EUROPEAN
COMMISSION

Brussels, 9.3.2018
C(2018) 1383 final

COMMISSION DECISION

of 9.3.2018

on the adoption of the work programme for 2018 and on the financing of the 'Preparatory action on Defence research', and authorising the use of unit costs under the preparatory action

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THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002[1], and in particular point (b) of the first subparagraph of Article 54(2), Article 84(2) and the first subparagraph of Article 124(1) thereof,

Whereas:

(1) In order to ensure the implementation of the 'Preparatory action on Defence research' ('the Preparatory Action') it is necessary to adopt a financing decision and the work programme for 2018. Article 94 of Commission Delegated Regulation (EU) No 1268/2012[2] establishes detailed rules on financing decisions.

(2) The main objective of the Preparatory Action is to prepare and test mechanisms that can identify, organise and deliver a variety of Union-funded cooperative defence research and technology development (R&T) activities to improve the competitiveness and innovation in the European defence industry and to stimulate cooperation amongst R&T players in all Member States.

(3) In order to implement the activities of the Preparatory Action, the Commission may use indirect management in accordance with Article 60 of Regulation (EU, Euratom) No 966/2012.

(4) The authorising officer by delegation has obtained evidence that the entity entrusted with the implementation of the budget by indirect management is fulfilling the requirements laid down in points (a) to (d) of the first subparagraph of Article 60(2) of Regulation (EU, Euratom) No 966/2012.

(5) It is necessary to allow for the payment of interest due for late payment on the basis of Article 92 of Regulation (EU, Euratom) No 966/2012 and Article 111(4) of Delegated Regulation (EU) No 1268/2012.

(6) Simpler funding rules reduce the administrative costs of participation and contribute to the prevention and reduction of financial errors. In this case, the use of unit costs is necessary to simplify the calculation of grant amounts, to decrease the workload of both the beneficiaries and the Commission significantly, and to accelerate payment procedures. The use of unit costs including personnel costs of owners of small and

[1] OJ L 248, 16.09.2002, p.1.

[2] Commission Delegated Regulation (EU) No 1268/2012 of 29 October 2012 on the rules of application of Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council on the financial rules applicable to the general budget of the Union (OJ L 362, 31.12.2012, p. 1).

medium-sized enterprises (SME) and natural persons not receiving a salary should therefore be authorised for the activities co-funded under the Preparatory Action. Article 182 of Delegated Regulation (EU) No 1268/2012 contains detailed rules regarding unit costs.

(7) As the Preparatory Action is aimed at research, it will reach the same group of beneficiaries as the Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020). For the sake of consistency and administrative simplification for beneficiaries, as far as possible, the same rules should be applied to the Preparatory Action as were applied to the Horizon 2020 programme. It is therefore appropriate to allow for the reimbursement of indirect costs at a flat rate of 25% and for the application of the same unit costs for SME owners and natural persons not receiving a salary as applied under the Horizon 2020 programme and for the reimbursment of direct elibigle personnel costs on the basis of unit costs determined according to the beneficiary's usual cost accounting practices.

(8) In order to allow for flexibility in the implementation of the Preparatory Action, it is appropriate to define the term 'substantial change' within the meaning of Article 94(4) of Delegated Regulation (EU) No 1268/2012.

HAS ADOPTED THIS DECISION:

Article 1

The annual work programme for the implementation of the 'Preparatory action on Defence research' for 2018 (the "Preparatory Action"), as set out in Annex I, is adopted.

The annual work programme constitutes a financing decision within the meaning of Article 84 of Regulation (EU, Euratom) No 966/2012.

Article 2

The maximum Union contribution for the implementation of the Preparatory Action for 2018 is set at EUR 40 000 000, and shall be financed from the appropriations entered in budget line 02.047703 of the general budget of the Union for 2018.

The appropriations provided for in the first paragraph may also cover interest due for late payment.

Article 3

The budget implementation tasks related to the actions carried out by way of indirect management, as set out in Annex I, may be entrusted to the entity referred to in point 1.3 of that Annex.

Article 4

The reimbursement of personnel costs of SMEs’owners and of other natural persons who do not receive a salary, declared by beneficiaries on the basis of unit costs, is authorised for the actions under the Preparatory Action, for the reasons and under the conditions set out in Annex II.

The reimbursement of personnel costs of entities determined according to the beneficiary's usual cost accounting practices and declared by beneficiaries on the basis of unit costs is

authorised for the actions under the Preparatory Action, for the reasons and under the conditions set out in Annex II.

Article 5

The indirect eligible costs of the grants awarded under the Preparatory Action shall be determined by applying a flat rate of 25 % of the total direct eligible costs, excluding direct eligible costs for subcontracting.

Article 6

Cumulated changes to the allocations to specific actions not exceeding 20% of the maximum contribution set in Article 2 of this Decision shall not be considered to be substantial within the meaning of Article 94(4) of Delegated Regulation (EU) No 1268/2012, where those changes do not significantly affect the nature of the actions and the objective of the work programme.

The authorising officer responsible may apply the changes referred to in the first paragraph. Those changes shall be applied in accordance with the principles of sound financial management and proportionality.

Done at Brussels, 9.3.2018

For the Commission
Elżbieta BIEŃKOWSKA
Member of the Commission

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ANNEXES 1 to 2

ANNEXES

to the

Commission Decision

on the adoption of the work programme for 2018 and on the financing of the 'Preparatory action on Defence research', and authorising the use of unit costs under the preparatory action

ANNEX I

The annual work programme for the implementation of the Preparatory action on Defence research for 2018

1.1. Introduction

The main objective of the Preparatory action on Defence research is thus to prepare and test mechanisms that can identify, organise and deliver a variety of Union-funded cooperative defence research and technology development (R&T) activities to improve the competitiveness and innovation in the European defence industry and to stimulate cooperation amongst R&T actors in all Member States.

