIN(2019) 5 final*, Strasbourg, March 12, 2019, p. 1.

<sup>37</sup> Op.Cit., “Shared Vision, Common Action: A Stronger Europe: A Global Strategy for the European Union’s Foreign and Security Policy”, p. 33.

## CHAPTER 3

# THE VALLEY OF DEATH

## Managing risk and resources

The temperature in Death Valley and the Arizona desert can reach highs of 46°C. Contrary to what its name suggests, the former gives sustenance to a wide variety of life forms but the latter is home to nearly 100 species of extinct or dormant varieties of military aircraft. Stored over 10.5 square kilometres in the sometimes unforgiving climate of the US southwest, close to 4,500 planes call Davis-Monthan Air Force Base home. Although it is often referred to as the ‘boneyard’, the aircraft storage facility is not exactly some monument to military wastage. In fact, the famous bird’s-eye view image of neatly aligned but defunct B-52 bombers and F-101 ‘Voodoo’ fighters in Arizona is a symbol of the US’s ability to develop military capabilities, quite literally, from the cradle to the grave.<sup>1</sup> In other words, the ‘boneyard’ is testament to numerous aerospace projects that successfully transited from the early design stages or concepts, through to prototyping and demonstration and finally to commercialisation and eventual use by various service branches of the US military. Turning from Death Valley to the so-called ‘valley of death’, there is nothing

**There is nothing automatic about pulling through defence research projects to the capability development stage.**

research projects to the capability development stage. In fact, a lot of defence capability projects will never make it to the ‘boneyard’.

Avoiding the ‘valley of death’ will be of paramount importance for the European Commission as it establishes the EDF. Although the EDA has managed certain defence projects, the Union as a whole does not have experience in managing procurement programmes or ensuring

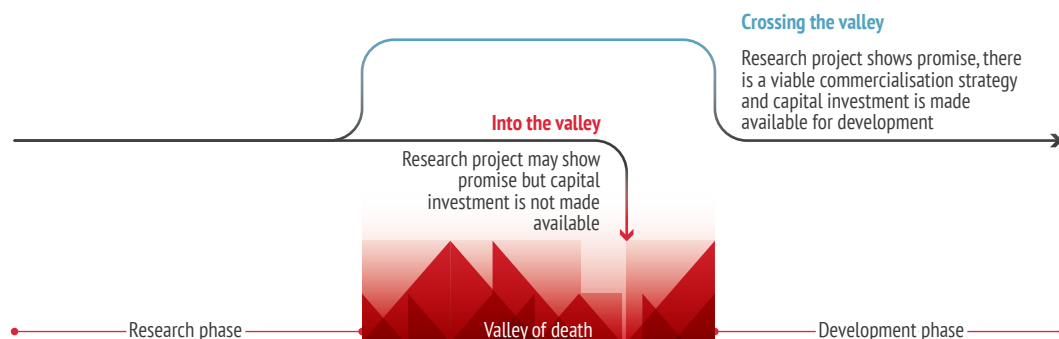
that defence innovation is pulled through to the capability development stage. As was shown in chapter one, the EU does have experience with developing and adopting legislation that is designed to alter national procurement practices. In particular, the 2009 defence procurement directive was geared to ‘ensuring that contracting authorities treat economic operators equally and in a non-discriminatory

manner’.<sup>2</sup> Yet, the directive only amounts to indirect knowledge of how defence procurement functions. This is not to say that Europe more generally lacks the experience to deal with collaborative defence programmes and projects – the A400M aircraft and the Eurofighter are just some of the stand-out examples. With regard to procurement, bodies such as the Organisation for Joint Armament Cooperation (OCCAR)

1 Aerospace Maintenance and Regeneration Group, “Inventory Database – Aircraft Type Summary”, July 16, 2019, [https://www.amarcexperience.com/ui/index.php?option=com\\_content&view=article&id=205&Itemid=274](https://www.amarcexperience.com/ui/index.php?option=com_content&view=article&id=205&Itemid=274).

2 Tom Dyson and Theodore Konstadinides, *European Defence Cooperation in EU Law and IR Theory* (Basingstoke: Palgrave Macmillan, 2013), p. 95.

FIGURE 10 | The valley of death



and NATO's Support and Procurement Agency (NSPA) have more experience than the EU but the introduction of the EDF will change this situation over time.

The purpose of this final chapter is to analyse how the Union's institutions can ensure that investments in defence innovation evolve into tangible capabilities for EU defence. It builds on the previous two chapters by showing how the more technical aspects of capability development under the Fund could hamper efforts to produce military systems needed for EU defence. Getting the transition from defence research to capability development right is crucial, but if the Union fails to accomplish this then there is little point in talking about how the EU can harness its defence innovation for strategic purposes to meet geopolitical challenges.

## TECHNOLOGICAL READINESS AND INNOVATION

The 'valley of death', or rather a failure to ensure technology transition through various technology readiness levels (TRLs), has long plagued defence planners. The TRL scale is a way of categorising technological developments from the basic stages of research up to commercialisation, and most TRL scales today have nine categories. The crux of the problem is relatively easy to comprehend. Research institutes or SMEs<sup>3</sup> conduct basic research into a new technology, but funding to take forward the project onto the development phase cannot be secured. This is because, while these early-stage research projects can indeed be promising, it is too early for firms or governments to validate how successful the technology will be at the commercialisation stage and therefore they do not invest the capital or take the necessary risk.<sup>4</sup> In such cases, technologies are cast aside or abandoned with the faint chance that they may be of use in another domain or at some future date. Defence

<sup>3</sup> SMEs and mid-cap firms are generally divided between three categories below prime firms or system integrators: 'Tier one' firms produce and supply sub-systems and major componentry such as jet engines for a fighter jet; 'tier two' firms manufacture component parts such as electronics and sensors or they undertake specialised engineering and forging; and 'tier three' firms tend to be SMEs that supply commodities and/or specialised services.

