



VALUE FOR MONEY?

DENMARK'S PARTICIPATION IN THE EUROPEAN DEFENCE FUND (EDF)

Business case and lessons learnt

May 2024

Table of Contents

About Terma A/S & the European Defence Fund 3

Key Findings 4

Introduction 7

Methodology..... 8

Contextual Elements 9

Number of Projects Won Per Country & Programme Phase 14

Number of Projects Primed Per Country & Programme Phase 18

Structure of the Consortiums and National Concentration Per Project 20

Financial Return of Participation Per Country & Programme Phase 26

Focus on EDF 2021 – Return on Investment Per Capita & Multiplication Effect 31

Conclusion..... 35

Recommendations 36

Sources..... 38



About Terma A/S

Terma is Denmark's largest defence and space industry. Its highly skilled 1.700 employees work on a wide variety of state-of-the-art products in the fields of aeronautics (self-protection systems, supplier to the F-35 programme), missions' systems (radars & C2 software) and space (ground-testing of satellites, star-tracking cameras, electronics subsystems).

Headquartered in Aarhus, Denmark, Terma has subsidiaries and operations across Europe (Austria, Belgium, Czech Republic, France, Germany, Romania), in the Middle East, in Asia Pacific as well as a wholly owned U.S. subsidiary, Terma Inc., with offices in Washington D.C., Georgia and Texas.

About the European Defence Fund (EDF)

The European Defence Fund is a programme launched in 2017 by the European Commission to support collaborative research and development in defence. With a total budget of 8 billion € for the period 2021-2027 (approximately 3 billion € to support defence research and 5 billion € for development of capabilities), the EDF has since funded 162 R&D projects for a total value worth 2.4 billion €.

In practice, the EDF consists in an annual call for proposals prepared and adopted by the European Commission and EU members states through the EDF programme committee. European industries and research entities (universities, research centers and technological organisations) are then invited to respond to the calls, under the sine qua non condition that a project is only eligible if at least three EU member states (all EU 27) or associated country (only Norway) are represented in the consortium.

Terma has been involved in EU-funded projects since 2017. Whereas two projects have already been completed (OCEAN 2020 focusing on maritime awareness and INTERACT dedicated to unmanned armed forces systems), the company is currently engaged in seven ongoing projects focusing on space-based missile early warning architecture (ODINS EYE I & II), earth observation for intelligence, surveillance and reconnaissance (PEONEER), federated cyber physical test range (FACT), artificial intelligence for Joint Intelligence, Surveillance and Reconnaissance (AI4DEF), self-protection systems for fixed and rotary wing airborne platforms (CARMENTA) and pilot interfaces and interactions for fighter cockpits (EPIIC).

Key Findings

THE EUROPEAN PERSPECTIVE A LOOK AT 14 COUNTRIES' PERFORMANCE IN EDF

Since 2017, the EU has allocated **2.4 billion € to fund 162 defence research and development collaborative projects** (PADR, EDIDP, EDF 2021 & 2022).

France, Spain, Italy and Germany are the largest beneficiaries of the programme so far, both in participation share, coordination effort and financial return. This is however unsurprising considering the size of their national defence industry and the national budget share allocated to defence R&D.

With three other regional groups (Benelux, Baltics, and Nordics), **these 14 EU member states have captured for each phase of the programme more than 80% of the available funding**, therefore leaving the other 14 EU members to share among themselves the remaining 20% of the budget.

Looking at the **consortium's structure**, the data shows 2 key trends (or strategies):

- **National groupings or “national fronts” effect:** some projects distinguished themselves by the presence of important groups of participating entities from the same country, suggesting a significant level of national coordination when applying.
- **Reduced country representation:** almost a third (29%) of the projects are run by a handful number of countries: over the 162 projects funded since 2017, 47 have 4 countries or less represented in the consortium, thus countering the idea that EDF projects needs to be “countries heavy” to obtain the funding (the minimum rule is to have entities from at least 3 EU member states).

Key Findings

THE REGIONAL PERSPECTIVE A LOOK AT THE NORDICS' PERFORMANCE IN EDF



Looking at the Nordics, **Sweden is undoubtedly the most engaged Nordic country in the EDF programme**, being almost present in one third (29,6%) of all the projects funded since 2017.

Norway is however an interesting case due to its “rocketing” trajectory: whereas it was almost totally absent in the pilot programmes (1 PADR project, none in EDIDP) it then operated a complete shift in EDF 2021 & 2022 winning 35 projects in 2 years. This is more than Finland and almost better than Denmark in 5 years. Worth reminding, Norway is an associated country to the EDF, meaning that it does not have any voting right within the EDF programme committee (unlike all EU member states).

The Nordics have so far **adopted a more reasonable attitude with regards to the priming of projects**, coordinating between 1 and 2 per phase (Swedish entities contribute to 3,7% of the coordination effort, Danish and Norwegian stakeholders 1,8%, and Finland 1,2%). As a possible strategy to compensate the challenge it represents to be coordinator, both **Norway, Sweden and Finland have made the choice to favour instead national fronts to maintain a certain level of influence** on the orientation of projects identified as crucial.

However, the data also shows that **there has not been yet a “Nordics dominant” project** that would gather entities from all four countries – which is surprising considering the long-standing cooperation through NORDEFECO.

Budget-wise, Sweden is once again the Nordic nation that demonstrates the **best return on investment for the period 2017-2021**:

- Sweden: 74 million €
- Finland: 34,3 million €
- Norway: 30,5 million €
- Denmark: 12,6 million €

Key Findings

THE NATIONAL PERSPECTIVE A LOOK AT DENMARK'S PERFORMANCE IN EDF

Denmark's presence and participation in the EDF programme remains largely unsatisfactory compared to the ambitions announced in the 2021 national defence industry strategy and the potential of its ecosystem.

Looking solely at the number of projects won between 2017 and 2022, **Denmark appears to perform well with 38 projects involving Danish entities**, coming as a solid second in the Nordics after Sweden. Over 162 projects, this is placing Danish presence in almost a quarter of all the projects funded (23%).

However, moving beyond the number of projects won, the 3 other criteria used in the analysis reveal several issues and bottlenecks that **translate a lack of strategic approach thus preventing Denmark from making better value its participation** in the programme:

- As of today, **no Danish SMEs has succeeded in winning a project from the dedicated "SME" category** in EDF 2021 & 2022
- Denmark remains very much on **the backseat of projects' leadership, assuming only 1,8% of the coordination effort**. And unlike other comparable countries, this trend is not compensated by a national coordination effort to build national fronts within consortium or by participating in projects involving less countries.
- Moreover, **the financial return on investment remains poor** (0,9% of the total EU funding distributed between 2017 and 2021, or 12,6 million €).
- Overall, **the cost-effectiveness of the Danish participation still to be improved**. Danish entities have received on average an EU grant of 343.791.73 € per participation in project. which is significantly lower compared to the other Nordics.

This result appears to be uncoherent **with Denmark's significant success in the similar civilian R&D programme Horizon Europe**. In only 2 years in, Danish entities participate in over 10% of the total projects funded and have already captured 2.47% of the total funding (523 million €).

Introduction

Since 2017, the European Union has taken a **growing role in supporting its defence industry**. Back in 2016, European Commission President Jean-Claude Juncker emphasized the paradigm in his State of the European Union speech: *“the business case is clear. The lack of cooperation in defence matters **costs Europe between 25 billion and 100 billion € per year** depending on the areas concerned (...)”*. He added: *“For European defence to be strong, the European defence industry needs to innovate. That is why we will propose before the end of the year a **European Defence Fund**, to turbo boost research and innovation”*.

Seven years later and following two pilot programmes (the Preparatory Action on Defence Research (PADR) and the European Defence Industrial Development Programme (EDIDP)) the **European Defence Fund (EDF) is now up and running**.

As of today, **162 defence research and development projects** (including PADR and EDIDP phases) **have already been selected** to receive funding from the European Union, for a total value worth 2,4 billion € (excluding co-financing from EU member states). Yet, more projects are to come since the EDF will run at least until 2027 and the European Commission has still 5,2 billion € available funding for the next 5 years (2023-2027)¹.

In Denmark, the EDF has been mobilised since its initial phase in 2017: labelled as an “industrial programme”, the now-abolished Danish opt-out on EU defence policy was indeed not applicable, thus authorising participation from Danish entities. As a recognition of its relevance, the **Danish national defence industry strategy** has acknowledged that *“Denmark’s participation in consortia under the EDF is important in terms of collaborating with defence-industry companies across the EU, and for developing technologies and capabilities in the Danish defence industry for the benefit of Denmark’s national security”*. Moreover, the authors intend to *“ensure the acquisition of funding for Denmark from the Fund”*.

1. After reallocations required for launching new tools such as ASAP, EDIRPA and IRIS 2, the EDF budget is now of 5,2 billion € for the period 2021-2027. However, the European Commission has tabled a proposal to boost again the EDF budget with an extra 1,5 billion € amid the upcoming revision of the EU’s multiannual financial framework (MFF).

Against this background, this policy paper intends to provide a **first objective assessment of the Danish performance in the programme** considering the upcoming political agenda both at national (new Danish defence agreement, update of the national defence industry strategy) and European levels (mid-term assessment of the EDF programme, upcoming European Defence Industry Strategy). One of the key interrogations addressed in the paper is: **to what extent is Denmark’s participation in the EDF cost-efficient?** Said differently, are the benefits derived proportional or higher than the investment made by participating entities and the Danish authorities? Is Denmark playing its cards well in the EDF framework?

To answer these questions, **the analysis relies on 4 criteria applied to 4 groups of countries** to allow for comparison, identify gaps and shortages and build learnings. The paper is structured around the following parts:

- Methodology used (analytical & geographic scopes, criteria)
- Contextual elements (programme timeline, R&D expenditures)
- Criteria #1 – Number of projects won per country
- Criteria #2 – Number of projects primed per country
- Criteria #3 – A look at the structure of the consortiums
- Criteria #4 – Financial return of participation per country
- Conclusion & recommendations for a better governance of EDF

REMARKS:

- Since the EDF programme will not be completed before 2027-2028, an update will be necessary at a later stage to better grasp the full picture of the Danish participation;
- This analysis relies on publicly available data (all sources are listed at the end of the document). The evaluation of the value and benefits generated in each projects (ex: knowledge and practices learnt, development of new partnerships and business) remain a task for both the Danish authorities and the participating entities.

Methodology



ANALYTICAL SCOPE

The paper focuses on the 4 phases of the EDF for which public information is available, namely the Preparatory Action on Defence Research (PADR), the European Defence Industrial Development Programme (EDIDP) and the European Defence Fund first two rounds (EDF 2021 & 2022).



GEOGRAPHIC SCOPE

The paper focuses on 14 of the EU members states, divided into 4 regional subgroups. As demonstrated further in the paper, these countries are the biggest beneficiaries of the EDF programme, thus making them relevant for drawing comparison.