The focus of the Preparatory action on Defence research is on defence rather than dual-use; nevertheless it will be complementary with existing Union programmes such as the Specific Challenge "Secure societies – Protecting freedom and security of Europe and its citizens" under Horizon 2020 as well as R&T activities in the Member States and in the European Defence Agency (EDA).

Union funding in the context of the Preparatory action on Defence research can only be used for R&T activities related to defence technologies, products and systems, and not to fund military operations.

In line with the objectives given in the 2018 budgetary remark for Item 02 04 77 03 — 'Preparatory action on Defence research' and after consultation with the Member States this work programme contains the actions to be financed and the budget breakdown for year 2018 as follows:

- for actions implemented in direct management (1.2): EUR 100 000. - for actions implemented in indirect management (1.3): EUR 39 900 000

1.2. Actions implemented in direct management

Hire of expertise and dissemination activities related to the 'Preparatory action on Defence research'

Legal basis

Preparatory action on Defence research – point (b) of the first subparagraph of Article 54(2) of the Financial Regulation

Budget line

Item 02 04 77 03

Amount

EUR 100 000

Description and objective of the implementing measure

10 direct contracts or specific contracts under framework contracts are expected to be awarded in the 1st semester 2018 for:

- Dissemination activities (publications, conferences) directly linked to the achievement of the objectives of the action or measures falling under this item,

- Hire of short-term external expertise for ad hoc meetings set up for the preparation of the future European defence research programme.

1.3. Actions implemented in indirect management

Management of actions (research projects) on behalf of the Union

Legal basis

Preparatory action on Defence research – point (b) of the first subparagraph of Article 54(2) of the Financial Regulation

Budget line

Item 02 04 77 03

Amount

EUR 39 900 000[1]

Implementing entity

These actions shall be implemented by the EDA through the delegation agreement signed in 2017 between EDA and the Commission on behalf of the Union.

The choice of the Agency for the delegation agreement is justified by its knowledge and its recognised experience in the organisation and management of research projects and programmes in the area of defence, its unique role in the Union and its experience from the implementation of the Pilot Project in Defence research in 2015 and 2016, in preparing and launching the call for proposals, organising the evaluation of the proposals, signing the grant agreements, monitoring and controling the progress of the projects.

The Commission wants to further test this mode of management in this area and assess the capability of the Agency to undertake the implementation of the work programmes by applying practices and instruments to increase the efficiency, transparency and accountability of the implementation phase.

Actions regard in particular the use of the IT tools used for the management of Horizon 2020 projects, the establishment of a database of evaluators of the proposals through an open call, the implementation of an ethical scrutiny of the proposals and the establishment of a detailed framework for the treatment of EU Classified Information[2].

The Commission shall closely monitor the implementation of the entrusted tasks, through

[1] The indicative budget is subject to availability of budget within the total of EUR 39 900 000.

[2] Union Classified Information

regular reporting and meetings with EDA. The Commission shall provide to EDA the technical description of the topics as set out in Appendix to the present Annex[3] and the rules for participation of the action, in line with the requirements of the Financial Regulation. The Commission will receive the evaluation results and have the right to ask for clarifications and modifications when necessary at any part of the implementation phase.

In accordance with the Delegation Agreement signed with EDA on the 31 May 2017, the Agency shall be allocated up to EUR 2 400 000 to cover expenditure related to the management of the relevant tasks for 2018.

Overall objective and purpose of the actions

[3] The topics and the technical descriptions were defined in close coordination with technical experts from the Ministries of Defence of all the Union Member States

In 2018, the Agency will run the following actions on behalf of the Union:

- Three calls for proposals:

  1) The first call (PADR-EDT-02-2018) will select one project for the development of a European high-performance (re)configurable system-on-a-chip or system-in-package components for defence applications (Indicative amount of the Call: up to EUR 12 000 000).

  2) The second call (PADR-EF-02-2018) will result in funding of one project to contribute to the development of a high power directed energy system. (Indicative amount of the Call: up to EUR 5 400 000).

  These 2 calls are capability-driven and focus on critical defence technologies.

  3) the third call (PADR-STF-02-2018) will fund one coordination and support action to start the strategic technology foresight. (Indicative amount of the Call: up to EUR 1 900 000).

- Complementary funding for a 2017 call is foreseen to give EDA an additional contribution for a project selected for funding after evaluating the proposals submitted to the 2017 call (PADR-US-01-2017) in the area of enhanced situational awareness in a naval environment. (indicative amount of funding : up to EUR 20 million).

- Financial contribution for the call for tenders launched by EDA for independent experts recruited for the evaluation of proposals submitted to the calls described above (EUR 100 000).

The detailed description of these actions is provided in the Appendix of the present Annex.

Grants will be awarded to consortia after the publication of calls for proposals. Entities from all the Union Member States and Norway[4] shall be eligible to apply. The proposals shall be evaluated on the basis of the following award criteria: (a) excellence, (b) impact and (c) quality and efficiency of the implementation. Union funding may reach 100% of the total eligible costs. Indirect costs shall be determined in accordance with article 5 of this decision. The award of the grants is expected for the 3rd quarter of 2018 and the duration of the projects is expected to be between 12 and 36 months.