<sup>4</sup> National Research Council of the National Academies, *Revisiting the Department of Defense SBIR Fast Track Initiative* (Washington, D.C.: The National Academies Press, 2009), p. 1.

innovation and capability development rarely progress in a linear fashion however. In fact, there is evidence to suggest that the process is more organic and based on constant communication between innovators, researchers, engineers and technicians, government ministries and the military. In this respect, technology is less of an object to be physically passed on through the procurement system and more of an entity that needs to be given meaning by buyers, contractors and innovators as they agree on what a particular technology should achieve.<sup>5</sup>

There are many reasons why technology does not transition from the earliest stages of research through to prototyping and development. Historically, a major issue has been that governments have been unwilling or unable to financially support the transition over the valley of death and research projects have then fallen by the wayside without further development. Humorous examples litter history including the failed attempt by the Defense Advanced Research Projects Agency (DARPA) to develop Hannibal-inspired 'mechanical elephants' for the Vietnam War, or its psychic spy programme of 'Men Who Stare at Goats' film fame and its interplanetary spacecraft project propelled by rearward exploding nuclear bombs.<sup>6</sup> However, some projects that have initially fallen into the valley of death can be rescued at a later date. This was certainly the case with Project Condor, which was a US research project into tactical drones in the 1970s, and that initially succumbed to the federal government's preference to fund cruise missile research instead – today, tactical drones are widely used by the US military and others.<sup>7</sup>

**I**t ultimately rests with defence firms to develop and employ the technical and technological means to produce capabilities.

The introduction of the Fund should counter the trend that has hitherto prevailed of not having a sufficient level of investment. In fact, the Commission is offering to cover up to 100% of eligible costs of any project that meets the criteria. In this way, funds worth €4.1 bil-

lion (spread over 7 years) will be available at the earliest stages of defence R&D for the EU. The experience of the Preparatory Action on Defence Research (PADR) has shown that open tenders are an effective way of attracting SMEs and mid-caps to apply for EU support. By bringing in industrial partners as early as possible, the Commission can try to reduce the inevitable 'information asymmetry' that

will exist between governments, firms and institutions. Military planners and government officials should have a relatively clear idea about the operational issue or objective they want to address (i.e. greater performance, enhanced lethality, stealth, etc.), but it ultimately rests with defence firms to develop and employ the technical and technological means to produce capabilities.<sup>8</sup> Defence firms are repositories of specialised technical knowledge and they are not always keen to share the information and expertise they have with governments and militaries – at least not until a contract has been awarded to them. The information firms hold can be considered as leverage during the negotiation of defence contracts. With the information advantage companies have over governments they are able to potentially extract extra profits by offering advanced technologies to militaries, yet the technical know-how possessed by firms is indispensable to the production of cutting-edge technologies.

For the Commission in particular, lowering the information asymmetry is vitally important in

<sup>5</sup> Everett M. Rogers, *Diffusion of Innovation* (New York: Free Press, 2003).

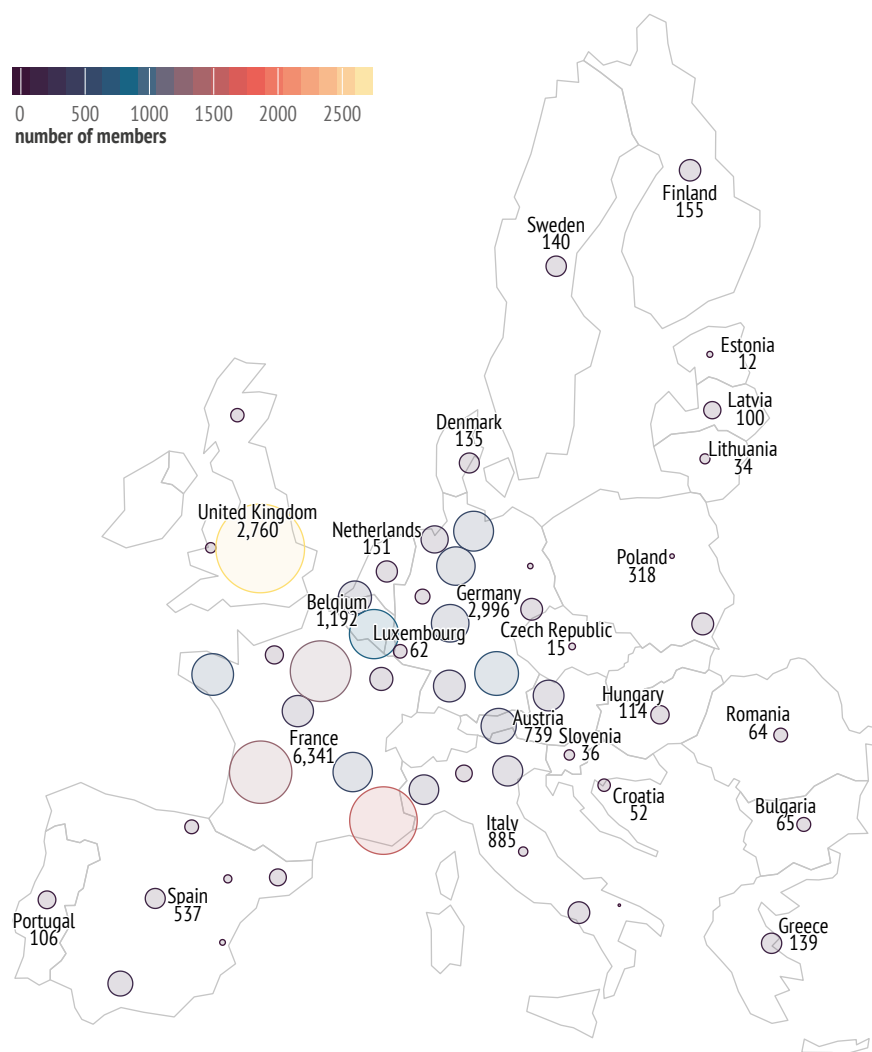
<sup>6</sup> Duncan Graham-Rowe, "Fifty years of DARPA: Hits, misses and ones to watch", *New Scientist*, May 15, 2008.

