

Towards a European Defence Innovation Ecosystem



This document has been approved by the five founding member organizations of EDRIN.
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EDRIN's MISSION

EDRIN is the group of independent solution-driven not-for profit European research organizations with a substantial role in defence research and development as part of a broader research portfolio.

We intend to:

- Act as a coordinated voice of RTOs in defence Research & Development
- Offer a one-stop-shop to political and industrial stakeholders and end-users thanks to our key role in the innovation ecosystem, deep experience in national, bilateral and multinational collaborative projects, large networks of excellent researchers and unique test facilities
- Provide strategic guidance and consolidated long-term roadmaps for key priorities to be put forward in a European Defence Research Programme
- Function as the bridging link between academia, SME, mid-caps and industry in both the traditional defence domains as well as an interface to civilian technologies and applications

WHAT WE BRING

EDRIN is the pivot in the value chain of European Defence Research & Development and cooperation. Its members bring decades of experience in defence research and technology working for Ministries of Defence, Armed Forces and multi-national defence organisations like EDA and NATO. EDRIN members connect academia, applied research, SMEs, end-users and industries including the non-traditional defence industries.

OUR ADDED VALUE

With its experience and broad network, EDRIN offers a one-stop-shop to political and industrial stakeholders and end-users. EDRIN will proactively engage with all relevant stakeholders to maximize the success chances of the EDF, which is to foster the competitiveness, efficiency and innovation capacity of the European defence technological and industrial base throughout the Union.

WHO WE ARE

Aiming at gathering the voice of the European not-for-profit RTO's involved in Defence R&D, EDRIN was created by the following founding members and is looking to grow continuously in 2020+:



Distinct Role of Research and Innovation in the EDF

The EDF is an instrument to incentivise investments in joint research and joint development of defence capabilities and underlying technologies. It aims to foster synergies and cost-effectiveness, to strengthen the global competitiveness of the EDTIP, promote the EU Member States jointly purchase and maintain defence equipment. The EDF provides grants for research and development actions. Both research and development actions shall be consistent with defence capability priorities commonly agreed by Member States, particularly in the context of the Capability Development Plan.

Although research and development share the same goals, there are also distinct differences. The development phase is highly focused on the development of capabilities based on requirements set by the military end-user. In general, there is little room to divert from these requirements, unless one accepts “mission creep”, which in many cases results in cost and time over-run. In other words, the development phase is solution driven and has little room to experiment with alternative solutions, especially beyond Technology Readiness Level (TRL) 4.

This implies that the seeding ground for innovation, disruptive technologies and emerging game changers must be kept open throughout the entire innovation value chain. In this process, more freedom and flexibility is required to explore new technologies from both the defence and civilian domain that can be used in the development phase. This means that the research phase must be more exploration driven.

For the upcoming process to further determine the structure and content of both windows of the EDF, EDRIN suggests to build this process upon the following principles:

- I. Research and Development should not only be handled sequentially**
- II. Research needs to be permeable to allow incorporation of innovations from non-defence domains**
- III. Exploiting the potential of basic research for defence**
- IV. Building and sustaining a European Defence Innovation Community requires investment**

I. Research and Development should not only be handled sequentially

Research topics in the European Defence Fund work programme should have wording that links research with short-term delivery of a planned capability, while ensuring an open path for disruptive technologies to be explored on the whole path towards development. The Capability Development Plan (CDP) is a condensed version of agreed development areas by the Member States of the European Defence Agency. Such plans typically span a time horizon from 8 to 12 years for research and development, while the development of a capability can take 20 or more years. Therefore, one can expect that at the start of the EDF the focus is on capabilities that are in current procurement plans, i.e. capabilities that will be fielded in the coming 8-12 years. This leaves little time for research at lower Technology Readiness Levels (TRL) and research will typically be closely linked to the challenges that occur during the development of the actual capability. Hence, research is indebted to development and has a facilitating role. This facilitating role should be reflected in the EDF research work programme.

Our specific recommendation for the strategic programming of EDF:

Create so-called **gateway-calls**. At specific gateways during a project in the development programme, there will be a gateway for innovations out of the research programme that can support solving a specific challenge no available technology can provide.

Create an instrument that allows **short-term delivery of ambitious results**: This could be translated into two project formats. **A)** Projects focussing on a component level, where a larger system capability lacks a specific tech-solution and needs a very short-term result that a research project of no longer than 2 years with a limited budget could deliver. **B)** Projects that focus on complex system integration missions, hence would require a larger budget to conduct multi-layered tasks in a bigger team effort. Both formats would require the participation of both research, industry and military end-users.

II. Research needs to be permeable to allow incorporation of innovations from non-defence domains

The leading role of defence research in innovation has diminished over the past decades. Increasingly, military systems and applications are based on or heavily rely on technology originally developed by non-defence sectors. Looking at major trends in the field of big data, AI, and digitization but also in areas like bio-tech, medical systems, robotics and energy shows clearly that military end-users as well as defence industries and research organisations should be aware of solutions and innovations in sectors outside the defence domain.

Typically, European defence research organisations have significant expertise in both military and civilian areas. This means they have an “in house” network they can bring to bear in order to maximize mutual benefits. Adapting technologies, concepts and principles from civilian domains in a defence environment has multiple advantages, e.g.:

- 1) Using existing results lowers overall costs for the research needed to make it applicable for defence use;
- 2) It is likely that results from other sectors have a high TRL level which reduces risks in further research;
- 3) Because R&D markets outside the defence sector are more open and heterogeneous, SMEs and mid-cap companies play a more important role. It is therefore easier to become part of a defence industry supply chain;
- 4) It supports standardization processes on vital components, potentially having a positive effect on time spans from lab to market.