[4] Legal entities established in Norway shall be eligible for funding provided that Protocol 31 to the EEA agreement authorises the participation and the financial contribution of the Kingdom of Norway in the PADR. The PADR annual work programme and the Decision of the EEA Joint Committee shall be adopted in the same year.

Appendix

Detailed description of the actions – 2018

Call – Electronic Design Technologies for Defence Applications - PADR-EDT-02-2018

Modern defence capabilities are increasingly depending on complex electronic technologies. With few EU-based suppliers, urgent action needs to be taken to ensure strategic autonomy and security of supply of such critical defence technologies. Setting up a European supply chain for specific, critical electronic design technologies will contribute to lift these limitations. (Re-) gaining leadership in these domains will moreover enable to capture business opportunities to Europe.

Proposals are invited against the following topic:

European high-performance, trustable (re)configurable system-on-a-chip or system-in-package for defence applications

Specific Challenge:

High-resolution and high-speed data acquisition impose ever stronger real-time requirements on data processing components on which an increasing number of defence applications critically depend upon in areas such as communications, electronic warfare, encryption, digital imaging, as well as radar and secure positioning, navigation and timing (PNT). General purpose processors show too low performance levels for critical processes in such defence applications.

Hence the need for defence-specific hard- and software approaches. These functionalities can be embedded in high-density electronic components that can be configured or even reconfigured[5] (such as Field Programmable Gate Arrays amongst others), are combined on a single System-on-Chip (SoC) or distributed over a Multi-Chip-Module (or other System-in-Package (SiP) solutions). The selection of the preferred technological solution should strike a balance between the requirements of the defence application(s) (in terms of, e.g., bandwidth, latency, flexibility, cryptologic restrictions, spatial requirements, power consumption), and economic drivers (such as the number of units expected to be produced, time to enter into service, the upfront costs (e.g., to non-recurring engineering), maintenance needs).

Performant (re)configurable SoC/SiPs are commercially available for a wide variety of applications in civil domains including medical and consumer electronics, automotive, and high performance computing. Using (re)configurable SoC/SiPs in (aero)space and defence applications adds stringent requirements for operation under harsh conditions. Moreover, military users need to be sure that these components can be trusted for use, e.g., in security systems, communication equipment and encryption algorithms available without restrictions.

For these technologies which are critical for a number of defence applications, the EU is currently fully dependent on suppliers established in non-EU countries, which implies risks of

[5] (Re)configurable components include but are not limited to (re)programmable components.

supply chains and vulnerabilities in terms of security. Furthermore, a number of regulations of non-EU nations can impose end-user restrictions on the use of the technologies (e.g., the US International Traffic in Arms and Export Administration Regulations (ITAR and EAR)). Setting up a EU-based supply chain for high-performance, trustable (re)configurable SoC/SiP for defence applications would contribute to remove these important limitations, as well as creating business opportunities in other highly demanding sectors beyond the defence sector.

Scope:

Proposals should design and validate a SoC/SiP and as such make a substantial contribution towards the development and manufacturing of European high-performance, trustable (re)configurable SoC/SiP suitable for multiple defence applications[6].

Design considerations and engineering decisions on the architecture of the SoC/SiP should thereby be driven by the state-of-the-art requirements of the selected defence applications. In particular long-term operation under harsh conditions, such as severe temperature variations, intense vibrations, and elevated radiation levels, as well as specific power requirements, should be adequately taken into account.

The design has to take into account that the manufacturing needs of the SoC/SiP should match the production capabilities of ideally more than one trustable fab or foundry established in the EU. In parallel to the proposed advances at the hardware level, advancing innovative development and debugging tools should be explored. They should enable to work at a high level of abstraction to design, simulate, integrate, synthesise, and test systems on the target device. Enhanced performance and shorter development times should be demonstrated by removing the debugging barrier between the processor and the (re)configurable component of the SoC/SiP.

Proposals should pay particular attention to security protection of the proposed hardware and software solutions.

The SoC/SiP architecture should be protected from intrusion or attacks, e.g., by secure boot mechanisms, embedding encryption engines, anti-tamper (which can be based on emerging technologies such as Physical Unclonable Functions (PUF)), anti-reverse engineering techniques and TEMPEST protection ideally allowing unclassified handling of information. The design and manufacturing process should be highly controlled to exclude that weaknesses, back doors or Trojan horses are implemented in the hardware and software components and systems. Flexible packaging options should be offered for the SoC/SiP device. When requested known good dies (KGD) should be supplied as well. The proposed security measures should be in line with the recommendations issued by the relevant national crypto approval authorities (CAA) of at least two Member States or Norway to handle

[6] Work on Application Specific Integrated Circuits (ASICs) is outside the scope of this call.

information up to the national equivalents of SECRET UE/EU SECRET provided under Council Decision 2013/488/EU [7] and Commission Decision (EU, Euratom) 2015/444[8].

Hardware and software products developed in the context of this topic should not be subject to non-EU export control regulations.

Proposals should include a size, weight, power and cost (SWaP-C) analysis to support the proposed (re)configurable SoC/SiP technology as well as a high-level description of the key performance indicators (KPIs) for state-of-the-art performance of the envisaged functionalities, and the methodologies on how to measure them. A report with a detailed description of these KPIs and methodologies should be delivered within 6 months after the start of the project.

In order to meet future capacity and performance requirements, the components should be implemented in a technology node (minimum transistor feature size) of 28 nm or smaller.