<sup>7</sup> Richard H. Van Atta et al, "Transformation and Transition: DARPA's Role in Fostering an Emerging Revolution in Military Affairs – Volume 1 Overall Assessment", *Institute for Defense Analyses*, Paper P-3698, April 2003, p. 7.

<sup>8</sup> Jean-Michel Oudot, "Performance and Risks in the Defense Procurement Sector", *Journal of Public Policy*, vol. 30, no. 2 (2010), pp. 201–18.

**FIGURE 11 | Selected EU defence clusters**

members per region



Note: The clusters listed derive from association registrations with the European Defence Agency's Regional Industrial Portals and Clusters list and the European Commission's European Network of Defence-Related Regions (ENDR). Not all defence clusters in Europe are listed here and it should be noted that defence clusters are made up of defence firms, SMEs, civil firms and research institutions. Cluster bubbles are a geographical approximation in terms of exact location. In a number of countries the cluster bubble has been centralised.

Data: European Commission; European Defence Agency, 2019

order to avoid extra costs emerging through the development process. Here, horizon scanning and foresight studies can bridge the gap between initial strategic priorities set at the EU level and technological possibilities. Of course, the CDP, SCCs and OSRA can help here too but there is a need for a foresight tool that can scan the horizon in both civilian and defence

technologies in order to foresee major changes in the wider technological landscape and industrial production methods (i.e. additive manufacturing, big data, quantum computing and the internet of things). Although the Commission and the EDA are already investing resources into technological foresight through the PADR and the European Defence Industrial

Development Programme (EDIDP), the broader point is really about accruing more expertise in order to be better placed to assess the technological solutions put forward by firms as part of EDF bids. For this knowledge to accrue within the EU, a 'culture of innovation' needs to take hold in the Commission. In fact, there is a need to ensure that EU institutions are aware of technology curves, cognisant of how fundamental research functions and endowed with imagination.<sup>9</sup> Without proper communication and information flows between research institutes, firms, governments and institutions it is extremely difficult to see the potential in early-day research projects and how they might someday be integrated into a weapons system or platform.

A culture of defence innovation can be difficult to inculcate in bodies like the EU. For example, while defence firms appear to be above the industry average in anticipating and preparing for industrial change,<sup>10</sup> the emergence of new technologies, industrial processes, data management procedures and the other complex characteristics of modern advanced research and industrial processes can overwhelm institutions and agencies. Therefore, one of the

**The objective should be to avoid the creation of 'research silos' that inhibit the broader innovation capacity of the European defence industry.**

challenges that will face the Commission is ensuring that defence research projects can learn from and communicate with each other. The objective should be to avoid the creation of 'research silos' that inhibit the broader innovation capacity of the European defence industry. Indeed, one study explains how projects that emphasise cooperative research and development have an advantage when it comes to promoting successful defence research projects.<sup>11</sup> Fortunately, 'networked' research projects are possible under the Fund because of the particular IPR regime for defence research outlined in the proposed regulation on the EDF. Indeed, because the Commission proposes to fund up to 100% of defence research eligible costs, the proposed Regulation permits defence research and associated IPR to be used by interested member states to allow for 'follow-up cooperative development'.<sup>12</sup> In this way, under certain conditions the results of defence research can be shared beyond the initial consortium of entities. This is positive but it will require an institutional capacity that effectively monitors defence research developments, and it should be recalled that the results of Horizon 2020 and EU civil research could be of great significance for defence research too.

9 National Research Council of the National Academies, *Accelerating Technology Transition: Bridging the Valley of Death for Materials and Processes in Defense Systems* (Washington, D.C.: The National Academies Press, 2004), p. 10.