- 4 largest defence industries: France, Germany, Italy and Spain
- Nordics: Finland, Sweden, Denmark and Norway (associated country to the EDF)
- Benelux: Luxembourg, Belgium, The Netherlands
- Baltics: Estonia, Latvia, Lithuania



CRITERIA MOBILISED

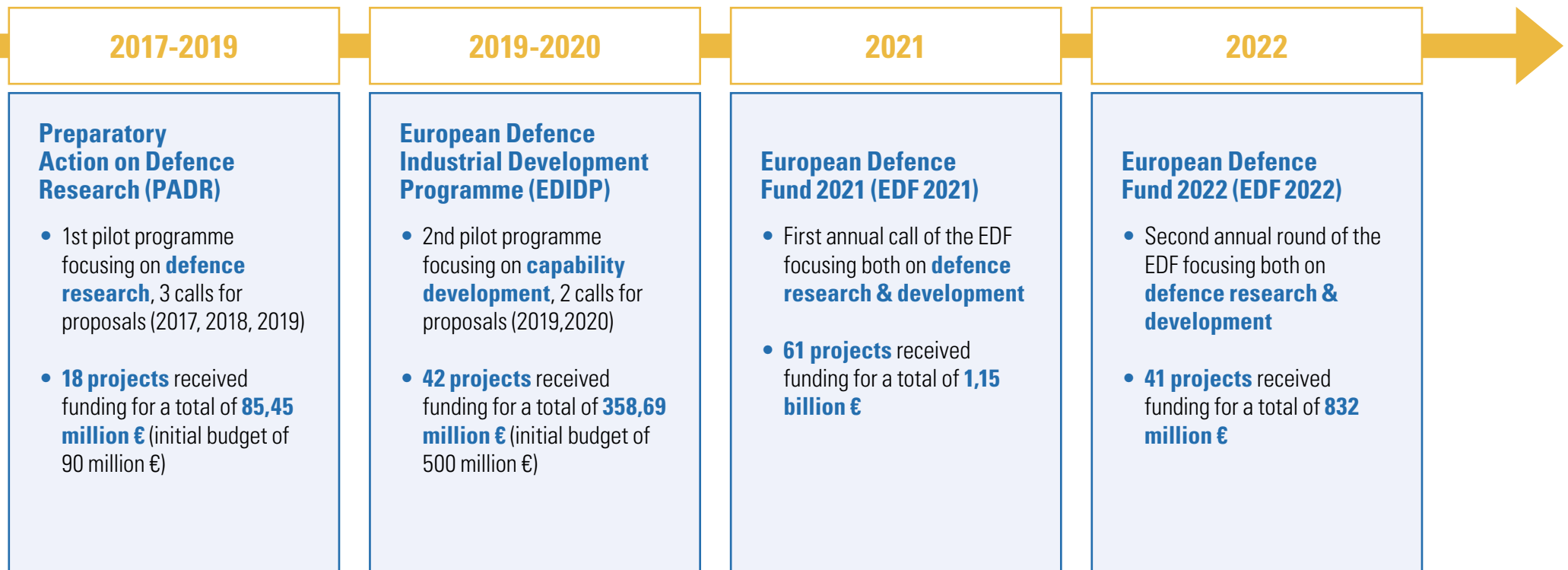
The analysis relies on the following 4 criteria aimed at defining each countries' position and approach to EDF:

- 1 Number of projects won per country & programme phase
- 2 Number of projects primed (coordinated) per country & programme phase
- 3 Structure of the consortium & analysis of national concentration
- 4 Financial return of participation per country & programme phase

Note: The following figures and charts presented on this paper have been built on publicly available information from reliable public and private organisations. The list of sources is published at the end of the paper.

Contextual Elements – Evolution of the EDF Programme (2017-2022)

The chart below summarises the key figures of the 4 phases analysed in this paper.
Overall, the EU has so far awarded **2,4 billion € funding to 162 projects** since 2017.

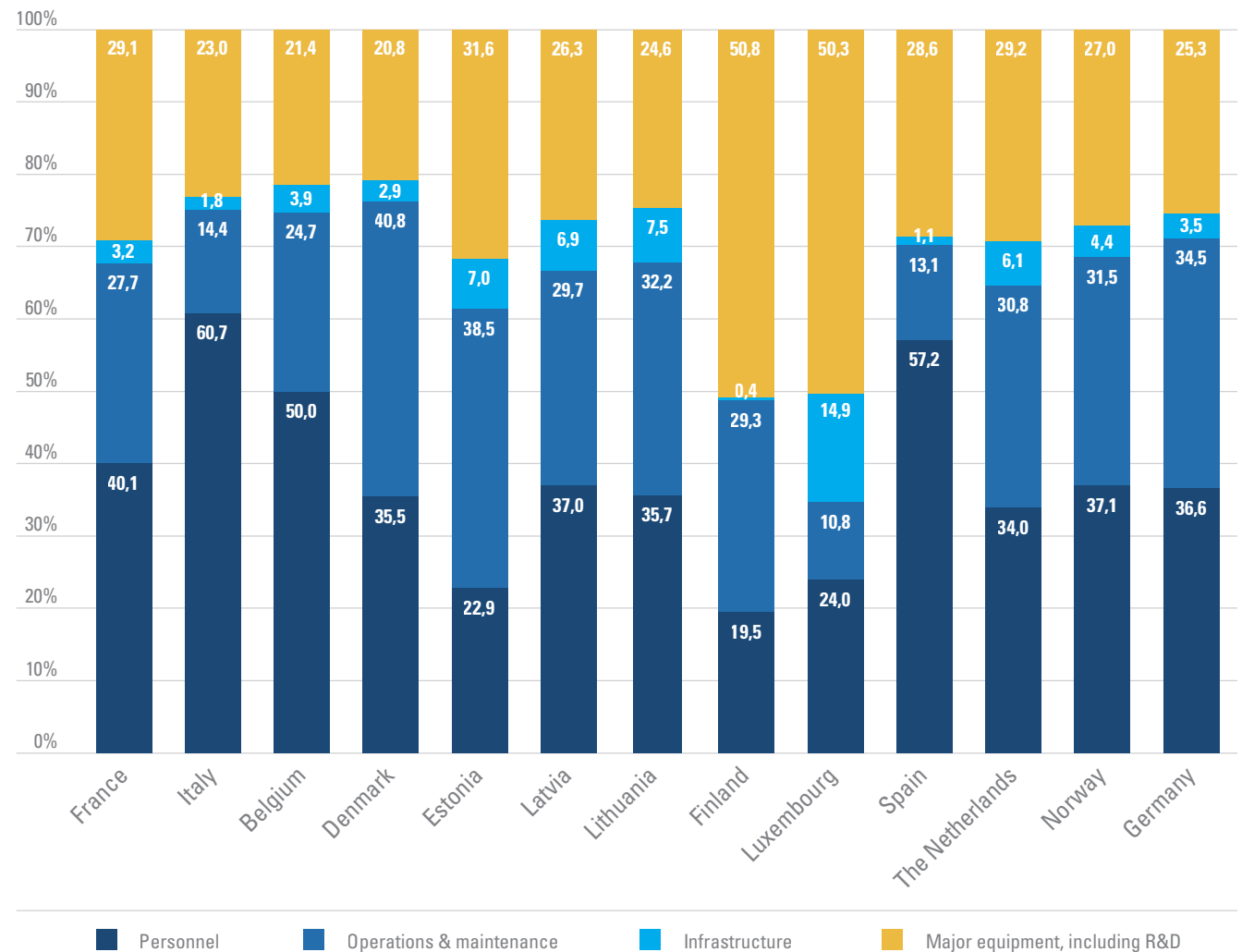


Contextual Elements – Denmark Invests the Least in Equipment Acquisition and Defence R&D

Investment in defence R&D is different from one country to another. The chart below is extracted from the NATO annual defence expenditures review published in July 2023. The bars in yellow represents the **share of national budget allocated to major equipment, including R&D spending**.

The graph shows that among these 13 NATO Allies selected for this study (Sweden is not included in the chart), **Denmark is the nation that is proportionally investing the least in equipment acquisition and defence R&D** (20,8% of total defence spending). However, Denmark remains compliant with the pledge taken at the Vilnius Summit in July 2023 to “commit to invest at least 20% of our defence budgets on major equipment, including related R&D”.

Main categories of defence expenditures in the total national defence budgets (2023)

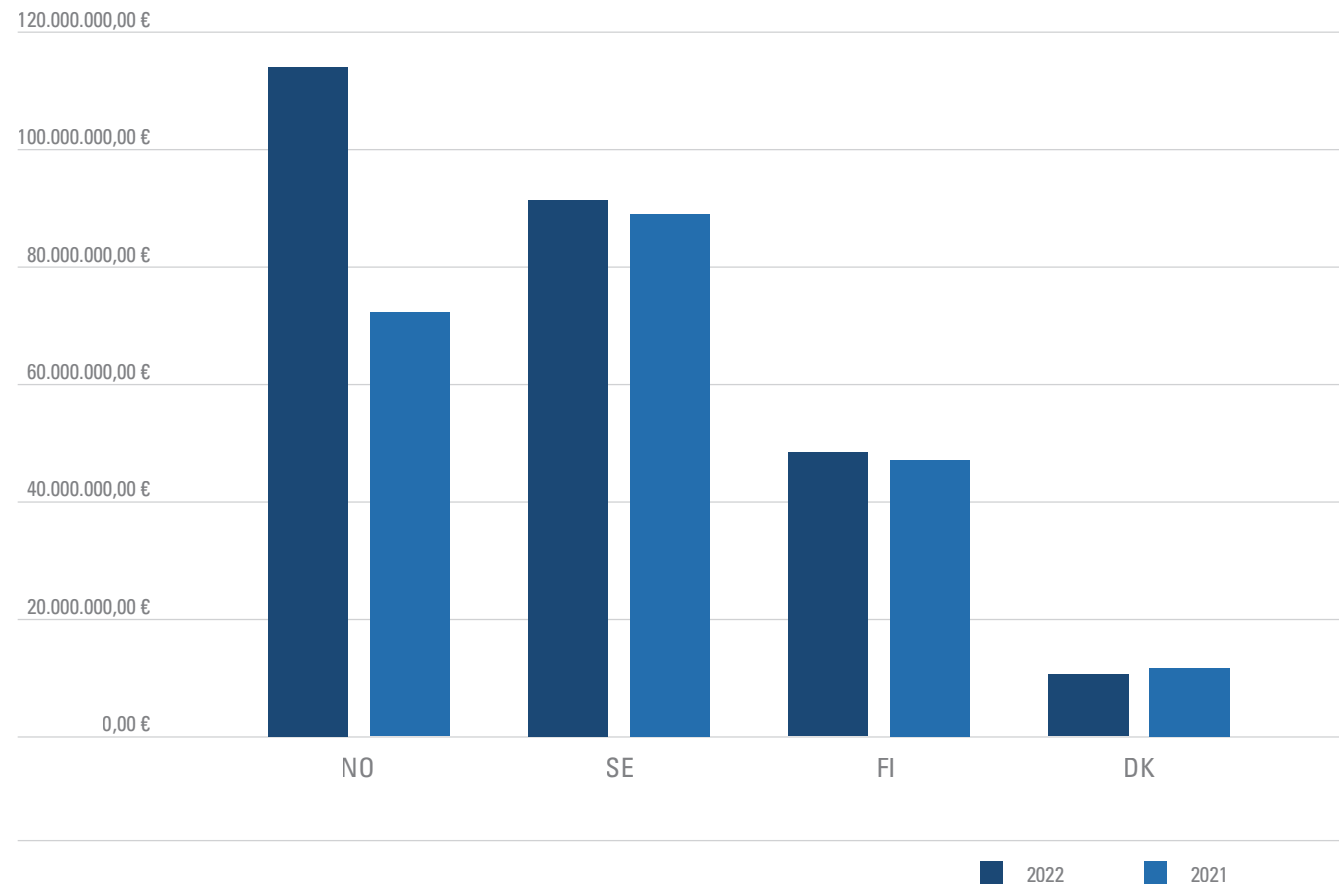


Contextual Elements – Defence R&D Spending Gaps Between the Nordics

This graphic presents the **annual spending for defence research and development** in the 14 EU countries. The data shows that **Denmark is the Nordic country investing the least in defence research and development** with a significant gap compared to Norway, Sweden and Finland. However, it is also worth noting that Denmark is the only Nordic country that has increased its defence R&D spending between 2020 and 2021, and this rise will continue in 2023 and 2024.