If the proposed architecture includes a FPGA, the SoC/SiP need to include at least the following features:

- 200k Look-Up Table (LUTs);
- Internal non-volatile memory;
- Digital Signal Processing hard-macros;
- Flexible interconnections between the DSP processing core, general processing cores and on- and off chip bridges and interfaces;
- Encryption module and anti-tamper and TEMPEST protection (as set out above);
- At least 10 Gb/s high-speed links / interfaces.

Deviations from the set of features listed above should be duly justified in view of the multiple defence applications envisaged.

The potential of the proposed solutions, in particular in the security and space domain[9], should be thoroughly explored.

When relevant, results publicly available from EDA and NATO activities and studies should be taken into account for the proposed work. The activities included in the proposals should clearly differentiate from or go beyond work already covered under relevant themes of the EU Research and Innovation Framework Programmes.

The implementation of this topic is intended to start at TRL 2 to 3 and target TRL 5.

[7] Council Decision 2013/488/EU of 23 September 2013 on the security rules for protecting EU classified information (OJ L274, 15.10.2013, p. 1).

[8] Commission Decision (EU, Euratom) 2015/444 of 13 March 2015 on the security rules for protecting EU classified information, OJ L72, 17.3.2015, p. 53.

[9] Applicants are invited to consult the Work programme 2018-2020 "5.iii. Leadership in Enabling and Industrial Technologies – Space", and in particular the technical guidance documents listed in the Work programme.

The Commission considers that proposal requesting a contribution from the Union between EUR 8 000 000 and 12 000 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

No more than one action will be funded.

Expected Impact:

- Convincing demonstration of the potential of EU-funded research in support of EU critical defence technologies, in particular in the domain of (re)configurable SoC/SiPs;
- Ensure secure and autonomous availability of high performance and trustable (re)configurable SoC/SiPs to military end-users;
- Contribute to strengthening the European microelectronics industry and help improve its global position through the implementation of innovative technologies along a new European manufacturing value chain;
- Improved competitiveness of the end-user industry in and beyond the defence sector.

Call – Effects - PADR-EF-2018

There is a critical need to invest in novel defence technologies that can deliver precise effects on conventional and unconventional threats. Such technologies are designed to engage in precise, graduated and environmental-responsible ways. Activities clearly aim to develop a strategic orientation to bring such innovative technologies closer to end-user uptake in the medium term. The Preparatory Action on Defence Research thereby provides the scope for research and technological development actions based on assessments of the current and future research and development needs. Several of these technologies are considered to be critical for EU Member States in terms of strategic autonomy and/or security of supply. The proposed programmatic approach should ensure that such important limitations can be lifted.

Proposals are invited against the following topic:

Towards a European high power laser effector

Specific Challenge:

Directed energy systems, and in particular laser systems, are potential game changers in future military activities[10]. They are capable to engage rapidly and precisely with agile targets at a low operational cost per shot and with a reduced risk to certain types of collateral damage. This makes them particularly attractive to counter a variety of threats, ranging from asymmetric threats such as incoming, low cost unmanned vehicles to Rocket, Artillery, Mortar (RAM) or missiles which conventionally would require expensive countermeasures

[10] Directed energy systems emit energy towards a target without using a ballistic projectile. A laser system is a directed energy system which relies on electromagnetic waves that engage the target at the speed of light. It consists of a laser effector (consisting of the laser source(s) and the beam forming and delivery optics) and the warning and tracking systems.

such as guided missiles. Laser systems also face a number of limitations, in particular their sensitivity to absorption and scattering which lead to decreased beam quality under adverse atmospheric conditions and hence reduce the circumstances in which the system can effectively be used.

In essence, the thermal interaction between the laser beam and the target ultimately leads to irreversible damage if the temperature of the target material can be raised sufficiently high. Therefore the laser output power should be as high as possible while maintaining a high beam quality to focus and lock the laser beam to a small spot size on the target. This allows reaching sufficiently high power densities to reduce the exposure time needed to induce critical failure of the target material.

Different designs based on different laser technologies have been developed to deliver output powers ranging from the kW-level up to several MW. The lower power levels are sufficient to affect soft, unmanned aerial vehicles (UAV) at short ranges (several hundreds of meters up to the kilometre range) while airborne MW-laser systems demonstrated to be able to counter ballistic missiles from a distance of hundreds of kilometres.

Current research and development (R&D) efforts aim to develop laser systems that combine several or many high output powers with a compact design to enable integration in mobile platforms, such as ships, trucks or helicopters. The required laser output power is directly linked to the target(s) and their associated scenario(s), the laser system architecture and performance. As a first estimate, high quality laser beams with output powers higher than 100 kW would enable to address the full target spectrum from tactical unmanned aerial vehicles (UAVs) up to certain types of missiles. Non-European countries have already demonstrated compact laser effectors generating up to 100 kW, and roadmaps are proposed to scale the powers well above the 100 kW level in the coming years. Over the last decade, the increase in the laser effector power in non-European countries relies merely on studies of new architectures, including incoherent, coherent and spectral beam combining.

In Europe, development programmes for single high power laser effectors do not go beyond power levels of 30 kW. Current European high power laser effectors rely mainly on non-European technology and are based on architectures that combine incoherent beams on the target.

The EU thus risks becoming fully dependent on suppliers established in non-EU countries for this critical defence technology. This not only limits the strategic autonomy of the Member States but also generates security-of-supply risks. End-user restrictions imposed by non-EU nations (e.g., the US International Traffic in Arms and Export Administration Regulations (ITAR and EAR)) already endanger the security-of-supply of essential components of such high power laser systems.

To remove such important limitations, a research and technological development (R&T) programme, later on followed by a development phase, needs to be initialised to design and build a European high power laser effector, to become available for defence applications within the next decade.