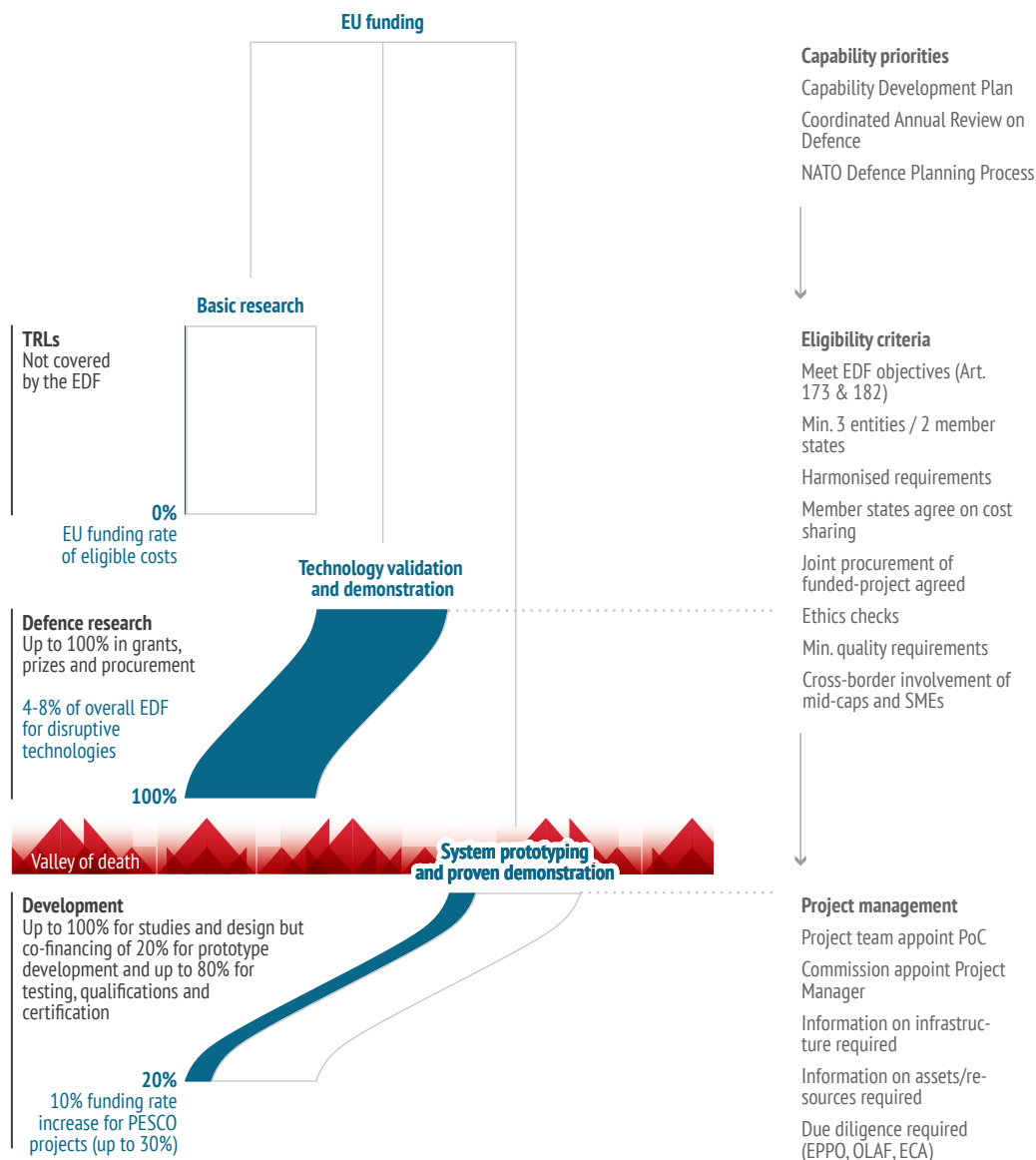
10 Lee Bibby and Benjamin Dehe, "Defining and Assessing Industry 4.0 Maturity Levels – Case of the Defence Sector", *Production Planning and Control: The Management of Operations*, vol. 29, no. 12 (2018), pp. 1030–1043.

11 Renaud Bellais and Renelle Guichard, "Defense Innovation, Technology Transfers and Public Policy", *Defence and Peace Economics*, vol. 17, no. 3 (2006), p. 276.

12 Op.Cit., "Proposal for a Regulation Establishing the European Defence Fund", p. 20.

## FIGURE 12 | The European Defence Fund

How it should work



Data: European Commission, 2019

Yet the EU should not necessarily be concerned with all projects that fall into the 'valley of death'. Not every single research project that falls into the 'valley' is a waste of resources and it is possible to 'fund failure'. The truth that

bedevils all defence R&D is that research innovation is expensive and occasionally liable to failure – no amount of extra money will assist a technology through to development if the basic idea fails for physical or theoretical

reasons.<sup>13</sup> In some cases, however, 'failure' should be positively viewed because any research endeavour that comprehensively proves that a certain technology cannot be used in defence may result in a strategic or military gain by denying adversaries the potential to develop the technology separately.<sup>14</sup> For the Fund, there will be no accurate way of discerning whether a defence research project will make it on to the development phase. While in the initial stages of the EDF it will be politically important to prove the added-value of defence research projects, as the Fund matures the Union will have to accept that investments may 'fund failure'. Naturally, any attempt to avoid funding failure will serve as a disincentive for research institutes and firms. Investment in defence is inherently about risk-taking.<sup>15</sup>

## FROM THE CRADLE TO THE GRAVE

Notwithstanding the specific challenges associated with defence R&D, there are also issues related to capability development when defence technologies are pulled through the TRLs. One of the most immediate challenges that will face the Commission is whether national procurement processes can be effectively brought together for individual research and capability programmes. Given that member states will be co-financing capability development projects,

and recognising that collaborative development and procurement is a key EDF objective, efforts will be needed to ensure that different ministries of defence and procurement agencies in the member states can work together. Of course, many European governments already have a wealth of experience in working with

**Not every single research project that falls into the 'valley' is a waste of resources and it is possible to 'fund failure'.**

neighbours and partners. Nevertheless, there will be a need for national authorities – working through a committee under the Fund (see Article 28.1 of the proposed EDF Regulation) – to agree on technical details before any project is initiated. Such details could include how much VAT should be levied on goods, how security of supply procedures will work, whether programmes will be managed using

e-procurement platforms or not and more.<sup>16</sup> Of course, ideally these issues need to be worked out by national authorities in advance of applying for a co-financed grant under the Fund and the experiences of the EDIDP should help acclimatise governments to EDF working procedures.

