EUROPEAN DEFENCE AGENCY

PREPARATORY ACTION ON DEFENCE RESEARCH

SESSION Effects

INFODAY AND BROKERAGE EVENT
12 APRIL 2018

EUROPEAN DEFENCE AGENCY

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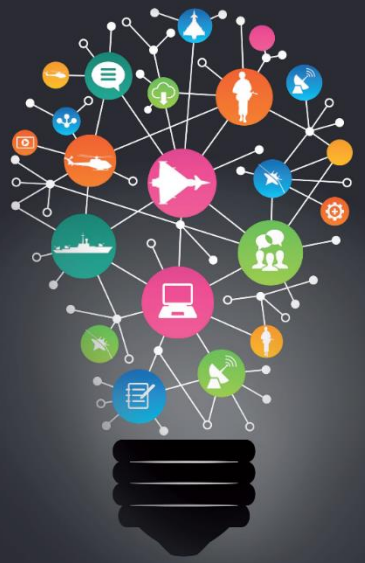


Call Text presentation RA Topic Call PADR-EF-02-2018

Towards a European high power laser effector

PADR-EF-02-2018 - Challenge (1/3)

Towards a European high power laser effector

Operational advantages:

- Engage rapidly and precisely **agile targets**;
- **Low operational cost** per short;
- **Reduced risk of collateral damage;**
- C-UAS;
- C-RAM;
- C-Missiles.

Existing limitations:

- Sensitivity to **absorption and scattering;**
- Decreased beam quality under **adverse atmospheric conditions.**

PADR-EF-02-2018 - Challenge (2/3)

Towards a European high power laser effector

Expected requirements:

- Laser **output power** as high as possible;
- Maintain a **high beam quality;**
- Focus and lock the laser beam to a **small spot size** on the target;
- **Compact design;**
- **Integration in mobile platforms** (ships, trucks or helicopters);
- **> 100kW**

PADR-EF-02-2018 - Challenge (3/3)

Towards a European high power laser effector

Current activities in Europe:

- Single high power laser do not go beyond **30 kW;**
- Architectures that combine **incoherent beams** on the target;
- Risk of fully **dependency on non-EU suppliers;**
- Potential **end-user restrictions** (e.g. ITAR).

PADR-EF-02-2018 – Scope (1/6)

Towards a European high power laser effector

- Output power well beyond **100 kW;**
- Operate in a **continuous mode** and **high duty cycle;**
- Output wavelength, beam quality and optical systems able to cope with:
  - **variable atmospheric conditions;**
  - **ranges** for the specific scenarios;
  - **environmental safety constraints** (urban areas);
- Graduated responses by **varying output power**, at the level of the source, without beam quality degradation.

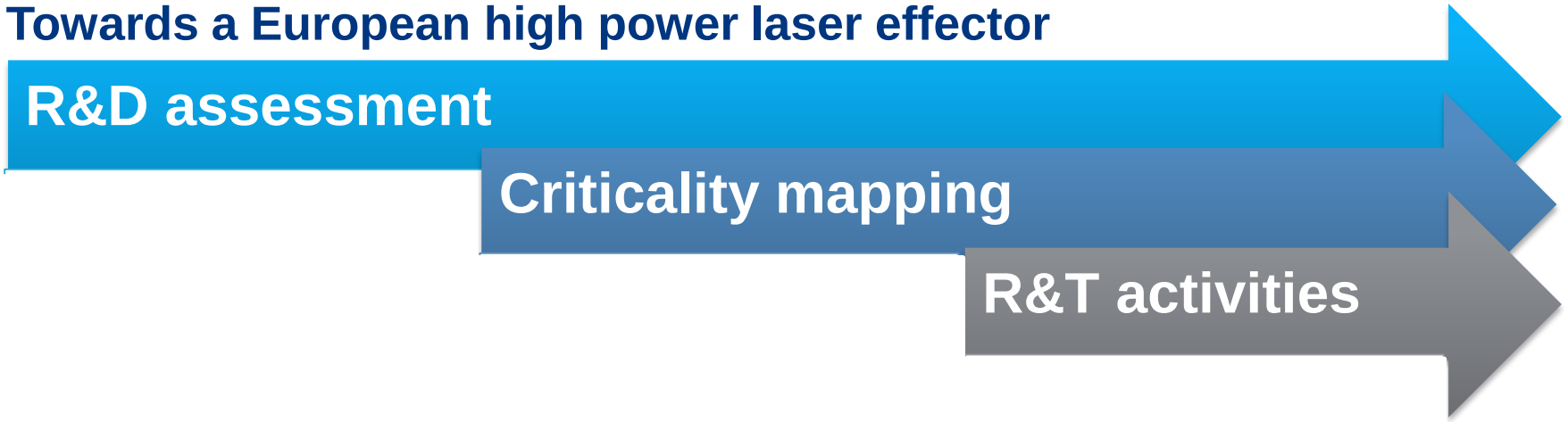
PADR-EF-02-2018 – Scope (2/6)

Towards a European high power laser effector

- **Integration** in current and future compact laser systems;
- **Mounted on mobile (sea, land or air) platforms:**
  - reduced energy consumption;
  - lower cooling requirements;
- **Lower weight** while keeping a sufficiently rugged design;
- **Wall plug vs. optical efficiency** of the laser effector must be clearly estimated;
- **Optimised duty cycle** for each type of platform;
- Damage and lifetime **predictions** of components (simulations and modelling).