Scope:

European high power effectors should deliver an output power of well beyond 100 kW (in continuous mode) and operate at a high duty cycle. The output wavelength, the beam quality and the optical systems (including at least fast steering mirrors, and adaptive optics if deemed necessary) should be able to cope with variable atmospheric conditions, ranges which can be expected in specific scenarios and environmental safety constraints (to limit collateral damage, e.g., when used in densely populated urban areas). Graduated responses by varying the output power at the level of the source without beam quality degradation should be explored. The effector(s) could be integrated in current and future compact laser systems to be mounted on mobile (sea, land or air) platforms. Therefore, appropriate attention should be paid to reduced energy consumption and lower cooling requirements in accordance with the expected volume and power available for each platform. Solutions to lower the weight while keeping the design sufficiently rugged should be explored. Wall plug vs. optical efficiency of the laser effector must be clearly estimated. The duty cycle can be optimised for each type of platform due to integration constraints. Damage and lifetime predictions of the components of the effectors should be covered as well as simulations and modelling capacities.

Proposals need to include (a) a **R&D assessment, including a technology roadmap**, (b) a **criticality mapping** and deliver (c) **R&T activities** based on this assessment and mapping exercise.

(a) R&D assessment

A small part of the proposed budget should be dedicated to develop a R&D assessment, including a technology roadmap, describing the elements, timing and value chains needed for a joint EU development programme for laser effector(s) for defence applications to reach TRL 8 by 2027. The roadmap should address at least the following typical scenarios:

- Countering RAM;
- Countering missiles;
- Countering rapid, small boats;
- Countering tactical manned and unmanned aerial vehicles.

The assessment should furthermore identify specific measurement aspects related to high power laser beams, such as beam divergence and diameter, wavefront aberration, power density, light – matter interaction, amongst others. A synthesis of national and international legal and safety regulations applicable to the use of high power laser systems should be included.

Specific requirements related to the laser technologies for the further development of a complete laser system and its integration into the sensor and weapon systems of current and future platforms should be identified and evaluated within the context of defining or refining concepts of employment and use.

A realistic breakdown of the development cost of the laser effector(s) should be presented.

An outline of the roadmap should be included in the proposals.

(b) Criticality mapping

The materials, components and technologies that need foremost priority support because of technological or economic bottlenecks need to be thoroughly assessed. Insufficient R&D capacity in the EU at the early stages of the development as well as lack of industrial capacity (including skills) towards the pre-manufacturing stages of the laser effector should be mapped. End-user restrictions imposed by non-EU countries should be identified.

Depending on the scenarios selected for the R&D assessment, the mapping should at least investigate the critical components or technologies that hamper technological progress in the following challenges:

- **Single-beam** high power laser technology;
- Laser **architectures capable to deliver graduated responses** for integration in different platforms, including novel beam combining technologies, like coherent beam combining, should be investigated;
- Technologies for the **wavefront management of the laser beam** (including innovative adaptive optics) to correct in real time aberrations induced by atmospheric conditions;
- Technologies and solutions for focusing and tracking the laser beam on the target,

thereby keeping in mind that those components or technologies should satisfy platform-integration constraints related to size, weight, volume and power. An initial version of the assessment and the critical materials/components/technologies mapping needs to be provided in the early stages of the project, to be updated by the end of the project.

A first identification of the main critical technological aspects should be included in the proposals.

Both the assessment, including the roadmap and the criticality mapping will form an integral part of the Special Report[11].

(c) R&T activities

Most of the proposed research efforts and the budget should be dedicated to initiate R&T activities in line with the proposed roadmap.

The consortium should therefore select to address one or more materials, components, laser design or technologies pertaining to the main critical technological aspects. The proposal should clearly demonstrate that R&T activities will generate by the end of the project results that can be taken up in the early stages of the development of the laser effector(s). To this end, at least one demonstrator is required in order to prove that the specific technology gap is filled and/or to prove the potential of the technology for future power increase (scalable laser power capability).

[11] Model in Annex I of the 2018 Calls for Proposals and General Annexes.

Involving European end-users in order to obtain realistic specifications for the envisaged scenarios would be considered an asset. Proposals should include a high level description of key performance indicators (KPIs) for the envisaged functionalities and the methodologies on how to measure them. A report with a detailed description of these KPIs and methodologies should be delivered within 6 months after the start of the project.

When relevant, results publicly available from EDA and NATO activities and studies should be taken into account for the proposed work. The activities included in the proposals should clearly differentiate from or go beyond work already covered under relevant themes of the EU Research and Innovation Framework Programmes[12].

The implementation of this topic is intended to target TRL 5.

The Commission considers that proposals requesting a contribution from the Union between EUR 4 000 000 and 5 400 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

No more than one action will be funded.

Expected Impact:

- Convincing demonstration of the potential of EU-funded research in support of EU critical defence technologies, in particular in the domain of high power laser effectors;
- Establish a R&D assessment including a technology roadmap towards an EU High Power Laser Effector by 2027 with milestones and estimated budget needs;
- Ensure secure and autonomous availability of high power laser effectors to military end-users by 2027;
- Contribute to strengthening the European industry and help improve its global position through the implementation of innovative technologies along a new European manufacturing value chain.

[12] Applicants are in particular invited to consult the Work programme 2018-2020 "5.iii. Leadership in Enabling and Industrial Technologies – Space", and in particular the technical guidance documents listed in the Work programme.