All defence development processes are fraught with *direct* and *indirect* costs and it is difficult for contractors in firms and government procurement agencies to take stock of the full costs of a programme in advance of its commencement.<sup>17</sup> Direct costs relate to the design and execution of a capability programme, whereas indirect costs can result from changes in demand or customer purchasing decisions.<sup>18</sup> The political and economic costs of defence capability development can emerge from anywhere. Governments (and now the EU) are investing taxpayers' money to hopefully ensure value for

<sup>13</sup> Carlos Martí Sempere, "A Survey of Performance Issues in Defence Innovation", *Defence and Peace Economics*, vol. 28, no. 3 (2017), p. 338.

<sup>14</sup> Renaud Bellais, *Production d'Armes et Puissance des Nations* (Paris: L'Harmattan, 1999).

<sup>15</sup> Op.Cit., "Defense Innovation, Technology Transfers and Public Policy", p. 276.

<sup>16</sup> European Defence Agency, "Vademecum on Member States' Defence Procurement Practices for Defence Procurement Gateway", October 10, 2014.

<sup>17</sup> Federic M. Scherer, *The Weapons Acquisition Process: Economic Incentives* (Boston, MA: Harvard University, 1964).

<sup>18</sup> William P. Rogerson, "Economics Incentives and the Defence Procurement Process", *Journal of Economic Perspectives*, vol. 8, no. 4 (1994), pp. 65–90.

money, quality and high performance rates for defence equipment.<sup>19</sup> However, disagreement between firms, governments and militaries over technical specifications and harmonisation for defence equipment can drive up costs during the lifetime of a programme. Altering technology needs or introducing new technical specifications during the early stages of development are particularly expensive because they may result in the need for additional testing and demonstration phases. In addition to disagreement between government organs and firms, additional costs may emerge because originally contracted technologies have been superseded by new ones which makes initial assumptions or performance demands obsolete.

In this sense, the onus is on participating member states to work out differences over military requirements. The Commission has been very clear that no funds under the EDF will be released for capability development unless military requirements have been harmonised in advance, but this is not a concern that is applicable only at the start of capability programmes. In fact, there is a need to ensure that national requirements do not deviate as programmes are initiated and developed. One of the ways in which the costs of non-harmonised technical requirements can be managed is through the application of standards. Governments and firms already apply environmental, health and safety and quality assurance standards (e.g. EN, ISO, STANAGs) to defence programmes as a way of managing costs and ensuring that equipment and systems meet minimum performance, quality, environmental and safety levels.<sup>20</sup> In the defence sector, standardisation may even lead to a greater degree of interoperability between armed services both within

**Rigid national supply chains do not necessarily assist with the goal of de-fragmenting the EDTIB.**

and between countries. It has been calculated by a number of studies that greater standardisation in the EU and within NATO could lead to cost savings of up to 50%<sup>21</sup> and increase military capacity by 30–50%.<sup>22</sup>

Accordingly, the EDF could be leveraged to enhance defence standardisation efforts. First, however, it is necessary to establish a clear understanding of where civil and ‘hybrid’ (i.e. dual-use) standards could be applied during the research and development phases of the Fund. One way of doing this is to optimise existing standards databases and registers. Today, defence establishments already use the NATO Standardisation Document Database (NSDD),

European Defence Standards Reference System (EDSTAR) and European Defence Standards Information System (EDSIS) databases, but more work needs to be done to ensure that these databases can be used to identify new standards and detect obsolete ones. In particular, ‘managing obsolescence is important because standards that are out-

dated or inapplicable pose a risk to life-cycle management’ and they can potentially lead to unnecessary costs and, even worse, faulty or substandard equipment and technology.<sup>23</sup> Thus, as part of the management of future individual work programmes under the Fund it would be a missed opportunity if the Commission and governments fail to collectively integrate standards into capability programmes.

Aside from standardisation, however, another issue confronting the Commission is how SMEs and mid-caps will be integrated into defence R&D projects and capability development programmes. It can be notoriously difficult for SMEs to internationalise their business and there can

<sup>19</sup> Ibid., p. 67.

<sup>20</sup> Daniel Fiott, “European Armaments Standardisation”, Report for the European Parliament SEDE Sub-Committee, *Report No. PE603.872*, October, 2018, <https://www.iss.europa.eu/sites/default/files/EUISSFiles/Defence%20study.pdf>.

