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Adapting, not copying: Creating an enhanced European Defence Innovation ecosystem by examining the US model.

Abstract:

This brief analyses the organisational structure of the European Defence Technological and Industrial Base's innovation funding ecosystem and compares it with the US Defence Industrial Base. The US model benefits from risk-friendly innovation funding tools, along with enhanced institutionalised links between technology disruptors and military planning processes. Contrastingly, the EU exhibits limited funding instruments geared towards disruptive technologies and a weaker innovation pipeline between the civilian and military domains. The brief will argue that while the EU cannot fully emulate the U.S. model due to a distinct institutional environment, it can selectively adapt practices tailored to its specificities. These include a DARPA-inspired defence R&D governance for current and future iterations of the European Defence Fund, and strengthening European innovation intermediaries, such as the EDA's Hub for EU Defence Innovation, by drawing from the case study of the US's Defence Innovation Unit.

Introduction

With Russia's illegal war of aggression against Ukraine approaching its fourth year, the conflict has highlighted the focal role of disruptive technologies in modern warfare. Systems such as AI-enhanced targeting and autonomous drones can alter the battlefield dynamics and have actively allowed Ukraine to equalise numerical and traditional capability gaps it has faced (Pardo de Santayana, 2024). As recognised by the EU in its recent Defence Industry Transformation Roadmap, technological innovation and rapid adaptation have become decisive factors of defence readiness. Moreover, with the pace of battlefield innovation and adaptation rendering systems obsolete within months, a more streamlined, flexible, and risk-friendly EU defence innovation ecosystem has to be a key aspect of a holistic European Defence Industrial Strategy.

While the EU has made considerable steps in increasing its defence spending, growth in defence Research and Development (R&D) expenditure has not followed the same trend, having increased by only 37% since 2022, compared to an 81% increase in spending for

defence equipment during the same timeframe[1]. This imbalance and the seemingly prioritisation of filling capability gaps, rather than investing in defence innovation and future capabilities, risks deepening the EU's long-standing reliance on the United States for advanced military technologies.

In this political context, with the EU increasingly reliant on a US administration that is not hesitant to sidetrack it in critical negotiations over the future of European Security, actively challenge its Member States' sovereignty and employ this technological/defence reliance as leverage, this policy brief will examine and compare the defence innovation systems of the EU and the United States. By analysing the institutional structures and public-led governance models that underpin the EU and U.S. innovation ecosystems, the brief identifies key lessons that can enhance EU defence innovation and contribute towards its goals for strategic autonomy.

The transatlantic R&D Gap

Although the purpose of the brief is to display how institutional and governance choices of the US defence innovation ecosystem contribute to the US's technological primacy over the EU, the gap in R&D spending remains a crucial factor that needs to be considered. While the gap in defence R&D spending has been well-documented, with the US outspending the EU by a factor of 10, a more crucial datapoint lies in the allocation of expenditure to Research and Technology (R&T) purposes, which has long been considered focal for long-term innovation through the funding of basic research (Heng, 2025). In this metric, the US has been consistently allocating close to 2.7% of its defence budget for R&T purposes (Winn and Shearer, 2024), while the EU allocates solely 1.6% a percentage reached only after the onset of the war in Ukraine (EDA, 2025), still far from its stated goal since 2007 for a 2% allocation to R&T activities.

The EU Defence Innovation ecosystem

i) The European Defence Fund (EDF)

While European governments have led defence innovation efforts, either through their national defence spending or collaborative capability development programmes, the EDF has emerged as a key mechanism for the transmission of R&D funding in recent years. Marking a historic attempt by the EU to create a substantial financial arm for its defence industrial policy

[1] Based on the author's calculation from official data provided by EDA in its annual "Defence Data" reports.

aspirations, the Fund has been endowed with € 8 billion for the Multiannual Financial Framework of 2021-2027. Although this amount may not seem sufficient compared to the EU's annual spending of 13 billion euros, the EDF actually places the European Commission as the third-largest investor in defence R&D annually. With the EDF having reached its 4th funding cycle, the Fund has thus far succeeded in enhancing the links and creating new networks of cooperation between various players in the EDTIB (Blavoukos et al, 2025). At the same time, it will also contribute to the creation of more than 50 prototypes across multiple battlefield domains (Clapp,2025).