	2020	2021
FR	5.600.000.000,00 €	6.500.000.000,00 €
DE	1.472.000.000,00 €	1.649.000.000,00 €
NL	162.900.000,00 €	148.000.000,00 €
ES	128.100.000,00 €	115.900.000,00 €
NO	113.143.689,97 €	71.693.642,62 €
SE	90.600.000,00 €	88.200.000,00 €
IT	61.400.000,00 €	61.500.000,00 €
FI	48.000.000,00 €	46.700.000,00 €
LT	11.900.000,00 €	4.700.000,00 €
BE	11.500.000,00 €	17.200.000,00 €
DK	10.480.145,30 €	11.483.363,71 €
EE	4.400.000,00 €	5.100.000,00 €
LV	2.100.000,00 €	5.000.000,00 €
LU	1.700.000,00 €	700.000,00 €

Defence R&D expenditure in Nordic countries



CRITERIA #1

Number of Projects Won

per country & programme phase

CRITERIA #2

Number of Projects Primed

per country & programme phase

CRITERIA #3

A Look at the Structure of the Consortiums

National concentration per project

CRITERIA #4

Financial Return of Participation

per country & programme phase



CRITERIA #1

NUMBER OF PROJECTS WON

per country & programme phase

Number of Projects Won Per Country & Programme Phase

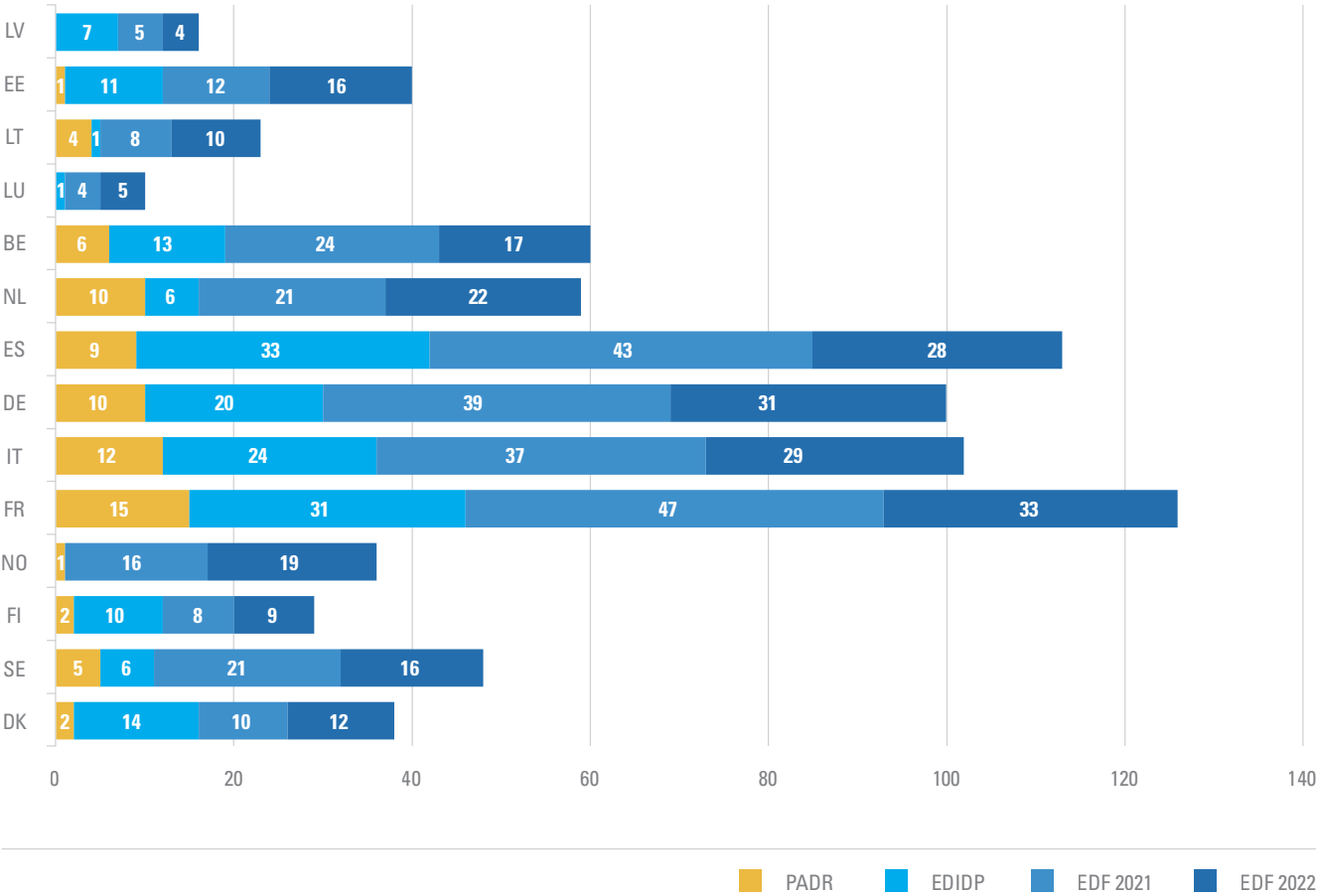
The first criteria takes stock of each countries’ overall participation in the programme since its first pilot phase in 2017 (PADR), looking at the number of projects won.

Unsurprisingly due to the size of their national defence industries but also national budgets for defence R&D, **France, Spain, Italy and Germany** are present in the majority of projects. For EDF 2021, French entities are for instance involved in 47 projects over 61 in total (43 over 61 for Spain).

Norway is an interesting case due to its “rocketing” trend: whereas almost totally absent in the pilot programmes (1 project in PADR, 0 in EDIDP), Norway then operated a complete shift in the first two years of the EDF wining 35 projects in 2021 and 2022 (which is more than Finland and almost as much as Denmark in 6 years). It is also worth reminding that Norway is an associated country to the EDF, meaning that it does not have any voting right within the EDF programme committee (unlike all EU member states).

Denmark’s path in the programme shows an initial “holding back” position in PADR (2 projects) followed by a strong engagement in EDIDP (14 projects) and a constant participation in EDF 2021 & 2022 (10 projects on average per phase). The same path can be observed for **Estonia**, although the country has significantly boosted its participation in EDF 2021 and 2022.

Number of projects won per country & programme phase (2017-2022)



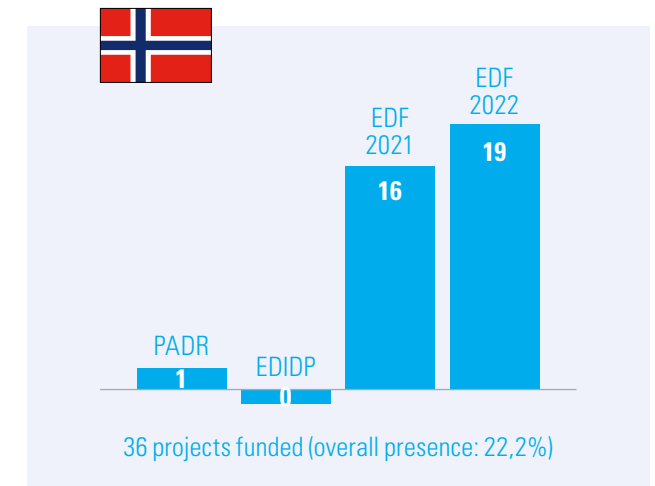
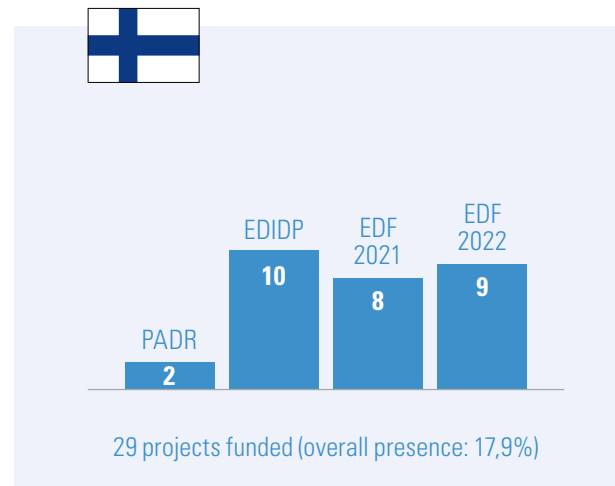
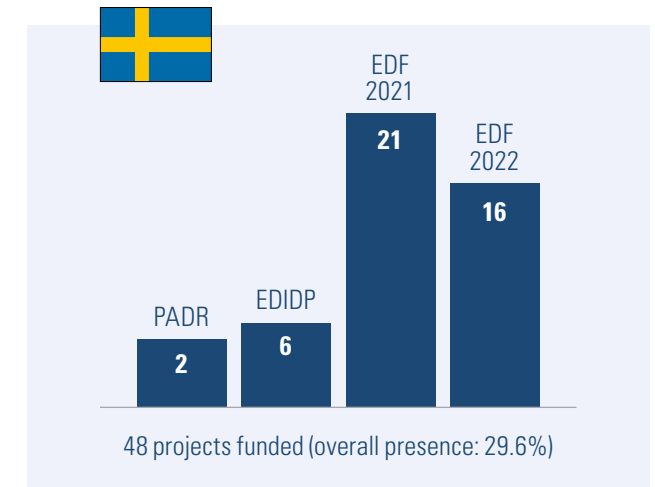
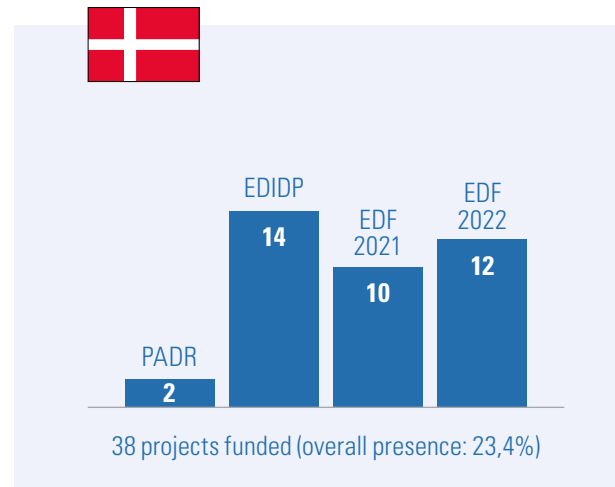
Number of Projects Won Per Country & Programme Phase

Looking at the regional angle, **Sweden** is with no doubt the most engaged country in the EDF programme for the Nordics as it is almost present in one third (29,6%) of all the projects that have been funded since 2017.

Denmark comes as a solid second considering the size of its national defence R&D ecosystem but also the fact that it has the smallest budget dedicated to defence R&D in the Nordics. Since 2017, Denmark has been participating in 38 EDF projects in total (overall presence: 22,2%).

Norway's rocketing trend is even more visible on this graph, having engaged in 35 projects in only 2 years with only 13 national entities involved.

Number of projects won in the Nordics per programme phase (2017-2022)



Number of Projects Won Per Country & Programme Phase

On the 17 existing EDF categories, **Denmark is involved in 12 of them**, the most crowded one being the following 4:

- Space (7 projects)
- Naval combat (5 projects)
- Disruptive technologies (4 projects)
- Medical response & CBRN (4 projects)

The **5 categories that are not covered by Denmark** are (1) air & missile defence, (2) sensors, (3) materials & components, (4) simulation and training and (5) the open SME calls. The absence of Danish entities in this last category so far is surprising since the Danish defence industry ecosystem is mostly made of small and medium enterprises. It is however important to precise on the one hand that this absence does not exclude the fact that Danish SMEs have submitted proposal but were not selected, and on the other hand reminding that the SME calls is one of the most competitive category – thus reducing the chance to obtain funding.

Sweden for its part covers all 17 categories with a strong focus on naval combat, air combat and force protection mobility.

With the exception of air combat, **Norway** is also covering all categories. The figures show that a priority is given to the projects in the naval combat category (4 projects won in 2021 and 2022), followed by efforts in information superiority, cyber, ground combat, space, and energy and environment.