To ensure the permeability of technologies between the two worlds, defence and other sectors, EDRIN as a network can play a key role as a facilitator and interface between these two worlds.

Our specific recommendation for the strategic programming of the EDF

In each work programme of the EDF, there should be a funding stream that supports a **continuous, structured process to ensure the exploitation of solutions from non-defence domains**. This is an ambitious and challenging endeavour, hence an instrument similar to the **Coordination and Support Actions (CSA)** in the civilian research programmes is needed. However, it should be considered to support establishing a platform that ensures this process across the entire span of the EDF rather than only funding single projects, this would lower the risk of loss of expertise and duplication of efforts.

To achieve this goal, experts from both defence and other domains need to be part of such projects and closely collaborate with each other. EDRIN as a network can function as an impartial facilitator between these players.

III. Exploiting the potential of basic research for defence

In the previous paragraphs, much attention was paid to mid- and higher level TRL research as they will find their ways into capabilities currently planned for in national defence plans. For next generation capabilities, however, also low TRL basic research is essential. That level of research is the incubator for technologies that need to find their way into future, beyond 15 years, capabilities. **The challenge will be to identify these low TRL technologies requiring a deep understanding of the technology on one hand and its use in a defence environment on the other hand.**

The future defence environment is dictated by the foreseen geopolitical situation, threat environment at that time and the impact on military operations. That makes the assessment of added value of low TRL research for far future operations difficult. As a first step, it requires insight in fundamental research often done at universities and defence laboratories and its usability for future military purposes. Identification of low TRL research could be done using the same processes and instruments needed to “scout” technologies in non-defence sectors, combined with well-established processes and formats of a 360° technology horizon scanning and foresight of emerging technologies and dynamic technological developments worldwide and their potential future defence relevance assessment in EU Member States. The “*Mad Scientist*” initiative of the U.S. Army Training and Doctrine Command (TRADOC) is an interesting example of how to bring a group of people with a wide ranging background together to discuss future operations and capabilities. With support of the European Commission a similar set up could be established in Europe. Results could be integrated in a transparent and comprehensive repository for non-defence research.

It must be understood that the future is volatile, thus research proposals cannot and should not in all cases directly be linked to clearly defined defence capabilities let alone CDP priorities. Hence, a descriptive roadmap and expected time-line for future steps should be part of the proposals. **The low-TRL research actions in the work programmes should be as open as possible** and the PADR 2019 call on “Future Disruptive Defence Technologies” can be used as an example. Because there is much uncertainty about the future usability of the technology the initial duration of the project should be limited with options for continuation if the results are promising AND the future need is still acknowledged.

In most European countries, there are only single project related **links between academic actors and military end-users**. As a contrast, in the U.S. there are so-called DIUX (Defence Innovation Unit Experimental), where R&D experts from the military have physical offices/labs at university campuses and research organizations in order to best scout new tech-solutions for Defence.

Our specific recommendation for the strategic framing of the EDF

Foresee a budgetary stream for **innovative ideation formats**, which are common in civilian academic environments. Such formats could include defence-hackathons, start-up-labs, technology-days, innovation-forums, foresight workshops and serious gaming concepts. Aside from linking innovative ideas in basic research with long-term needs of military end-users, this element would also be an excellent opportunity to support the building of the **next generation defence experts**, who are a key for a future competitive EDITB. Thus, instruments that **support pan-European talent scouting, career fairs, expert-mobility** et al. should also be considered.

IV. Building and sustaining a European Defence Innovation Community requires investment

The EDF will not replace existing defence R&D efforts. In all official documents, it is stated that EDF is an instrument to INCENTIVISE investments in joint research and the joint development of defence capabilities and underlying technologies. If EDF actions are “on top of” national, bi- and multi-national cooperation initiatives, efficient interfaces and links between these different levels are key in order to prevent further duplication, to ensure resource efficiency and to foster European collaboration in a domain, which is still strongly dominated by national actors. Some RTOs are already involved in numerous EDA activities, such as the CapTech groups or the OSRA process and many of them have now already participated in the Pilot Projects and the Preparatory Action for Defence Research.

EDRIN as a network has been founded in 2019 and so far comprises five renowned RTOs with a strong footprint in defence research on both national, European and international (NATO) scale. As a network, EDRIN brings to bear both the experience and expertise in establishing cross-domain and pan-European networks that are needed to make EDF a success. Therefore, in a next step EDRIN will proactively reach out to relevant organizations across the entire EU and grow our network into a solid representation of the entire European defence research community.

EDRIN is a distinctly RTO driven platform, as such it will also strongly support the establishment of a much broader European defence community that will include SMEs, midcaps, industry and of course military end-users. Specifically in the research domain, a well-connected European community similar to the civil security research domain still needs to be established. Throughout the process towards fully implementing the EDF on all levels, EDRIN will actively engage with the European Institutions and relevant intergovernmental organizations.

Our specific recommendation for the strategic programming of the EDF

As EDRIN, we also strongly recommend that the European Commission **backs such important networking activities with resources** throughout the entire duration of the EDF in order to make a solid European research community a reality.

We recommend that the European Commission considers the **establishment of an expert group** that provides strategic expertise, consisting of representatives of military end-users, defence procurement agencies, academia and applied research, SME/midcaps and industry, including a link to non-defence defence sectors.