Call – Strategic Technology Foresight - PADR-STF-2018

Future defence capabilities rely on emerging key enabling and cutting edge technologies, which today often are of "dual-use". Securing the supply of these technologies has become a challenge, both for industry as for national defence administrations. The requirement of non-limited access and availability makes some of these technologies defence-critical, leading to a need for joint/ coordinated action at national and European level. Rapidly evolving technological innovation calls for a mechanism to identify key trends and developments. The Preparatory Action will therefore include actions to develop a sustainable strategic technology foresight methodology. In view of the reform of the International Traffic in Arms Regulations (ITAR), an important part in this area would be to launch a stocktaking exercise on critical defence technologies components and materials, with focus on ITAR related components in Europe's armament systems, including in future technologies.

In the context of the development of the future EU-funded defence research programme, these analyses should suggest potential roadmaps, themes, and business models, to be implemented and funded at national, multilateral or EU level, as appropriate.

Proposals are invited against the following topic:

The European Defence Research Runway – part II

Specific Challenge:

Technology non dependence is an essential parameter of the strategic autonomy and freedom of action of the EU Member States. Uninterrupted supply from trusted sources of key materials, including raw materials, components and technologies for critical armament systems is fundamental for the reliable use of military capabilities when and where needed. Trusted supply without limitations from non EU countries regarding the use or export is also essential for the competitiveness of the EU defence industry, allowing competing in global markets with technological solutions that do not have to respect third parties conditions.

In the short and medium term, technologies subject to the US International Traffic in Arms Regulations and Export Administration Regulations (ITAR and EAR) are as a consequence a challenge for Member States and defence industry as they limit freedom of action and export. Furthermore also currently freely available components may become ITAR-related once they are used in US weapon systems. Technologies and materials from other non EU sources may also be procured with restriction of use and components are often not trustable for sensitive functions. Moreover supply may even be denied in some particular cases with potentially highly detrimental impact on systems and operations. To support Europe's strategic autonomy availability of selected ITAR restricted and other foreign-sourced components and materials in Europe would be as beneficial for Member States as for Europe's defence industry.

Avoiding long term critical defence technology dependencies is equally important for the future strategic autonomy of the EU. Identifying critical technology building blocks for future

defence systems and disruptive capabilities and preparing the necessary steps to have them available on time, is indispensable in order to avoid staying behind from the global competitors, prevent future technology dependencies and ensure the independent development of cutting edge capabilities.

To gain an overview about the technology dependence challenge, a stocktaking of ITAR and other non EU sourced components used in Europe's armament systems would be the first step to tackle this issue. A methodology consulting Member States and defence industry would need to assess the sourcing risk and criticality in order to identify and prioritize components and materials desirable to be available in Europe in the future. For selected technologies, roadmaps and business models can be produced to provide proposals for research topics for a follow on defence research programme.

Scope:

This action should aim to provide an effective way for tackling the issue of the critical defence technological dependencies for the EU regarding current and future systems and capabilities. The action needs to address at least the following activities:

(a) Mapping of the ITAR and other non EU sourced components and materials in the systems developed by the EU industry and used and to be used by the EU armed forces. The mapping should cover the dependencies in the full spectrum of the value chain, possibly down to the raw material sourcing;

(b) Identify critical technology building blocks and possibly components for future systems and disruptive capabilities for which European technology non-dependence will be crucial. The activity should be based on the results of the European Defence Technology Runway Part I on future trends and aim to identify the major technical challenges in these critical areas for which non-dependence will be crucial;

(c) Develop a methodology to assess the supply risk of technologies and components of point a) and b) and their criticality for armed forces and the defence industry. Such methodology should be established in consultation with ministries of defence and the defence industry;

(d) Prepare technology roadmaps, ideally including cost substantiated predictions, and suggest business models for selected technologies, taking into account supply risk and criticality. An assessment of the scientific, technological and manufacturing readiness of the European ecosystem should be included. This activity should also propose actions in line with the technology roadmaps and suggested business models.

The activities should benefit and when appropriate complement or incorporate existing works, and in particular:

- the European Defence Technology Runway Part I, for identifying technologies and sharing methodology as appropriate;
- the study "Study on the dual-use potential of dual-use potential of Key Enabling Technologies (KETs)"[13];

[13] https://publications.europa.eu/en/publication-detail/-/publication/c092b731-f415-11e6-8a35-01aa75ed71a1

- the study “Raw materials in the European defence industry”[14] and relevant activities of the Joint Research Centre;
- relevant work of the European Defence Agency, the “Leadership in Enabling and Industrial Technologies - Space” research programme under Horizon 2020 and the European Space Agency (ESA), and in particular the Critical Space Technologies non-dependence actions for identified in the frame of the Commission-ESA-EDA Joint Task Force[15].

Proposals should include elements to ensure continued monitoring and updating beyond the action's lifetime.

The European Commission considers that proposals requesting a contribution from the Union in the range of EUR 1 500 000 to 1 900 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

This topic is complementary with topic *"PADR-STF-01-2017: The European Defence Research Runway – part I"*. Grant agreements under this topic will therefore include the options for 'complementary grants', (including, in particular additional access rights to background and results for the purposes of the complementary grant).

No more than one action will be funded.

Expected Impact:

The action should allow

- the EU and the Member States to understand the dependencies for defence technologies and the ways to prioritise and address them;
- to underpin coordination of defence research activities at the European and national level and improve synergies with space and other civil technology research activities addressing non-dependence needs;
- to provide input for the long term agenda for defence research in the EU in the area of critical defence technologies;
- explore themes for a future European Defence Research Programme;

[14] https://publications.europa.eu/en/publication-detail/-/publication/5d0ca1b4-aaff-11e6-aab7-01aa75ed71a1/language-en/format-PDF/source-50416951

[15] The relevant document entitled "Critical Space Technologies for European Strategic Non-Dependence Action List 2018-2020" can be made available by EDA upon request.