Finland also covers 12 categories, focusing on ground combat (through notably the FAMOUS programme) and air combat.

Denmark's involvement in EDF per category

NAVAL COMBAT EUROGUARD, EPC, dTHOR, SEA DEFENCE, OCEAN 2020	AIR COMBAT EPIIC, FIT4STOP, CARMENTA
GROUND COMBAT FAMOUS 1, FAMOUS 2, E-COLORSS, INTERACT	CYBER FACT
DIGITAL TRANSFORMATION AIDEDex, CONVOY, AI4DEF	INFORMATION SUPERIORITY SESIOP, EC2
FORCE PROTECTION & MOBILITY ACHILE, JEY-CUAS	ENERGY & ENVIRONMENT SCUALE
SPACE ODINS EYE I, ODINS EYE II, SPIDER, EPW, PEONEER, SAURON, INTEGRAL	MEDICAL RESPONSE & CBRN RESILIENCE, COUNTERACT, MoSaiC, CBRN-RSS
UNDERWATER WARFARE CUISS	DISRUPTIVE TECHNOLOGIES DISCMAM, ADEQUADE, ROLIAC, TRANSFLYTOR
AIR & MISSILE DEFENCE	SIMULATION & TRAINING
SENSORS	OPEN SME CALLS
MATERIALS & COMPONENTS	



CRITERIA #2

NUMBER OF PROJECTS PRIMED

per country & programme phase

Number of Projects Primed Per Country & Programme Phase

The second criteria looks at the number of projects primed or coordinated in each of the 14 countries selected.

The coordination role is usually a **key position to influence the orientation of a project** in the proposal phase as the entity initiates and conducts the discussions. The coordination of a project can therefore be used as a criteria to measure the influence of a country within the EDF.

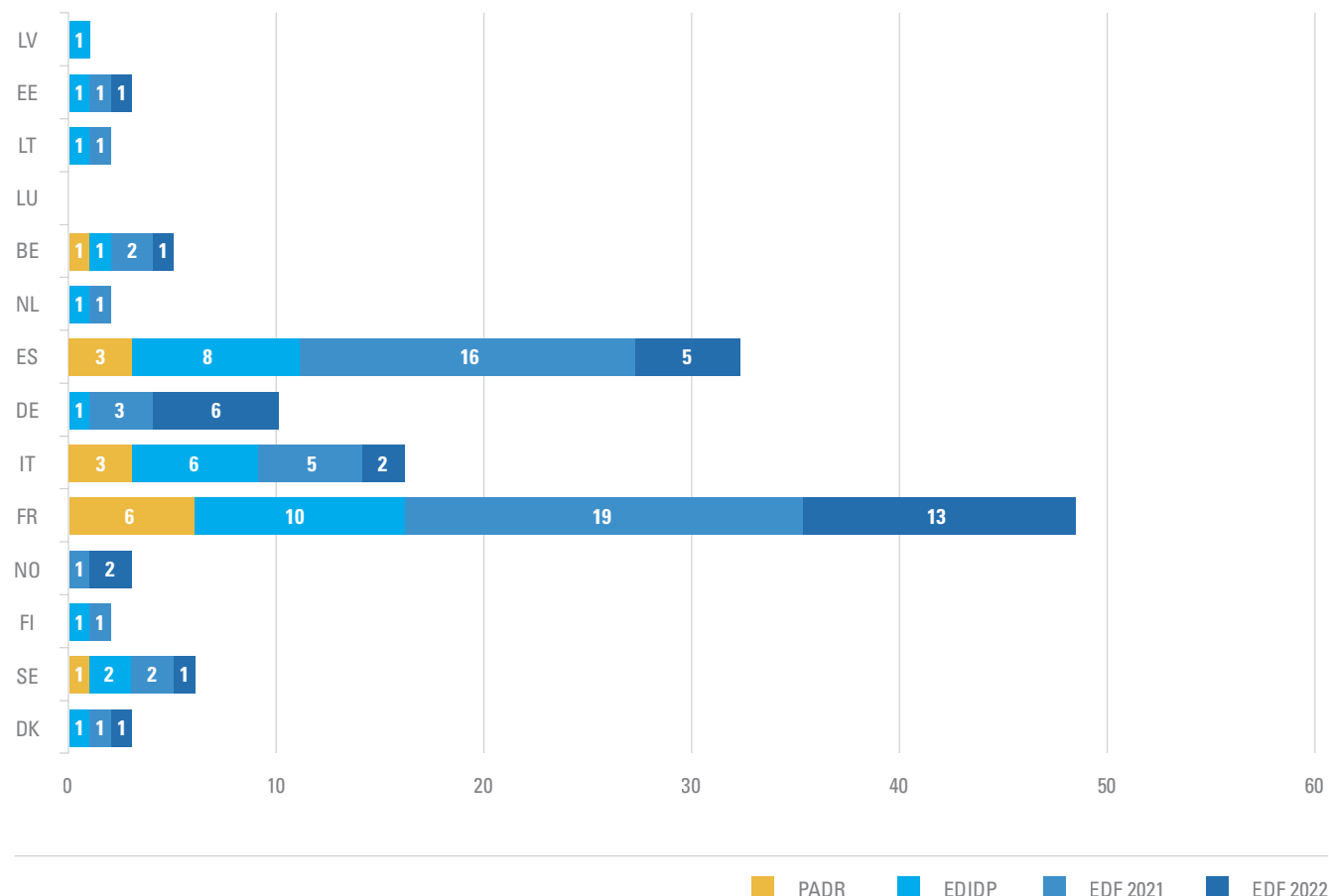
However, it also exists situations where certain entities occupy the role of coordinator either **by default** (the task coordination represents an important work, thus de-incentivising certain entities to take that role) or **by opportunity** (due to the complexity of the projects, some entities can inherit the role of coordinator).

As expected, entities from **France, Italy, Germany** and **Spain** are very often acting as coordinator of the projects, representing on average two third of the overall coordination effort in the EDF so far (entities from these 4 countries coordinate together 66,6% of the PADR projects, 59,5% in the EDIDP, 70,4% in the EDF 2021 and 63,4% in the EDF 2022).

Worth noting, **Germany remains under-represented in the coordination effort** compared to the 3 other countries (10 German coordinators over the 162 projects, against 32 for Spain and 48 for France).

Sweden, Denmark, Estonia, Finland, Norway, Belgium and **The Netherlands** adopt a humbler attitude, coordinating between 1 and 2 projects per EDF phases (Swedish entities contribute to 3,7% of the coordination effort, Danish and Norwegian stakeholders 1,8%, and Finland 1,2%).

Number of projects won per country & programme





CRITERIA #3

A LOOK AT THE STRUCTURE OF THE CONSORTIUMS

National concentration per project

Structure of the Consortiums and National Concentration Per Project

The third criteria looks at the structure of consortiums, trying to identify a pattern in national concentration.

1. Projects with a strong national concentration (3 entities from the same country or more involved in the same project)

The figures presented in the charts after identify EDF consortiums where **3 entities or more from the same countries are participating in the same projects**.

The data show a **national groupings or “national fronts” effect** in some projects, suggesting a significant level of national coordination when entering consortiums. This is particularly visible for the four largest defence industries:

- **Spain** for instance has placed on average 3 to 4 Spanish entities in 46% of the projects it has been involved since 2017. This is particularly visible for EDF 2021 where Spain has 3 or more Spanish entities involved in 23 consortiums over the 43 projects it is participating.
- **Italy** appears to adopt a more targeted approach, as some specific projects reflects a strong national concentration that can represent a significant share of the total number of consortium's participants (ex: the project NEUMANN (EDF 2021) gathers 18 Italian entities over 38 partners; the project VERTIGO (EDIDP) gathers 7 Italian entities over 9 partners).

Yet, some smaller countries have also adopted this national concentration strategy, possibly to **compensate the difficulty to prime or coordinate too many projects while maintaining a certain level of influence on the activities**. For instance:

- **The Netherlands** has managed to place a “Dutch front” in 10 projects over the 43 it is involved in total for EDF 2021 and 2022, despite only coordinating only 1 projects for the same phases (2021 and 2022).
- **Norway** and **Sweden** have also concentrated forces in 6 projects for EDF 2021 & 2022.
- **Estonia** seems to also be testing this model in EDF 2022 with 2 consortiums (SPIDER & STORE) containing each 3 Estonian entities.

Denmark also provides few examples of concentration (ex: INTEGRAL, DISCMAM, RESILIENCE), but this practice of a building “national fronts” does not appear to have been systematised or to be based on a strategic decision. In the projects presented after, the Danish participation does not exceed the 3 entities threshold.

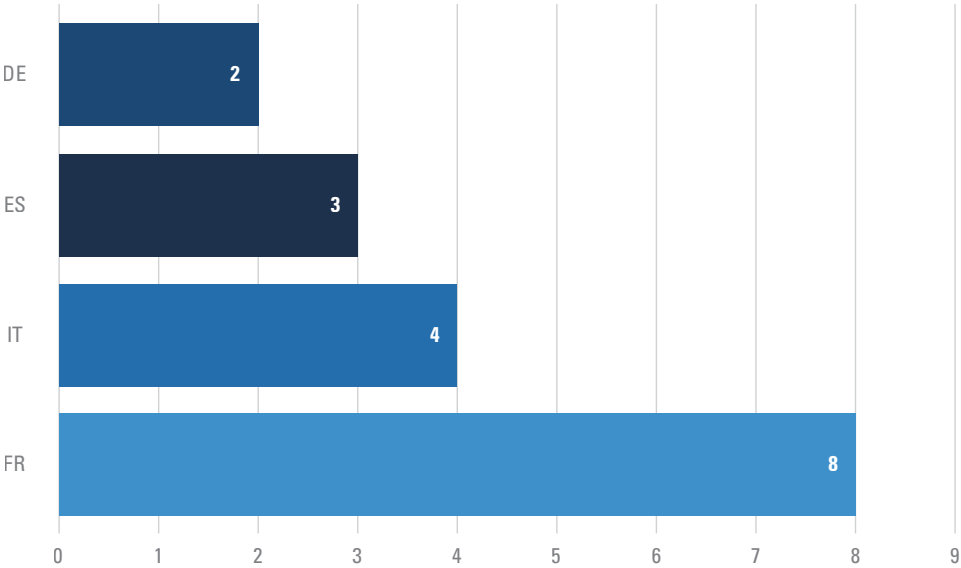
Structure of the Consortiums and National Concentration Per Project

1. Projects with a strong national concentration (3 entities from the same country or more involved in the same project)

PADR (2017 – 2019)

Reminder: 18 projects were selected in total for the PADR

Number of PADR projects with at least 3 national entities or more involved in the same project



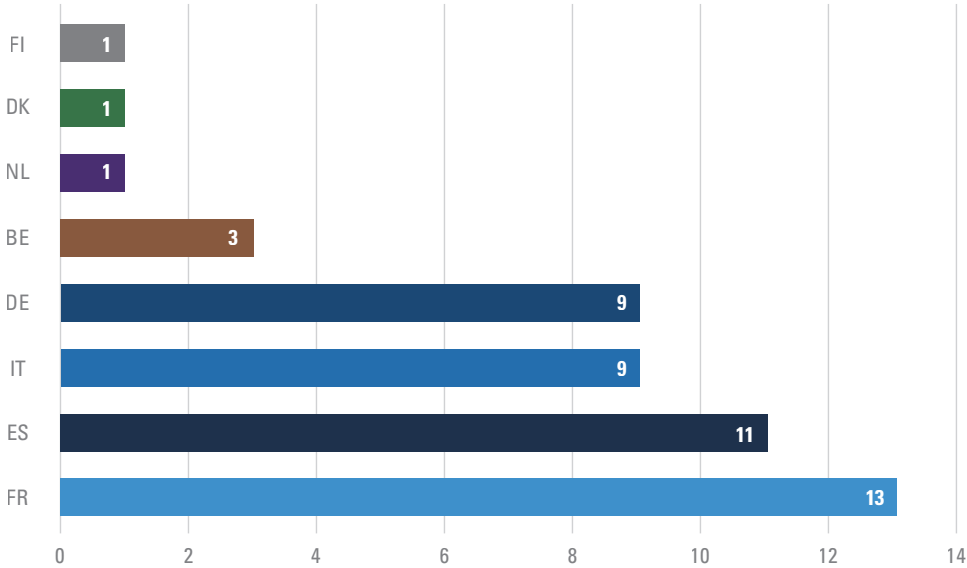
Examples:

- **EXCEED** – 9 French and 4 Spanish entities over 19 partners
- **OCEAN 2020** – 9 Italian and 5 German entities over 43 partners
- **TALOS** – 5 French and 3 German entities over 15 partners
- **SOLOMON** – 4 Italian and 3 French entities over 17 partners

EDIDP (2019 - 2020)

Reminder: 42 projects were selected in total for the EDIDP

Number of EDIDP projects with at least 3 national entities or more involved in the same project



Examples:

- **JEY-CUAS** – 7 French, 5 Italian, 4 Spanish entities over 38 partners
- **FAMOUS** – 5 Finnish and 3 Spanish entities over 19 partners
- **CARMENTA** – 3 French, 3 German and 3 Spanish entities over 14 partners
- **INTEGRAL** – 3 Danish entities over 23 partners

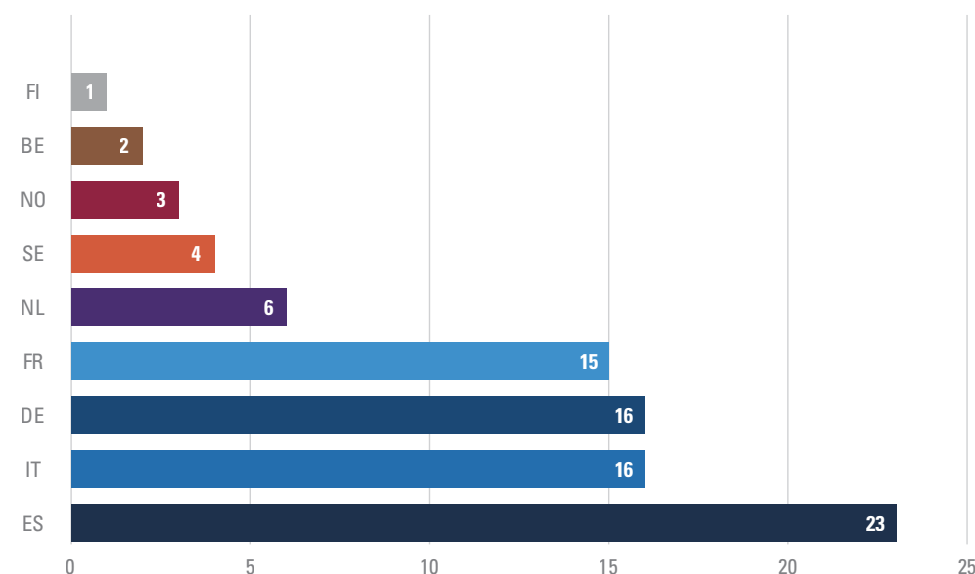
Structure of the Consortiums and National Concentration Per Project

1. Projects with a strong national concentration (3 entities from the same country or more involved in the same project)

EDF 2021

Reminder: 61 projects were selected in total for EDF 2021

Number of EDF 2021 projects with at least 3 national entities or more involved in the same project



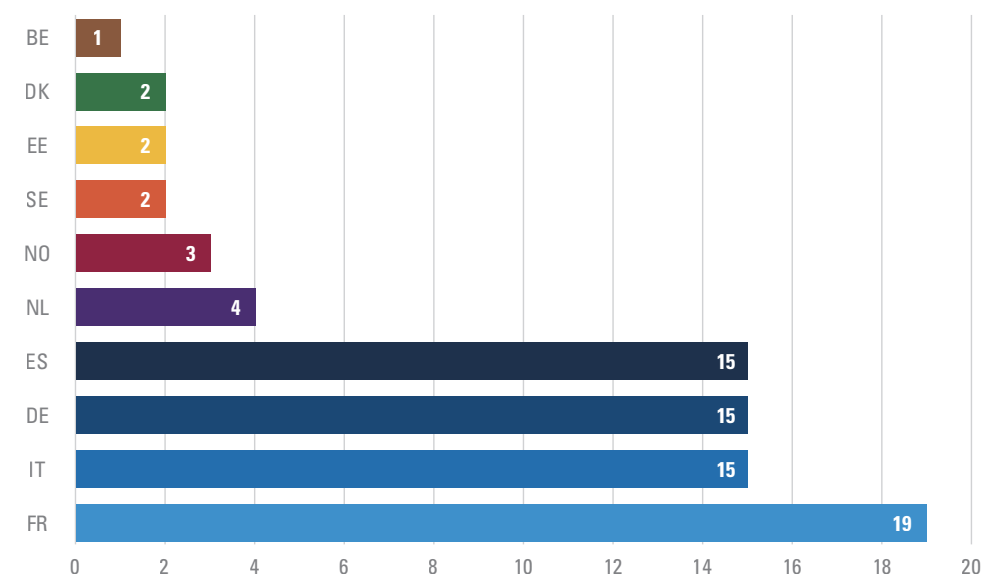
Examples:

- **NEUMANN** – 18 Italian, 6 Swedish, 3 German entities over 38 partners
- **ADEQUADE** – 10 Italian, 7 French, 5 German 3 Dutch, 3 Spanish entities over 31 partners
- **EDINAF** – 6 Dutch, 5 Norwegian, 4 French, 4 Spanish, 4 German, 3 Italian entities over 28 partners
- **dTHOR** – 6 French, 4 Norwegian, 4 Dutch, 4 Spanish, 3 Italian entities over 20 partners

EDF 2022

Reminder: 41 projects were selected in total for EDF 2022

Number of EDF 2022 projects with at least 3 national entities ore more involved in the same project



Examples:

- **ODINS EYE II** – 10 German, 7 French, 4 Italian entities over 38 partners
- **DISCMAM** – 4 Spanish and 3 Danish entities over 10 partners
- **EUROGUARD** – 6 Dutch, 4 Spanish, 4 Dutch, 3 Italian, 3 French over 23 partners
- **STORE** – 4 German, 4 Italian, 3 Estonian, 3 French entities over 20 partners

Structure of the Consortiums and National Concentration Per Project

2. Projects with a small number of countries (projects with 4 countries or less represented)

It is worth reminding that a sine qua non condition for a consortium to be eligible to participate in EDF is to have at least 3 countries represented. Complementary to the national concentration effect, the data also demonstrate that **almost a third of projects are only run by a handful number of countries** (29% in total, i.e. 47 projects over the 162 funded since 2017).

PADR	8 projects over 18 funded with 4 or less countries represented
-------------	--

Examples

- **AIDED** – 4 countries represented (BE, UK, NL, LT)
- **OPTIMISE** – 4 countries represented (ES, IT, FR, SK)
- **PILUM** – 4 countries represented (FR, DE, PL, BE)
- **ARTUS** – 3 countries represented (DE, FR, AT)

EDIDP	15 projects over 42 funded with 4 or less countries represented
--------------	---

Examples

- **LOTUS** – 4 countries represented (HE, CY, NL, ES)
- **ECYSAP** – 4 countries represented (ES, IT, EE, FR)
- **FIIST** – 3 countries represented (SL, ES, AT)
- **HERMES** – 3 countries represented (CY, DE, PL)

EDF 2021	19 projects over 61 funded with 4 or less countries represented
-----------------	---

Examples

- **HEGAPS** – 4 countries represented (ES, BE, DK, NO)
- **FACELIFT** – 4 countries represented (SL, FR, CZ, DE)
- **ABITS** – 3 countries represented (SL, IT, AT)
- **AMLT D** – 3 countries represented (LT, HE, BE)

EDF 2022	5 projects over 41 funded with 4 or less countries represented
-----------------	--

Examples

- **EAGLES** – 4 countries represented (DE, IT, FR, HE)
- **SILENT** – 4 countries represented (FR, DE, IT, BE)
- **TRAVISMOS** – 3 countries represented (SL, HU, AT, IT)
- **WEMOR** – 4 countries represented (HE, SE, BG, ES)
- **HARTIROID** – 3 countries represented (FR, SE, ES)

Structure of the Consortiums and National Concentration Per Project

2. Projects with a small number of countries (Projects with 4 countries or less represented)

Several observations can be drawn:

- As always, the 4 biggest countries (**France, Italy, Spain, Germany**) are over-represented in projects with reduced country representation. This is particularly the case for France who is part of 57% (27 over 47 projects) of the projects with reduced country representation.
- **Greece** also seems to favour this approach, being represented in almost 20% of projects with reduced country representation.
- The data also shows that so far, **there has not been yet a “Nordics dominant” consortium**. The closest example is the project PADIC (EDIDP) who gathers Swedish, Finnish and Estonian entities.
- In EDF 2021, the 19 consortiums with 4 or less countries were all projects that belonging to the **“Open SME call”** category.
- Except for one project (HEGAPS), **Danish entities** seem to be usually involved in bigger consortia with more nations represented.

Although it is difficult to evaluate whether these figures demonstrate a strong will of EDF beneficiaries to be part of smaller consortium or are simply a coincidence, it still demonstrates that **EDF projects do not necessarily need to be “countries heavy”** to win EU funding – if the project is coherent with the capability needs.





CRITERIA #4

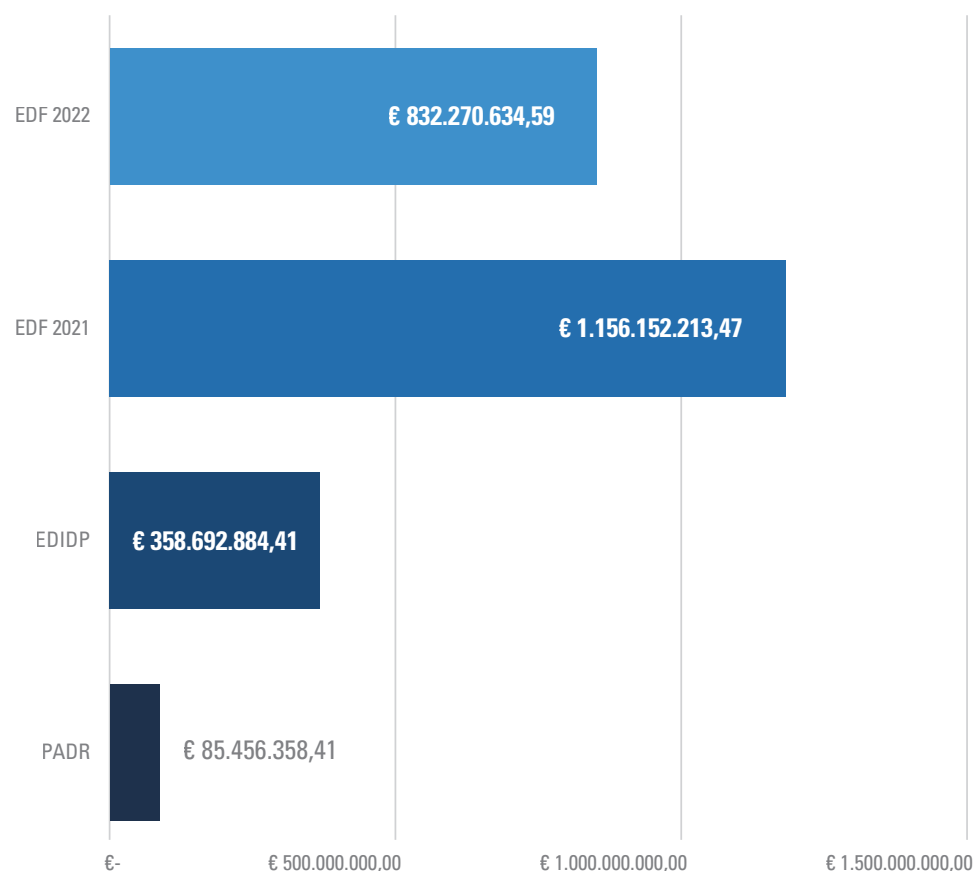
FINANCIAL RETURN OF PARTICIPATION

per country & programme phase

Financial Return of Participation Per Country & Programme Phase

The last criteria used in this analysis looks at the financial return of EDF participation per country.