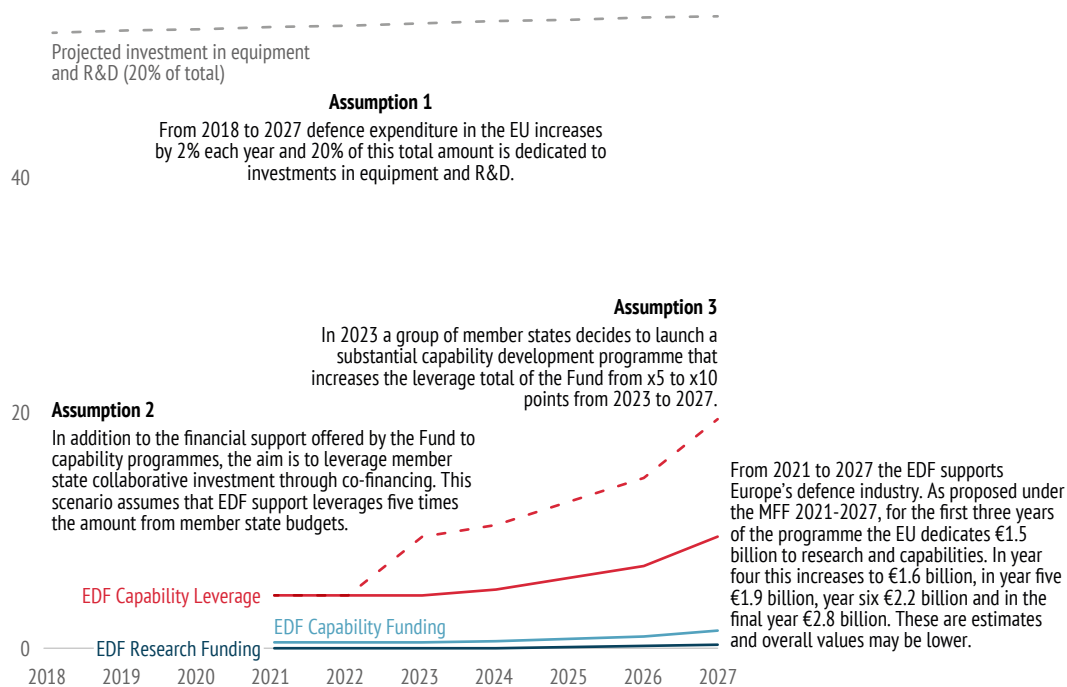
<sup>21</sup> Jordi Molas-Gallart and Richard Hawkins, “Standardisation Systems in the Defence Industries of the European Union and the United States”, Final Report submitted to the European Commission, Directorate General III, No. ETD/97/501185, September 1999.

<sup>22</sup> Ron Matthews, *European Armaments Collaboration: Policy, Problems and Prospects* (Oxon/New York: Routledge, 1992).

<sup>23</sup> Op.Cit., “European Armaments Standardisation”, p. 48.

FIGURE 13 | A hypothetical future for the EDF

€ billions



Data: European Commission, 2019

be fears that joining a larger consortium including prime firms can result in a loss of technology IPR or decision-making power. In this regard, rigid national supply chains do not necessarily assist with the goal of de-fragmenting the EDTIB even though it is often argued by prime firms that they are better placed to manage supply chains. Accordingly, it is wise of the Commission to seek to bring SMEs into the Fund as early as possible, but there is a need for greater clarity on how SMEs that are involved in defence R&D will benefit from the Fund's capability development process as a whole. For example, if a group of research institutes and SMEs are involved in defence research projects under the Fund, what guarantee do they have that their IPR will be protected should these projects then be integrated into capability development programmes? If a group of prime firms want to integrate defence technologies that are produced by SMEs under the Fund's 'research

window', what incentive is there for SMEs or institutes to engage with the Fund if they think that their investments will be swallowed up by larger firms without much reward? In this respect, one way of crossing the 'valley of death' under the Fund is to ensure that SMEs and mid-caps financially gain from collaborative technology investments as and when these technologies are integrated into capability programmes.

Finally, the Union needs to pay particular attention to the likely maintenance, repair and overhaul (MRO) costs of a piece of equipment or system once it has been developed under the Fund. Before any Fund project begins, comprehensive risk assessments could look at the entire life cycle of a project: from the initial inception of a project to its use and ultimate disposal. MRO is critical in terms of ensuring the safety of the piece of equipment or

system.<sup>24</sup> Safety is a critical feature of defence production because the use of specialist materials and chemicals in the development of equipment or systems can be of harm to the environment, soldiers and civilians. Despite this, however, MRO can be a costly and complex process because the number of original equipment manufacturers (OEMs) involved in a programme increases when individual components or spare parts are required.

Proper MRO strategies can drive down costs by ensuring that replacement parts are made more durable and that brand new technologies or components can be designed to enhance the lifespan of a piece of equipment or system. In our digital era, investment in sensors and software that can detect faults, schedule maintenance, ensure regulatory compliance and flag diminishing performance levels are needed. Although Article 24 of the proposed regulation on the Fund states that the work programme ‘may also take into consideration’ MRO factors, in reality sound defence procurement systems automatically include MRO assessments at the beginning of development and procurement programmes. In this sense, a lot more can be done under the Fund to ensure that costs are managed over the entire lifespan of a technology or capability at the development and production phases.<sup>25</sup>

## DON'T FORGET ABOUT STRATEGY

This chapter began by asking whether institutions can ensure that investments in defence innovation evolve into tangible capabilities for EU defence. We were interested in charting

some of the challenges and possible solutions to crossing the ‘valley of death’. The Commission now find themselves in the position of having to ensure technology transition from innovation, to prototyping and on to development and commercialisation. This chapter has signalled that there are a number of strategies that can be deployed to ensure that EU defence innovation projects glide over the valley of death. Standardisation, research networks, the

involvement of industry, MRO and strategic foresight can help the Union manage the costs and challenges associated with capability development. However, as the characteristics of combat and warfare are likely to change during the life-cycle of the Fund this may force the Commission and governments to re-direct or augment defence programmes.

This is particularly salient given that many defence development programmes can last for years, if not decades, depending on the technologies and systems that are being integrated. Here, the Commission can and should think rather more strategically about how it stitches together the seven-year periods in which the EDF will be rolled out. In other words, while the Fund will be in place over the 2021–2027 period a number of capability programmes could last longer than 7 years. Therefore, for capability programmes that might last for 10 years or more there is a need for a longer-term defence investment strategy beyond the compartmentalised 7-year periods imposed by the MFF.