Despite these successes, the Fund has, however, remained constrained in its potential to unleash defence innovation in part because of its intergovernmental characteristics, which seem to favour considerations of broad participation and a prioritisation of national industries over efficiency reasons (Brehon, 2025). While formally the Commission selects the funded projects, the Fund's annual working programme, which directs its activities and the types of projects that will eventually receive funding, is shaped by the committee of EU MS (Fiott, 2024). Potentially more problematic, the Fund displays a strong inclination towards thematic calls, with the 2025 call including only two open, non-thematic calls out of 33 topics in total and seven thematic calls. Although thematic calls are a crucial signal of the Member States' priorities to the industry and indeed provide the Fund with a more specific mission focus, they can also limit EDF's ability to act as an innovation incubator and fund more fundamental research, which is crucial for technological breakthroughs (C. Fuest *et al.*, 2024). In that regard, it shouldn't come as a surprise that only 4-8% of the Fund's annual appropriations are directed toward disruptive innovation. Furthermore, according to recent data published by the Commission, only 400 million euros of EDF funds have been directed towards innovative capabilities such as drones and AI compared to 1.5 billion euros for "legacy" defence equipment (Foy and Dubois, 2025). Lastly, despite the Fund's potential, it has received criticism for the lack of assurances for longer-term funding of projects, while its application process imposes heavy administrative burdens on smaller firms (Maulny, 2024), a fact recognised by the European Commission, which, in its defence omnibus, proceeded in a simplification of several procedures (Clapp, 2025).

ii) Hub for EU Defence Innovation (HEDI)

While EDF, despite its shortcomings, has played a focal role in promoting collaborative European projects in defence R&D, collaborative Research, Technology and Innovation (RT&I) comprises one of the core tasks of the European Defence Agency (EDA, 2024). With this task

in mind, the Agency launched in 2022 HEDI to improve MS coordination on these activities, while also identifying new innovative ideas and disruptors stemming from the commercial sector. To further advance the adoption of innovative solutions, HEDI organises Innovation challenges and prizes to provide funding and visibility to innovators. Moreover, solutions that arise from these challenges and exhibit significant potential to gain the attention of EU States can also be provided with a structured path and funding to proceed in their demonstration and prototype phases. However, despite the potential of HEDI to link technological disruptors with the EU's capability development plans and defence research agendas, leveraging the EDA's expertise in military affairs, it has remained significantly constrained due to lack of a dedicated budget for its activities (Möhring, 2024), a reality acknowledged by EDA in its 2024 long-term review and further proved by the fact that during its first two years of implementation (2023,2024) only three contracts have originated out of the Hub's efforts.

The US paradigm for a defence innovation ecosystem

i) Defense Advanced Research Projects Agency (DARPA)

Analysing the defence innovation ecosystem of the US, the role of DARPA must be mentioned. With a budget not surpassing 1% of overall US defence R&D spending (~ 4 billion USD in 2024 and 2025), DARPA has throughout its history contributed to transformative innovations such as the GPS, the internet and drone technology. Despite a limited budget compared to overall US defence R&D spending, DARPA's breakthroughs suggest that its success stems from its distinct operational model, which has been described as exemplary for innovation organisations (Kattel and Entsminger, 2025). The core aspect of the "DARPA-model" lies in its flat leadership model that entails minimal reporting lines for all DARPA projects solely to the hierarchy of the DoD and DARPA. Research projects are designed and led by highly qualified Programme Managers (PMs), who usually originate from the academic or industry domain and are contracted for short durations, typically spanning three to five years. They are afforded the freedom to design their projects, construct their research teams, and proceed with rapid funding authorisation. In turn, this flexibility encourages a high-risk, tolerant approach, with the DARPA mission and subsequently its projects aiming towards breakthrough technological development, rather than incremental advances (Azoulay et al., 2019). In that aspect, DARPA follows a reversed innovation pipeline model ("right to left"), with PMs first identifying the desired technological evolution and only then proceeding in locating the essential steps for its achievement (Bonvillian, 2018). Moreover, despite the risk-friendly nature of DARPA programmes, constant reviews and clear benchmarks allow for projects to be accurately