EU funding distribution per phase (without missing projects)



What is the total amount of EU funding obtained by each country? Before diving into the numbers, 4 preliminary remarks are necessary here:

- These figures only present the **grants provided by the EU**, and do not consider the national funding (co-financing) allocated by national governments. Worth reminding, the modalities of co-financing (rate and eligibility) is different from one country to another.
- The figures below provide information **only for the PADR, EDIDP and EDF 2021** since the financial data for EDF 2022 were not publicly available at the time of writing this paper.
- As explained for each phase, **some financial data are still missing for a handful number of projects**. However, the results show that even if all the information were available it would not significantly change the balance of power presented in the next pages.
- The return on investment gives an idea of each country's performance in the EDF programme, but the **financial allocation of the budget remains a decision taken by the consortiums**. As such, the size of the budget share obtained by an entity depends on numerous factors, such as (1) the time of arrival in the consortium (initiator of the consortium or last-minute addition), (2) the size of the entity joining (large company, midcap, SME, research centers), or (3) the nature of the activities carried out in the consortium (the bigger or the more critical the workshare, the bigger the budget). Some more political aspects (4) can also play, for instance if two competing consortiums decide to merge into one project.

Overall, the financial return can be a useful indicator to assess how strategically oriented an entity and/or a country is when participating in EDF.

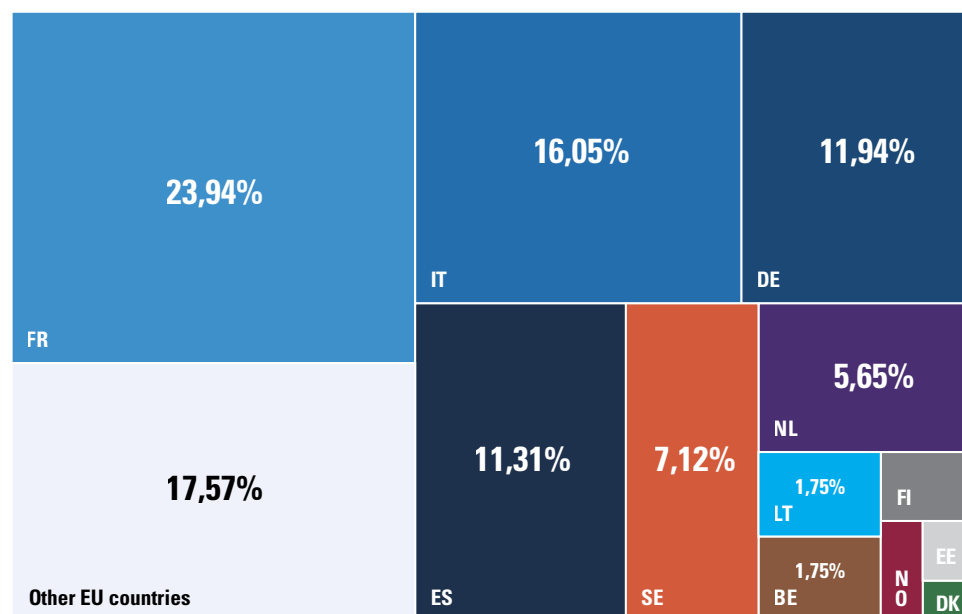
Financial Return of Participation Per Country & Programme Phase

1. Financial return for PADR per country (2017-2019)

Note: The figures do not take into account the financial return for the projects METAMASK, SPINAR and PRIVILEGE that are funded with lump sums (total value: 4.2 million €). As a result, **these % have been calculated on a total budget allocation of 81.2 million €** (instead of 85.4 million € which is the total including the 3 projects mentioned above). No Danish entity are involved in these 3 projects.

Countries	PADR budget allocation (€)	Total share (%)
France	19.447.826,32 €	23,94%
Germany	9.697.766,00 €	11,94%
Italy	13.043.064,24 €	16,05%
Spain	9.184.522,75 €	11,31%
Belgium	1.418.425,00 €	1,75%
Luxembourg	0 €	0,00%
The Netherlands	4.591.148,63 €	5,65%
Denmark	340.463,00 €	0,42%
Sweden	5.782.571,25 €	7,12%
Finland	973.000,00 €	1,20%
Norway	569.410,00 €	0,70%
Estonia	500.000,00 €	0,62%
Latvia	0 €	0,00%
Lithuania	1.421.911,75 €	1,75%
Subtotal for these 14 countries (without 3 lump sum projects)	66.970.108,94 €	82,43%
Other EU countries	14.271.300,69 €	17,57%
Total (without 3 lump sum projects)	81.241.409,63 €	100%

PADR initial budget	90 million €
Funding awarded (18 projects)	85,4 million €
Funding awarded without 3 missing projects (METAMASK, SPINAR, PRIVILEGE)	81,2 million €



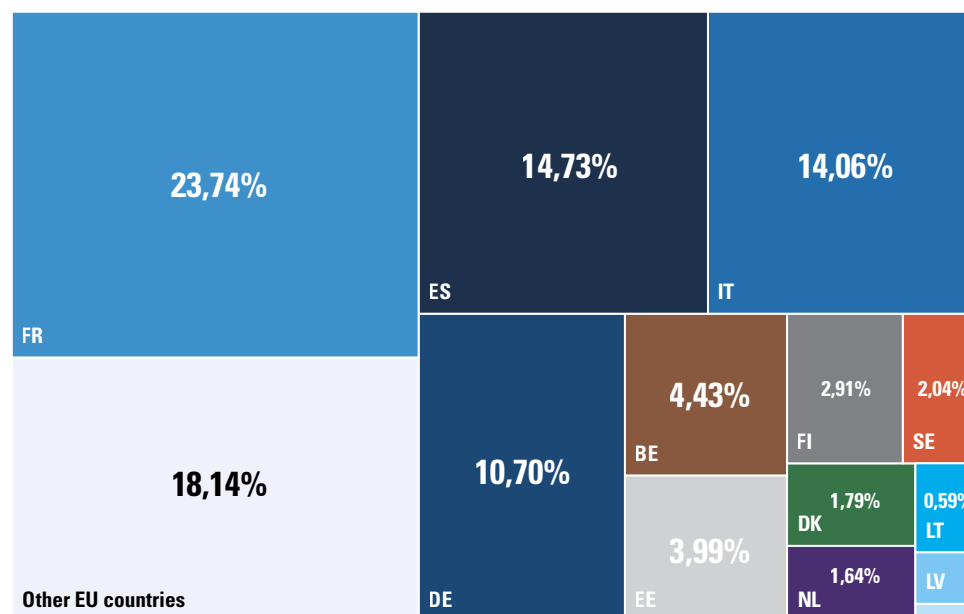
Financial Return of Participation Per Country & Programme Phase

2. Financial return for EDIDP per country (2019-2020)

Note: The figures do not take into account the financial return for the projects SRB, and HERMES due to absence of information (total value of these 2 projects: 4,8 billion €). As a result, **these % have been calculated on a total budget allocation of 353,7 million €** (instead of 358.6 million € which is the total including the 5 projects mentioned above). No Danish entity is involved in these 2 projects.

Countries	EDIDP budget allocation (€)	Total share (%)
France	84.001.485,12 €	23,74%
Germany	37.867.822,50 €	10,70%
Italy	49.754.466,32 €	14,06%
Spain	52.098.888,99 €	14,73%
Belgium	15.675.044,21 €	4,43%
Luxembourg	720.000,00 €	0,20%
The Netherlands	5.796.000,54 €	1,64%
Denmark	6.324.539,53 €	1,79%
Sweden	7.220.347,14 €	2,04%
Finland	10.304.846,44 €	2,91 %
Norway	0 €	0%
Estonia	14.119.372,53 €	3,99%
Latvia	2.100.467,06 €	0,59%
Lithuania	3.645.789,35	1,03%
Subtotal for these 14 countries (without 2 missing projects)	289.629.069,73 €	81,86%
Other EU countries	64.164.034,68 €	18,14%
Total (without 2 missing projects)	353.793.104,41 €	100%

PADR initial budget	500 million €
Funding awarded (41 projects)	358,6 million €
Funding awarded without 2 missing projects (SRB, HERMES)	353,7 million €



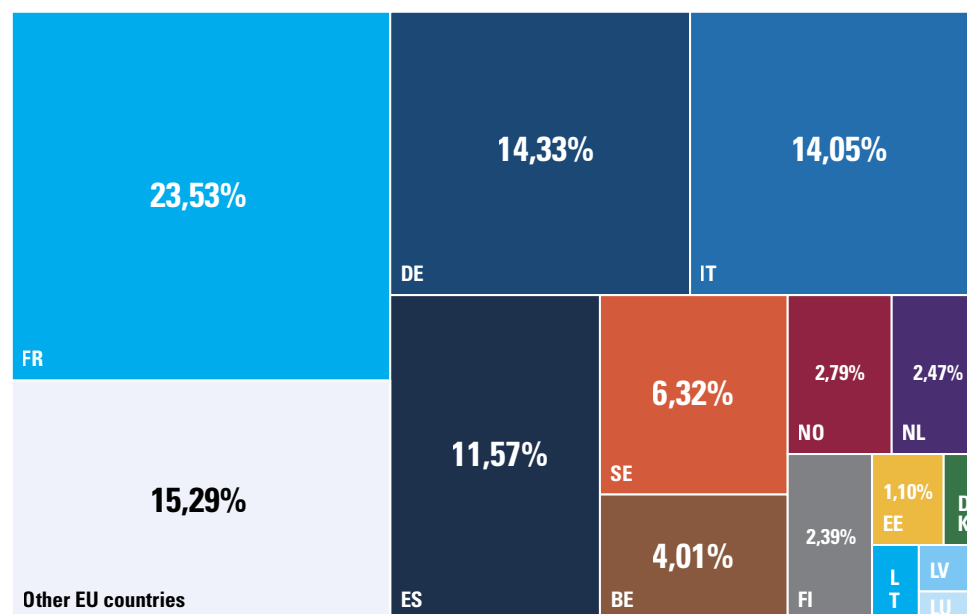
Financial Return of Participation Per Country & Programme Phase

3. Financial return for EDF 2021 per country

Note: The figures do not take into account the financial return for the projects ARTURO, ECOBALLIFE, EPC and EU HYDEF due to absence of information on grant distribution (total value: 189,9 million €). As a result, **these % have been calculated on a total budget allocation of 966,1 million €** (instead of 1,15 billion € which is the total including the 4 projects mentioned above). Two Danish entities are involved in the project EPC.