Furthermore, while entities seeking support under the Fund will have to commit to purchasing defence capabilities financed through the EDF, there remain questions about whether there will be enough demand for EU-funded capabilities overall and whether governments cooperating with each other can ultimately forge a common export policy for systems and

<sup>24</sup> Darli Rodrigues Vieira and Paula Lavorato Loures, “Maintenance, Repair and Overhaul (MRO) Fundamentals and Strategies: An Aeronautical Industry Overview”, *International Journal of Computer Applications*, vol. 135, no. 12 (2016), pp. 21–29.

<sup>25</sup> Bernt E. Tysseland, “Life Cycle Cost Based Procurement Decisions: A Case Study of Norwegian Defence Procurement Projects”, *International Journal of Project Management*, vol. 26, no. 4 (2008), p. 365.

equipment. In this respect, any decision by governments to launch projects and programmes under the Fund will include a political dimension as to whether a particular defence technology or system can be suitably commercialised and where demand will emerge beyond the project partners. Chapter two has already pointed to the escalating costs of defence technologies and systems, and so European governments have to be able to find a suitably sized market to sell defence products that they develop under the EDF. In essence, projects initiated by only a handful of countries are unlikely to generate sufficient market demand to help manage costs. In this respect, any capability projects funded by the EDF will need to find markets across the Union and farther afield in the form of exports. In this respect, it is positive to see countries such as France and Germany work towards a more complementary understanding of defence export policy.<sup>26</sup>

Finally, the reality is that the Fund can only be a long-term success if EU member state governments invest in EU capability development. While the requested amount of €13 billion spread over 7 years pales in comparison to the more than €200 billion spent each year by EU

member states on defence, the leveraging potential of the Fund should not be underestimated. Although it should be noted that any amount agreed by European leaders that sits below €13 billion would make this leveraging potential more challenging, yet even more necessary. In the realm of capability development under the Fund, the pooling of national resources will be required as only a maximum of 20% (or 30% under PESCO) of eligible costs will be contributed by the Union. This means that the leveraging potential of the Fund depends on the level of ambition of member states. If a group of member states launch a major defence programme under the Fund then this could unlock long-term investment by governments on military capabilities and defence innovation. Any decision to launch ambitious programmes under the Fund will, as chapter two suggested, rest on a clear and common understanding of the types of military contingencies the Union may be involved in in the future. Again, defence procurement may appear to be a technical feature of EU defence planning but it is inextricably linked to the broader political questions regarding defence that the Union faces.

26 "Déclaration franco-allemande de Toulouse", October 16, 2019, <https://www.elysee.fr/admin/upload/default/0001/06/b6d6d489f677358036fcc00c43d51f7a4213b233.pdf>.

# CONCLUSION

This *Chaillot Paper* has attempted to draw together discussions about defence innovation, capability development and strategy. The paper began by setting three specific questions: (i) how can economic and political factors be balanced in EU defence industrial policy?; (ii) what strategic considerations are driving forward defence innovation investments at the EU level?; and (iii) how can the Union's institutions ensure that investments in defence innovation evolve into tangible capabilities for EU defence? In the course of the analysis, we have seen how the defence sector continues to be a highly strategic domain that is of benefit to Europe's industrial prowess and its defence. EU initiatives such as the European Defence Fund and Permanent Structured Cooperation have been introduced to support the EDTIB and EU defence overall. Yet, as this paper has cautioned and detailed, the defence market should not simply be conceptualised as an economic sector. Obviously, the defence market raises a host of political considerations that cannot be ignored. Beyond a recognition that the defence industry is about competitiveness and politics, however, is the challenge that this fusion of economics and politics throws up for EU institutions and member states.

Beyond a largely economic interpretation of why the EU should invest in the European defence industry, the political dimension of capability development should not be overlooked because considerations about what capabilities should be developed and why they should be developed will likely influence the Union's future level of ambition in military terms. We have seen how a literal interpretation of EU security and defence based on the treaties is being stretched by member states, EU institutions

**Considerations about what capabilities should be developed and why they should be developed will likely influence the Union's future level of ambition in military terms.**

and the treaties to ensure that EU instruments such as the Fund and PESCO can be used to support the development of key technologies and capabilities. The Union finds itself in an era where crisis management capacities remain important, but where the collective definition of what defence means and how it should be geographically interpreted is being debated. Fortunately, EU defence cooperation instruments such as the EDF and PESCO allow member states – at least in theory – to be as ambitious as they like when it comes to defence capability assumptions and programmes. This ability, of course, in turn depends upon the level of investment and political commitment shown towards instruments like the EDF during budgetary discussions under the MFF.

This paper has also sought to address how a range of factors such as risk and cost could hamper EU defence investments. In particular, the paper has counselled that strategies are needed to avoid the 'valley of death' in EDF programmes. The ability of the EU to pull technologies through to the later stages of capability development will certainly be a mark of its maturity as an investor in defence. As this *Chaillot Paper* has highlighted, this will not be easy but supporting the standardisation of technologies, learning lessons from civil investments in research and focusing on the full life cycle of defence equipment development beginning with design and ending with disposal should help. In essence, the Fund is an opportunity to inculcate a broader culture of innovation in the relevant EU institutions and in capitals. Because the logic of the Fund is founded on cross-border cooperation, innovation and industrial competitiveness there is a chance for Europe to rethink its approach to defence innovation. The Fund may

financially support defence programmes, but it could possibly even lead to a shift in mindsets. Such a shift does not simply relate to how the Union thinks about defence innovation but how it relates to and deals with the inherent risk involved in defence research and development.