evaluated, while flexible funding arrangements enable funding to either increase or terminate, depending on the project's progress. However, DARPA's potentially most important contribution lies in its ability to shield innovation from governmental and military pressures. At the same time, though, its position as part of the DoD's apparatus also allows innovation disruptors to implement and improve their breakthroughs through structured avenues of communication with military services. (Bonvillian, 2015).

ii) Defense Innovation Unit (DIU)

While DARPA has made impressive advancements in the research and development phase of technologies with lower Technological Readiness Levels (TRLs)[2] , it has been widely recognised that the future of defence innovation is also located in more mature commercial applications that can be swiftly adapted for military use. Thus, recognising the need to foster stronger ties between the DoD and this commercial segment, in order to maintain the US's technological supremacy, a plethora of "agencies" in the form of "defence innovation intermediaries" under the DOD's structure were established, with a mission to engage with this part of the innovation ecosystem (Budden and Murray, 2019). Central among them has been the Defense Innovation Unit (DIU). Established in 2015, it has also incorporated under its umbrella additional "defence innovation intermediaries" (Schmid and Wong, 2020). These "agencies" under a common structure are responsible for administering a significant part of the technological development cycle, from establishing synergies with start-ups to supporting the prototyping and early production phases. DIU is equipped with the ability to offer flexible funding arrangements for prototype activities that deviate from complex and bureaucratic heavy DoD processes, which usually discourage technological SMEs from engaging with defence procurement. Moreover, successful prototypes are also offered a streamlined path to procurement and contracting without the need to undergo further competitive stages and bureaucratic steps (Schmid and Wong, 2020). Thus far, DIU has managed to fund 450 prototype developments, with prototypes successfully procured by the DoD reaching a value of 1.7 billion USD (United States Government Accountability Office, 2024).

However, limitations remain despite these positive developments and the innovative approach of DIU and its incorporated organisations. Although DIU presents positive results in prototype development, it is unable to engage in long-term funding, which curtails the potential for

[2] Technology Readiness Levels (TRL) are a type of measurement system used to assess the maturity level of a particular technology. Each technology project is evaluated against the parameters for each technology level and is then assigned a TRL rating based on the projects progress. There are nine technology readiness levels. TRL 1 is the lowest and TRL 9 is the highest.

scaling up disruptive innovations and SMEs if their products are not immediately contracted by the DoD (Schmid and Wong, 2020).

Policy Recommendations

Transforming the EDF into a fully-fledged DARPA-like organisation, or endowing HEDI with a budget approaching the 1 billion USD of DIU, is unlikely to occur due to the EU's unique political context and financial constraints. However, the US case study offers valuable practices that the EU could adopt to strengthen its defence innovation ecosystem and leverage the potential of disruptive technologies in the military domain.

1. Incorporating DARPA elements into future iterations of the EDF.

While undeniably the EU defence innovation ecosystem could benefit from the establishment of a European DARPA, the creation of an organisation with extensive autonomy over funding and project selection decisions seems very unlikely given the control that EU MS want to exercise over the EDF's funding and programme decisions.