Countries	EDF 2021 budget allocation (€)	Total share (%)
France	227.371.156,74	23,53%
Germany	138.487.733,16	14,33%
Italy	135.716.811,83	14,05%
Spain	111.774.358,16	11,57%
Belgium	38.760.364,44	4,01%
Luxembourg	3.129.647,75	0,32%
The Netherlands	23.865.413,99	2,47%
Denmark	5.941.238,78	0,61%
Sweden	61.069.942,63	6,32%
Finland	23.044.174,39	2,39%
Norway	26.940.962,36	2,79%
Estonia	10.668.845,00	1,10%
Latvia	4.877.672,47	0,50%
Lithuania	5.848.783,13	0,61%
Subtotal for these 14 countries (without 4 missing projects)	817.497.104,23	84,61%
Other EU countries	148.672.029,33	15,29%
Total (without 4 missing projects)	966.169.133,56	100%

Funding awarded (41 projects)	1,15 billion €
Funding awarded without 4 missing projects (ARTURO, ECOBALLIFE, EPC, EU HYDEF)	966,1 million €



Financial Return of Participation Per Country & Programme Phase

Overall, the EU funding dedicated to defence R&D has so far been largely **captured by the 14 EU member states used in this analysis** : together these countries have obtained more than 80% of the EU funding in all phases (PADR, EDIDP, EDF 2021), thus leaving the 14 other countries to share between themselves the remaining 20%.

France is without any doubt the EU country with the highest return on investment, absorbing on average 23% of the available budget in each phase. More remarkable is the **funding gap between France and the 3 other biggest national defence industries** (Italy, Spain and Germany) amounting at minimum to a 7 percentage point difference. Since the previous criteria has shown that both Italy and Spain are involved in numerous projects with primary roles, it could indicate that French entities are better at matching the responsibilities they undertake and the funding they obtain.

Looking at smaller countries, **Belgium** is doing particularly good in EDIDP and EDF 2021 as it is reaching a financial return that is almost the double of its neighbour The Netherlands (4,01% budget share for Belgium against 2,47% for The Netherlands for EDF 2021).

Estonia is also performing quite well with a peak in EDIDP where it captured almost 4% of the overall budget (14,1 million €).

In the Nordics, **Sweden** is the country that demonstrates the **best return on investment** on average catching at least 5 million € per phase.

Finland has had a breakthrough in EDIDP notably due to the important responsibilities taken in the projects iMUGS and FAMOUS, confirmed in EDF 2021 with the phase 2 of FAMOUS where the 5 Finnish entities have received almost 20% of the EU grant (17,5 million € over 94 million €).

As for **Denmark**, the results are much more mixed so far:

- Except for one project in EDF 2021 (FAMOUS 2), **Danish entities have systematically received EU grants below 1 million €**.
- More specifically, Danish entities received **on average an EU grant of 343.391,73 € per participation in project**. This is significantly lower compared to the other Nordics (1,5 million € for Norway, 1,2 million € for Sweden, 983.000 € for Finland), Estonia (802.000 €) or The Netherlands (503.000 €).
- **Overall, the cost-effectiveness of the Danish participation is still to be improved**. As an example, one can see in EDIDP that Estonia has obtained a double financial return compared to Denmark (14,1 million € against 6,3 million €) despite participating in less projects (11 for Estonia, 14 for Denmark).

Focus on EDF 2021 – Return on Investment Per Capita & Multiplication Effect

The table below presents the **return on investment per capita of EDF 2021** to assess each country's performance according to the number of inhabitants. Although the size of the population does not provide any indication on the size of the defence industry nor on the level of investment in R&D, these data can nevertheless gives an idea of the proportionality of the return on investment per nation. Two main lessons can be drawn:

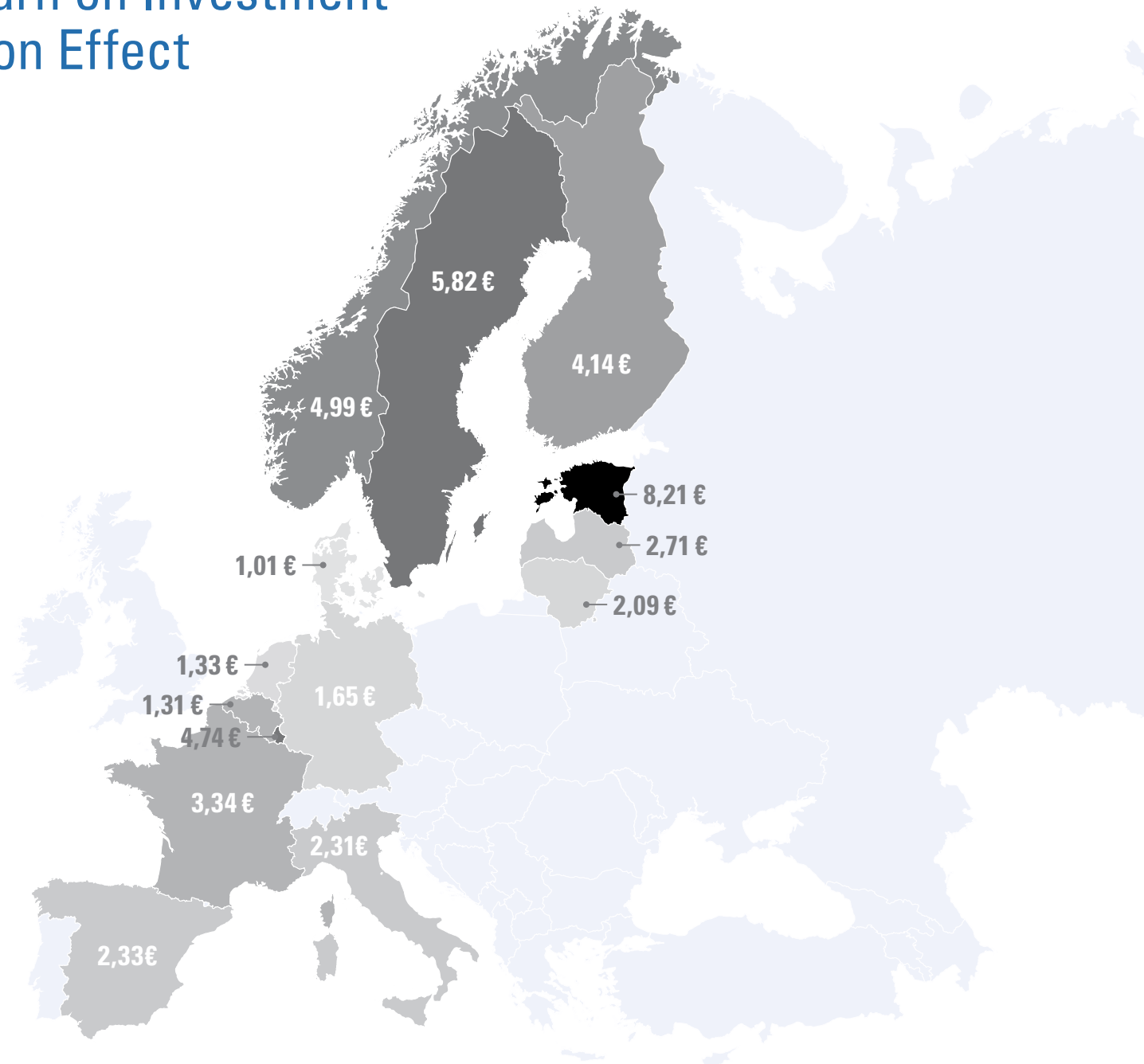
	Defence R&D spending in 2021	EDF 2021 return on investment	Country population in 2021	EDF 2021 return on investment per capita
EE	5.100.000,00 €	10.668.845,00 €	1.300.000	8,21 €
SE	88.200.000,00 €	61.069.942,63 €	10.500.000	5,82 €
NO	71.693.642,62 €	26.940.962,36 €	5.400.000	4,99 €
LU	700.000,00 €	3.129.647,75 €	660.000	4,74 €
FI	46.700.000,00 €	23.044.174,39 €	5.500.000	4,19 €
FR	6.500.000.000,00 €	227.371.156,74 €	68.000.000	3,34 €
BE	17.200.000,00 €	38.760.364,44 €	11.700.000	3,31 €
LV	5.000.000,00 €	4.877.672,47 €	1.800.000	2,71 €
ES	115.900.000,00 €	111.774.358,16 €	48.000.000	2,33 €
IT	61.500.000,00 €	135.716.811,83 €	58.800.000	2,31 €
LT	4.700.000,00 €	5.848.783,13 €	2.800.000	2,09 €
DE	1.649.000.000,00 €	138.487.733,16 €	84.000.000	1,65 €
NL	148.000.000,00 €	23.865.413,99 €	17.900.000	1,33 €
DK	11.483.363,71 €	5.941.238,78 €	5.900.000	1,01 €

- **Some countries are clearly outperforming compared to their size:** Estonia is undoubtedly the top performer with a return of 8€ per citizen. Sweden, Norway and Finland are also quite efficient, being at least 3€ ahead of Denmark which ranks in the last position with 1,01€ return per citizen.
- **Some countries have successfully used the EDF as a “funding multiplier” to their own national defence R&D budget:** in addition to the figures per capita, the table also underlines the success of certain countries when comparing their annual R&D budget to the annual return on investment. Luxembourg for instance managed to win 4.5 times its own R&D budget in EDF 2021. Belgium, Italy and Estonia also managed to capture more than the double of their own R&D budget for the year 2021.

Focus on EDF 2021 – Return on Investment Per Capita & Multiplication Effect

EDF 2021 - Return on investment per capita

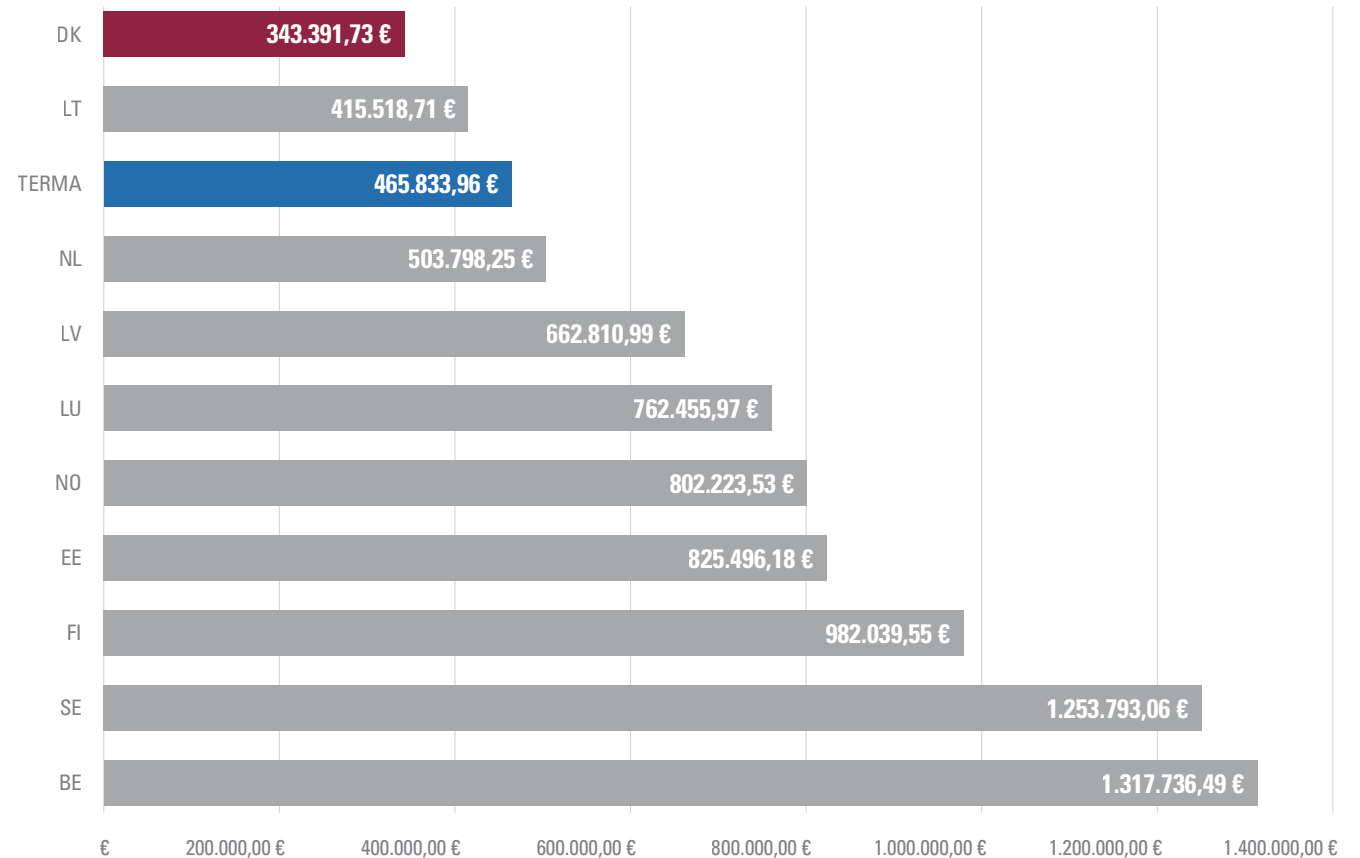
1,01 € — 8,21 €



Focus on EDF 2021 – Average Individual Grant Per Entity

The chart on the right presents the average individual grant per entity in one project and per country. It shows that **Danish entities receive on average an EU grant of 343.000 € per participation in a project**. This is significantly lower compared to the other Nordic countries (1,2 million € for Sweden, 982.000 € for Finland, 800.000 million € for Norway), but also Baltic and Benelux states. Also worth noting, except for one project in EDF 2021 (FAMOUS 2), Danish entities have systematically received **EU grants below 1 million €**.