Beyond the programmational or technical aspects of the Fund, however, this paper has also asked how the EU's future defence investments should be seen in light of changes to the global defence market and shifting geopolitical trends. We have seen how the defence technology strategies of countries such as the US, China and Russia appear to show an emerging arms race based on the assumption of strategic rivalry. Technology has been mobilised and instrumentalised by the US, China and Russia, and while the EU is certainly not naïve about the security implications of developing and buying certain technologies, the Union looks likely to insist on its own framing of international instability and geopolitics. In short, we should not expect the EU to simply download American and Chinese conceptualisations of or doctrines for high-technology warfare. But the EU will still need to invest in defence technologies as a way of keeping in touch with the military-technological curve, to uphold its territorial integrity and security, ensure military superiority during crisis management operations and missions and protect the supply lines and strategic connections that are central to its economic prosperity and security.

**The ability of the EU to pull technologies through to the later stages of capability development will certainly be a mark of its maturity as an investor in defence.**

Yet, the development of defence technologies and capabilities is also a key plank of any strategy to becoming more autonomous in the defence domain. The increasing geostrategic entanglement of the US and China means that the case for greater European strategic autonomy in defence is growing. In this sense, if the Union wants – and can afford – to remain ‘strategically agnostic’ in the growing rivalry between the US, China and Russia it needs to be prepared to invest in its military capabilities – not least because, for example, the fallout from a broader Sino-American conflict is likely to hit key European interests such as economic connections and supplies. Accordingly, justifying the Fund on commercial grounds only misses the strategic relevance of EU investments in defence and the need for ‘technological sovereignty’ in key areas. While the Union has a range of proven capability prioritisation tools, the problem facing Europe is that there is as yet no clear understanding of *why* Europe needs an industry from a defence or strategic perspective. Whether or not it is a good idea to write down and codify this understanding in some sort of strategic defence review is the task for another paper. What is undoubtedly the case, however, is that the EU's future investments in defence technologies and capabilities will increasingly have to meet the challenge of an increasingly turbulent geopolitical context.

# ABBREVIATIONS

## 5G

Fifth Generation Cellular  
Network Technology

## ASD Europe

AeroSpace and Defence  
Industries Association of  
Europe

## C<sub>2</sub>

Command and Control

## CARD

Coordinated Annual Review  
on Defence

## CDP

Capability Development  
Plan

## CMP

Coordinated Maritime  
Presence

## CSDP

Common Security and  
Defence Policy

## DARPA

Defense Advanced Research  
Projects Agency

## DG

Directorate General

## DoD

Department of Defence

## DTIB

Defence Technological and  
Industrial Base

## ECA

European Court of Auditors

## EDA

European Defence Agency

## EDF

European Defence Fund

## EDIDP

European Defence  
Industrial Development  
Programme

## EDSIS

European Defence  
Standardisation  
Information System

## EDSTAR

European Defence  
Standards Reference System

## EDTIB

European Defence  
Technological and  
Industrial Base

## EEAS

European External Action  
Service

## EN

European Standard

## EPPO

European Public  
Prosecutor's Office

## EU

European Union

## EUMC

European Union Military  
Committee

## FCAS

Future Combat Aircraft  
System

## HR/VP

High Representative of  
the Union for Foreign  
and Security Policy/Vice-  
President of the European  
Commission

## INF

Intermediate-Range  
Nuclear Forces

## IPCR

Integrated Political Crisis  
Response

## IPR

Intellectual Property Rights

## IPSD

Implementation Plan on  
Security and Defence

## ISO

International Organisation  
for Standardisation

## ISR

Intelligence, Surveillance  
and Reconnaissance

## MFF

Multiannual Financial  
Framework

## MRO

Maintenance, Repair and  
Overhaul

## NATO

North Atlantic Treaty  
Organisation

## NSDD

NATO Standardisation  
Document Database

## NSPA

NATO Support and  
Procurement Agency

## OCCAR

Organisation for Joint  
Armament Cooperation

## OECD

Organisation for Economic  
Cooperation and  
Development

## OEM

Original Equipment  
Manufacturer

**OLAF**

European Anti-Fraud Office

**OSRA**

Overarching Strategic  
Research Agenda

**PADR**

Preparatory Action on  
Defence Research

**PESCO**

Permanent Structured  
Cooperation

**PGMs**

Precision-Guided  
Munitions

**PLA**

People's Liberation Army

**R&D**

Research and Development

**RPAS**

Remotely Piloted Aircraft  
Systems

**SCCs**

Strategic Context Cases

**SMEs**

Small and Medium-sized  
Enterprises

**STANAG**

Standardisation Agreement

**TEU**

Treaty on European Union

**TFEU**

Treaty on the Functioning  
of the European Union

**TRL**

Technology Readiness Level

**UN**

United Nations

**US**

United States

**VAT**

Value Added Tax

This *Chaillot Paper* focuses on new EU initiatives in the defence domain – in particular the creation of the European Defence Fund – and on the Union’s evolving role and engagement in this sector.

The paper seeks to address three specific questions: (i) how can economic and political factors be balanced in EU defence industrial policy?; (ii) what strategic considerations are driving forward defence innovation investments at the EU level?; and (iii) how can the Union’s institutions ensure that investments in defence innovation evolve into tangible capabilities for EU defence?

Cautioning against an exclusively economic interpretation of why the EU should invest in the European defence industry, the paper argues that the political dimension of capability development should not be overlooked. It also analyses how the EU’s future defence investments should be seen in light of changes to the global defence market and shifting geopolitical trends.