Despite that, elements of the DARPA organisational model could be integrated into the European Defence Innovation Scheme (EUDIS), a dedicated funding instrument of the EDF geared towards innovative SMEs and start-ups. Given EUDIS's focus on SMEs and disruptive innovation, it could benefit from a certain degree of autonomy in project selection and funding decisions, while maintaining a close level of connection with the EDF ecosystem, particularly for successful projects that may require increased funding in later stages. However, this autonomy would not entail that the Commission, through its DG DEFIS officials, would be leading these decisions. On the contrary, drawing directly from the DARPA case study, qualified individuals acting as PMs would be in charge of selecting and assisting in the administration and development of projects that EUDIS would undertake.

While this governance structure might seem far from the EU modus operandi, various EU-funded innovation tools and programmes rely on external/independent experts for funding and project management decisions. Case in point, specific projects of the European Innovation Council (EIC), which based on the latest defence omnibus will also fund defence innovation projects, are being administered by Project Managers. Even more poignantly, the European Research Council (ERC), potentially the most successful EU initiative for funding scientific research and innovation, has complete autonomy with its independent Scientific Council being

in charge of drafting the ERC's annual work programme and proceeding in the selection of eligible projects (C. Fuest *et al.*, 2024).

With two annual funding cycles remaining for EUDIS and the EDF, an immediate application of a more autonomous EUDIS could serve as a relatively inexpensive and valuable test for incorporating DARPA governance elements into EU defence R&D mechanisms, while still respecting national sensitivities. In this way, and based on concrete data and experience, both the Commission and the EU MS would be able to make a more informed decision for the future design of a potentially enhanced EDF under the 2028-2034 Multiannual Financial Framework, which envisages substantial increases in defence funding.

2. Adopt the DIU model for HEDI and ensure the inclusion of Ukraine

EDA's Hub for European Defence Innovation (HEDI), despite being uniquely positioned to act as the EU's response to DIU by leveraging the EDA's ability to connect commercial innovation with capability development and strategic research processes, is essentially nullified under a non-existent budget.

In that aspect, a strengthened HEDI that takes up a bigger part of the EDA's 50 million euros budget or possesses a clearly defined budget that would allow for predictability and the potential to scale up its innovation funding activities, could actually deliver on its mission of providing funding support for the prototype phase of promising solutions. Moreover, through the EDA's ability to conclude framework contracts, as shown in the case of munition procurement for the needs of Ukraine, successful prototypes could gain a streamlined pathway to procurement, and thus scaling up of production while avoiding the complex, lengthy and sometimes protectionist national procurement practices. At the same time, European MODs would also benefit from immediate access to the most promising innovative solutions, while also achieving economies of scale through collaborative procurement and essentially splitting the costs for further R&D and production support.

At the same time, with the most innovative start-ups in the defence domain currently present in Ukraine, HEDI would significantly benefit from their participation. Thus, following the recent inclusion of Ukraine into the EDF and given that the country already has an active administrative agreement with EDA, Ukraine's participation in HEDI should be swiftly ensured.

Conclusion

As the war in Ukraine has shown, structured and rapid defence innovation that can be swiftly implemented on the battlefield will be key in addressing capability gaps that might emerge.

While funding remains a crucial aspect, the case study of the US clearly displays that the design and governance of innovation organisations and systems can be key in ensuring disruptive innovation that can be tapped into by defence forces. Although replicating DARPA and DIU is both politically and financially infeasible at an EU level, their organisational structures provide key lessons for the EU defence innovation ecosystem. Greater autonomy in project selection and funding decisions made by qualified PMs could be incorporated into EUDIS, as a small section of the EDF, committed to disruptive innovation. At the same time, a financially strengthened HEDI that offers a structured pathway to commercial innovators for prototyping and procurement could develop into the EU's response to DIU.

Ultimately, while these reforms could enhance the EU's defence innovation ecosystem and allow the Union to lessen its dependence on the advanced capabilities of the US, a shift in mindset and the recognition that disruptive innovation carries significant risk and potential for failure should be acknowledged. Only this way, riskier research that can also yield significant advances will be pursued instead of incremental and safer advances.

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