Average individual grant per entity in one project (2017-2021)





CONCLUSION & RECOMMENDATIONS

for a better governance of EDF

Conclusion

The analysis of the four criteria strongly indicates that **Denmark's presence and participation in the EDF programme remains largely unsatisfactory** compared to the ambitions announced in the 2021 national defence industry strategy and the overall potential of the Danish defence ecosystem.

Looking solely at the number of projects won between 2017 and 2022, **Denmark appears to perform well with 38 projects involving Danish entities**, coming as a solid second in the Nordics after Sweden.

However, the other 3 criteria used in the **analysis depict several issues and bottlenecks and an overall lack of strategic approach** preventing Denmark from making better value its participation in the programme:

- As of today, **no Danish SMEs has succeeded in winning a project from the dedicated "SME" category** in EDF 2021 & 2022
- Denmark remains very much on the **backseat of projects' leadership, assuming only 1,8% of the coordination effort**. And unlike other comparable countries, this trend is not compensated by a national coordination effort to build national fronts within consortium or by participating in projects involving less countries.

- Moreover, **the financial return on investment remains poor** (0,9% of the total EU funding distributed between 2017 and 2021, or 12,6 million €).
- Overall, the cost-effectiveness of the **Danish participation still to be improved. Danish entities received on average an EU grant of 343.391,73 € per participation in project**, which is significantly lower compared to the other comparable countries (1,5 million € for Norway, 1,2 million € for Sweden, 983.000 € for Finland), Estonia (802.000 €) or The Netherlands (503.000 €).

Taking a step back, this outcome is particularly surprising considering the following two elements:

- Since Denmark has been involved in the very early phase of the EDF programme, one could have expected the **learning curve to be much flatter by now after 7 years in the programme**.
- Moreover, one could have expected **Denmark to have leveraged its successful experience in the similar EU civilian research programme Horizon Europe**. Why can Denmark demonstrate leadership when partnering in civilian R&D EU-funded projects but struggle much more in the defence sector?

All in all, the findings presented in this paper advocate for **further understanding of the issues faced by the participating entities, and how to mitigate them**. To this end, the next pages propose several recommendations to improve the governance of the programme at national level.

KEY FIGURES OF DENMARK'S PARTICIPATION IN HORIZON EUROPE (HE)

According to the Danish Ministry of Higher Education and Science, Denmark's participation in the EU civilian R&D programme Horizon Europe is already very positive for the first two years:

- 1173 Danish entities are involved in 826 projects, representing 10% of the total number of projects funded;
- Among the 1173 entities, 287 are leading a project as coordinator;
- Overall, in the first 2 years of HE, Denmark has already captured approximately 523 million € of the available funding (3.9 billion DKK) – representing 2,47% of the total budget.

Recommendations

To generate the greatest value for participation in the EDF, Denmark needs to clarify its approach and use of the fund. Several actions could be taken to further mature the governance model at national level:



1. Developing a more “strategic sourcing” approach to generate greater value for money

Danish entities participate in the EDF programme with the aim to develop or upgrade products and technologies that are matching the capability needs of the Armed Forces. It is therefore essential that these priorities are well identified and understood by the research and business community, and that the proper channels exist for ensuring a continuous dialogue among the triple helix. Concrete measures to strengthen the strategic approach could include:

- **A multiannual EDF R&D roadmap identifying the few EDF categories that are deemed the most relevant to be invested in.** As mentioned in the pages before, Denmark is today involved in 12 of the 17 existing EDF categories through 38 projects. Narrowing down the scope of participation would be triply beneficial: (1) it would help Danish entities to better focus their resources and energy on projects that have a real interest for the end-users, (2) it would also reduce the spread of the Danish influence in the programme by encouraging more national coordination to build “Danish front” and (3) it should increase the return on investment. Said differently, the strategy towards EDF should focus on the quality of participation (role in the consortium, influence on the project’s orientation, value created) rather than on the quantity of projects won. This roadmap would be built in coherence with the Commission’s EDF Multiannual Perspective (MAP).
- **A yearly Danish EDF information day** to (1) present the new EDF work programme, (2) communicate or remind the priorities of the Danish authorities, (3) incentivise further Danish coordination inside the consortium and (4) discuss best practices.



2. Significantly reinforcing the staff dedicated to the EDF governance within Danish authorities

Overall, more staff is needed for:

- **Coping with the workload induced by the management of 30+ ongoing projects**, including the administrative complexities originating from the sensitive nature of the technologies at stake. As the number of projects will continuously increase until 2027 and generate more and more overlapping schedules of projects, more hands are needed;
- **Conducting scouting actions at European level** to (1) better position the Danish defence ecosystem in the programme by promoting their solutions and abilities, (2) better support their entry into consortium and (3) maintain continuous dialogue with the European Commission;
- **Exerting more thought leadership over the programme** by submitting more frequently topic proposals that are aligned with the Danish Armed Forces’ interest.

It is therefore necessary for Danish authorities to have sufficient time and resources for the daily management of these projects, but also for reviewing, assessing and liaising with participating entities. Ultimately, the abolition of the opt-out disposition on EU defence policy requires further human resources to cope with the new workload originating from Denmark’s participation in the European Defence Agency (EDA) and the Permanent Structured Cooperation (PESCO) as both play an important role in shaping the orientation of the EDF programme.

Recommendations

To generate the greatest value for participation in the EDF, Denmark needs to clarify its approach and use of the fund. Several actions could be taken to further mature the governance model at national level:

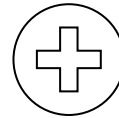


3. Increasing the financial support for participating entities (Danish co-financing fund)

Although the EDF provide a significant financial support to support defence innovation, the funding rates also vary from one project to another when it comes to development action. As a result, participating entities can apply to receive extra-funding from national authorities to cover indirect costs. This national co-financing is essential to carry the projects forward from the development phase into full-scale production.

As of today, DALO has an annual 20 million DKK envelope (approximately 2.6 million €) to support the application of Danish entities in the programme. Although this financial support is appreciated and needed, **this budget remains relatively insufficient compared to the number of projects (10 on average) and successful applicants (10 or more approximately) per year.**

As a result, the new defence agreement is an opportunity to increase the financial support by multiplying this envelope by at least two (40 million DKK) for the last 4 years of the EDF programme.



4. Offering further Project Establishment Support (PES) to Danish entities willing to participate in EDF projects

Applying to these multinational projects represent a significant investment in time and resources for participants.

Echoing the need for extra human resources within the relevant ministries, more support is needed for handling the application process. **A dedicated Project Establishment Support framework** would relieve the cost burden related to the project proposals and the project implementation. The following measures could be taken:

- Supporting the identification of relevant calls and connecting future participants;
- Supporting the handling of administrative documents related to both project proposal and project running (ex: Part A documents, budget, management of intellectual property rights, and legal matters such as grant agreement and project security information (PSI));
- Proposing yearly training or workshop to speed up the learning curve, develop a national EDF community and incentivise exchange of best practices.

Sources

Websites

- European Commission, DG DEFIS, results of PADR ([URL](#)), EDIDP ([URL](#)), EDF 2021 ([URL](#)) & 2022 ([URL](#))
- EU Funding & Tenders platform, Projects & Results ([URL](#))

Databases

- European Defence Agency, Defence Data Portal ([URL](#))
- Open Security Data Europe, European Defence Fund ([URL](#))

EU publications

- PADR, EDIDP, EDF 2021 & EDF 2022 projects factsheets (DG DEFIS website)
- PADR projects grant agreement factsheets (EDA website)
- European Court of Auditors, “Special report 10/2023 “Preparatory action on defence research””, 26/04/2023 ([URL](#))
- European Commission, State of the European Union 2016, 14/06/2016 ([URL](#))

Other institutional sources

- Danish Ministry for Higher Education & Science, “Nøgletal om Danmarks deltagelse i Horizon Europe”, 08/11/2023 ([URL](#))
- Danish Business Authority, “National Defence Industrial Strategy of the Danish Government & Action plan”, August 2021 ([URL](#))
- Defence expenditures of NATO countries (2014-2023), NATO ([URL](#))
- German Ministry of Defence, “17. Bericht des Bundersministeriums der Verteidigung zu Rüstungsangelegenheiten - Teil 1”, June 2023 ([URL](#))

Research centers

- Norwegian Defence Research Establishment (FFI), The Norwegian Defence Industry – main figures for 2020 ([URL](#)), 2021 ([URL](#)), 2022 ([URL](#))

Think tanks

- Hélène Masson, “Precursor programmes of the European Defence Fund – PADR & EDIDP. Review of participations and coordinators”, Fondation pour la Recherche Stratégique, 29/06/2020 ([URL](#))
- Christian Mölling & Torben Schütz, Policy paper, “Defence innovation, The German case”, ARES Group, May 2021 ([URL](#))
- Hélène Masson, “EDIDP – Results of the calls EDIDP 2019 & 2020”, Fondation pour la Recherche Stratégique, 06/07/2021 ([URL](#))
- Hélène Masson, “European Defence Fund. Results of the 2021 EDF 2022 calls results and comparison with EDF 2021”, Fondation pour la Recherche Stratégique, 17/07/2023 ([URL](#))

Press

- Jan Peter Myklebust, “Universities drive participation in Horizon Europe research”, University World News, 16/11/2023 ([URL](#))



Operating in the aerospace, defense, and security sector, Terma supports customers and partners all over the world. With more than 1,600 committed employees globally, we develop and manufacture mission-critical products and solutions that meet rigorous customer requirements.

At Terma, we believe in the premise that creating customer value is not just about strong engineering and manufacturing skills. It is also about being able to apply these skills in the context of our customers' specific needs. Only through close collaboration and dialog can we deliver a level of partnership and integration unmatched in the industry.

Our business activities, products, and systems include: command and control systems; radar systems; self-protection systems for ships and aircraft; space technology; and advanced aerostructures for the aircraft industry.

Terma has decades of hands-on know-how in supporting and maintaining mission-critical systems in some of the world's most hostile areas. Terma Support & Services offers through-life support of all our products to maximize operational availability, enhance platform lifetime, and ensure the best possible cost of ownership.

Headquartered in Aarhus, Denmark, Terma has subsidiaries and operations across Europe, in the Middle East, in Asia Pacific as well as a wholly-owned U.S. subsidiary, Terma Inc., with offices in Washington D.C., Georgia and Texas.



www.terma.com

TERMA^T
ALLIES IN INNOVATION