Contribution to call PADR-US-01-2017

The Work Programme for the Preparatory Action on Defence Research for the year 2017[16] included the funding of no more than one action upon evaluation of full proposals submitted to the call *"PADR-US-01-2017: Technological demonstrator for enhanced situational awareness in a naval environment"*.

Full proposals included the description of (i) a core part which would need a Union contribution between EUR 14 000 000 and 16 000 000 from the 2017 budget, and (ii) up to 4 additional research modules with a Union contribution of up to EUR 5 000 000 each that would extend the core project to cover the topic more substantially.

The proposals, including the total indicative budget of the core part and all additional modules were evaluated in their entirety during a single-stage evaluation procedure.

This action provides funding for 4 research modules of the project which was retained for funding as described above.

Indicative budget: maximum EUR 20 000 000 from the 2018 budget[17]

Evaluation experts

This action will support the use of appointed independent experts for the evaluation of proposals.

Type of Action: Expert Contracts

Indicative budget: EUR 100 000 from the 2018 budget

Other actions

Direct contracts or specific contracts under framework contracts are expected to be awarded in the 1st semester 2018 for:

- *Dissemination activities* (publications, conferences) directly linked to the achievement of the objectives of the action or measures falling under this item,

- *Hire of external expertise* for the preparation of the future European defence research programme.

Indicative budget: maximum EUR 100 000 from the 2018 budget

[16] Commission Decision of 11.4.2017 on the financing of the 'Preparatory action on Defence research' and the use of unit costs for the year 2017.

[17] This amount can be lower subject to the availability of unused budget from the 2017 budget.

ANNEX II

Reimbursement of personnel costs of beneficiaries

Introduction

In order to simplify the declaration and verification of costs of beneficiaries under the Preparatory action on Defence research (PADR), this decision authorises the reimbursement of personnel costs declared as unit costs on the basis of beneficiaries' usual accounting practices and the reimbursement of personnel costs of SME owners who do not receive a salary declared as unit costs. It further lays down methods to determine annual productive hours and hourly rates.

1. Rationale for the reimbursement of personnel costs declared as unit costs

(1) Experience from the Horizon 2020 Programme

Based on experience drawn from the implementation of the Horizon 2020, the use of unit costs would facilitate the implementation of the PADR for the following reasons:

Majority of beneficiaries have long established systems for the use of unit costs declared on the basis of the beneficiary's usual cost accounting practices for direct personnel costs;

- Use of unit costs will bring a simplification and reduce administrative burden for all concerned parties.

(2) The specific case of SME owners who do not receive a salary

SMEs are expected to participate in actions funded under the PADR. It should thus be possible to provide support for the work carried out by SME owners who do not receive a salary. However, in the absence of a salary, there is no actual cost recorded in the accounts of the beneficiary related to the work of these persons. This leads to the Union being incapable of co-financing such work which is otherwise real and necessary for the implementation of an action. The use of unit costs to support SME owners who do not receive a salary carried out in Union funded actions in accordance with Article 124(5) of Regulation (EC, Euratom) No 966/2012 would allow overcoming this difficulty.

Therefore, costs related to the work of SME owners who do not receive a salary shall be declared on the basis of unit costs in grants awarded under the PADR taking the form of reimbursement of eligible costs.

Research related actions are addressed under both the PADR and the Horizon 2020 programme, which attract the same population of beneficiaries. For the sake of consistency and administrative simplification for the beneficiaries, the same rules should be applied to the same beneficiaries which may receive funding under both programmes.

Reduction of risk

The use of unit costs will reduce the risk of irregularities, overstatements and fraud since personnel costs will be calculated according to established formulas set out in point 2. In addition, it will also contribute to the objective of simplification and cost-effectiveness of controls.

2. Methods to determine and update the amounts

2.1. Unit costs determined according to the beneficiary's usual cost accounting practices

Beneficiaries may declare eligible costs for the work carried out under the action for all categories of personnel, other than SME owners and natural persons not receiving a salary, using unit costs determined according to the beneficiary's usual cost accounting practices using annual productive hours.

Eligible staff costs shall be calculated according to the following steps:

STEP 1: Determine actual annual personnel costs for the year, as recorded in the beneficiary's accounts, excluding ineligible costs, costs included in other budget categories, and costs covered by other forms of grant (where applicable), in particular any indirect costs and provisions.

"Personnel" means staff working under an employment contract (or equivalent appointing act) assigned to the action, under the conditions set in the grant agreement. The personnel costs must be limited to salaries (including during parental leave), social security contributions, taxes and other costs included in the remuneration, if they arise from national law or the employment contract (or equivalent appointing act). Personnel costs may also cover the costs for natural persons working under a direct contract and the costs of personnel seconded by a third party against payment.

Calculating the actual annual personnel costs must be done according to the beneficiary's usual cost accounting practices, provided that they comply with the following cumulative criteria:

they are calculated on the basis of the total actual personnel costs recorded in the participant's general accounts for the personnel carrying out work for the action; this may be adjusted by the beneficiary on the basis of budgeted or estimated elements; those elements must be relevant for calculating the personnel costs, reasonable and correspond to objective and verifiable information;

the cost accounting practices are applied in a consistent manner, based on objective criteria independent from the source of funding;

they ensure compliance with the non-profit requirement and the avoidance of double funding of costs.

Among the boundary conditions to be applied, beneficiaries must ensure that the costs declared can be directly reconciled with the amounts recorded in their general accounts.

STEP 2: Determine a person's 'annual productive hours', for which beneficiaries may choose among 3 options:

(a) On the condition that either the contract of employment, or the applicable collective labour agreement, or the national working time legislation allow to determine the annual workable hours, the total number of hours worked by the person in the year for the beneficiary calculated as follows:

Annual productive hours =

{annual workable hours of the person } plus {overtime worked} minus {absences}

- *annual workable hours* means the period during which the personnel must be working at the employer's disposal and carrying out his/her activity or duties under the employment contract, applicable collective labour agreement or national working time legislation;
- *absences* means for example sick leave and special leave.

(b) The 'standard number of annual hours' generally applied by the beneficiary for its personnel in accordance with its usual cost accounting practices. This number must be at least 90% of the 'standard annual workable hours'.

If there is no applicable reference (i.e. employment contract, collective labour agreement or national law) for the standard annual workable hours, this option cannot be used.

(c) 1 720 hours for persons working full time (or corresponding pro-rata for persons not working full time).

For all options under (a), (b) and (c), the actual time spent on parental leave by a person assigned to the co-funded action may be deducted from the number of annual productive hours.

The total number of hours declared in Union or Euratom grants, for a person for a year, cannot be higher than the annual productive hours used for the calculations of the hourly rate. Therefore, the maximum number of hours that can be declared for the grant are:

{number of annual productive hours for the year minus total number of hours declared by the beneficiary, for that person for that year, for other Union or Euratom grants}.

STEP 3: Determine the hourly rate for a person (the 'unit cost') as follows:

actual annual personnel costs for the person for the year

divided by

number of annual productive hours.

The beneficiaries must use the annual personnel costs and the number of annual productive hours for each financial year covered by the reporting period concerned. If a financial year is not closed at the end of the reporting period, the beneficiaries must use the hourly rate of the last closed financial year available.

STEP 4: Multiply the hourly rate (the 'unit cost') with the number of actual hours worked on the action.

The number of actual working hours declared for a person must be identifiable and verifiable; they must be necessary for implementing the action and must be actually used during the action. Evidence regarding the actual hours worked shall be provided by the participant, through a time recording system for which the minimum requirements are set out in section 2.3.

2.2. Unit costs for SME owners and natural persons not receiving a salary

The direct personnel costs of **SMEs owners not receiving a salary** shall be based on a unit cost per hour worked on the action to be calculated as follows:

{Monthly living allowance fixed at EUR 4 880 multiplied by the country-specific correction coefficient as set out in the Appendix} divided by 143 hours

The fixed unit cost amount has been increased from 2017 to2018 as based on the monthly living allowance for a researcher fixed by the Commission in the reference decision Marie Curie for 2018 (C(2017) 6855 of 16 October 2017)

Futhermore, the country specific correction coefficient has been updated for 2018 as provided for in appendix to the Annex.

The value of the work of the SME owners not receiving a salary shall be determined by multiplying the unit cost by the number of actual hours worked on the Action.

The total number of hours declared, in a year, in Union and Euratom grants for one SME owner or natural person not receiving a salary may not be higher than 1 720 hours.

2.3. Time records

Beneficiaries must keep time records for the number of hours declared under the action. The time records may be either on paper or in a computer-based time recording system. They must be approved by the persons working on the action and their supervisors, at least monthly. The absence of an adequate time recording system is considered to be a serious and systematic weakness of internal control.

As an exception, for persons working exclusively on the co-funded action, there is no need to keep time records, if the beneficiary signs a declaration confirming that the persons concerned have worked exclusively on the action, or it is clearly indicated in their contract of employment (or equivalent appointing act).

3. No-profit and co-financing principles and absence of double financing

The conditions for reasonably ensuring that the no-profit principle is complied with are:

The calculation method of unit costs is based on the actual costs recorded on an annual basis in the beneficiary's accounts;
The unit cost covers only a part of the eligible costs;

The absence of profit will be verified at the time of payment of the balance according to the conditions stated in each grant agreement.

The conditions for reasonably ensuring the absence of double funding are:

The specification/identification of the categories of eligible costs subject to the unit cost;
Ex-Ante and Ex-Post controls may verify the declaration of hours / units across several funded actions in order to ensure there is no abuse of the number of hours for individuals declared in a given action.

Compliance with the co-financing principle will be ensured by application of a co-financing rate laid down in each grant agreement to the amount of the eligible costs.

Verification of compliance with the above principles for the funding on the basis of unit costs of the work carried out by SME owners not receiving a salary is limited, since the value of their work are not personnel costs borne by the beneficiaries. This exception is foreseen by Article 124(5) of Regulation (EC, Euratom) No 966/2012.

Appendix

Country correction coefficient (for 2018 onwards)

Country Code (*)	CCC
AT	106.7%
BE	100.0%
BG	62.0%
CY	82.6%
CZ	81.78%
DE	97.0%
DK	135.0%
EE	79.4%
EL	88.7%
ES	95.4%
FI	120.8%
FR	115.7%
HR	83.9%
HU	77.4%
IE	115.6%
IT	104.4%
LT	72.5%
LU	100.0%
LV	77.7%
MT	84.4%
NL	107.9%
NO	130.6%
PL	75.5%
PT	84.2%
RO	68.8%
SE	121.8%
SI	86.1%
SK	80.4%
UK	139.8%

(*) ISO 3166 alpha-2, except for Greece and the United Kingdom (EL and UK used respectively instead of GR and GB