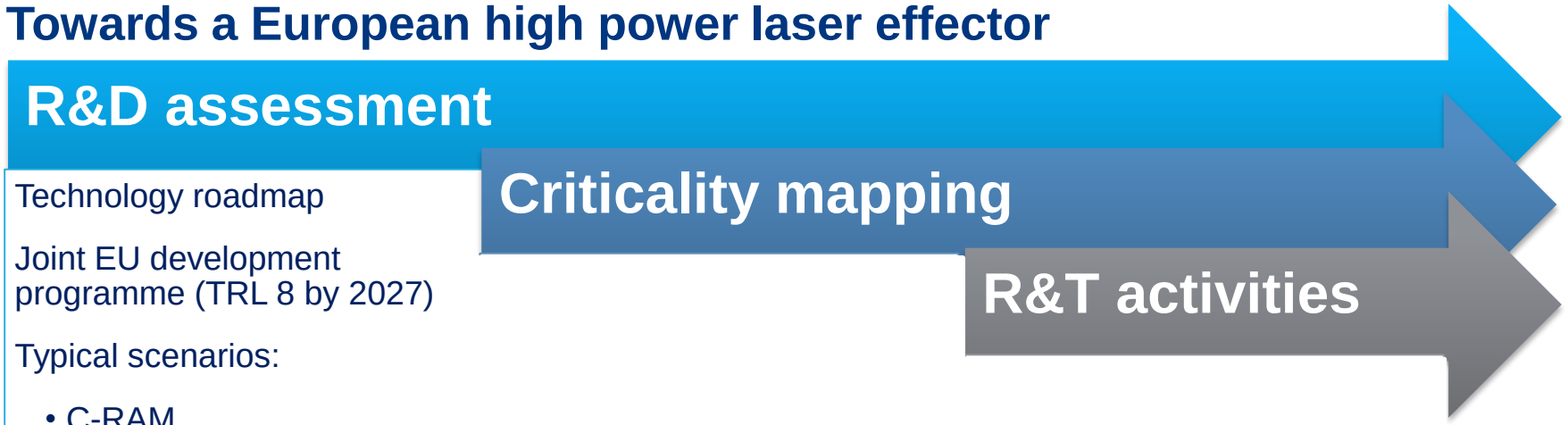
PADR-EF-02-2018 – Scope (3/6)

Towards a European high power laser effector



PADR-EF-02-2018 – Scope (3/6)

Towards a European high power laser effector



Technology roadmap

Joint EU development programme (TRL 8 by 2027)

Typical scenarios:

- C-RAM
- C-Missiles
- C-rapid, small boats
- C-M/UAS

Measurement aspects

Legal and safety regulations

Requirements for a complete laser system and its integration WS/platform

Cost breakdown for the development

Outline of the roadmap

PADR-EF-02-2018 – Scope (4/6)

Towards a European high power laser effector

R&D assessment

Technology roadmap

Joint EU development programme (TRL 8 by 2027)

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Outline of the roadmap

Criticality mapping

Map materials, components and technologies (including skills) need priority support

End-user restrictions imposed by non-EU countries

Based on selected scenarios (R&D assessment), investigate at least:

- **Single-beam** high power laser technology
- Laser **architectures capable to deliver graduated responses** (novel beam combining technologies)
- **Wavefront management of the laser beam** (including innovative adaptive optics)
- **Focusing and tracking the laser beam on the target**

R&T activities

PADR-EF-02-2018 – Scope (5/6)

Towards a European high power laser effector

R&D assessment

Technology roadmap

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R&T activities

Select one or more materials, components, laser design or technologies

R&T activities that can be taken up in the early stages of development phase

At least one demonstrator to address a specific technology gap and/or prove the potential of the technology for future power increase (scalable laser power capability)

Involving European end-users

Key performance indicators (KPI)

EDA, NATO and EU Programmes

PADR-EF-02-2018 – Scope (6/6)

Towards a European high power laser effector

- The implementation of this topic is intended to target TRL 5.
- EU contribution: EUR 4 000 000 to 5 400 000.
- **No more than one action will be funded.**
- **Deadline for applications: 28/06/2018**

PADR-EF-02-2018 – Expected impact

Towards a European high power laser effector

- Convincing the **potential of EU-funded research** in support of EU critical defence technologies (high power laser effectors);
- Establish a **R&D assessment** towards an EU High Power Laser Effector by 2027;
- Ensure a **secure and autonomous availability** of high power laser effectors to military end-users by 2027;
- **Strengthening European industry** on its global position, through innovative technologies along a new European manufacturing value chain.

Type of Action: **Research Action (RA)**

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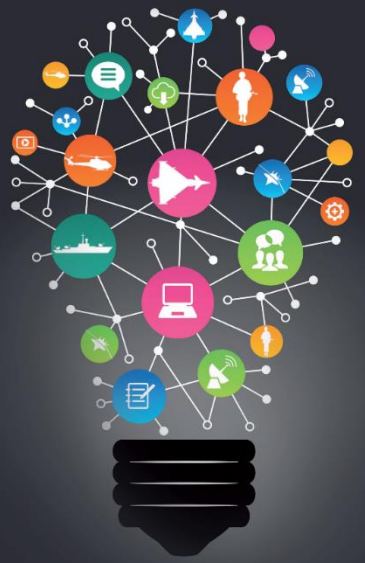

Questions and Answers

Towards a European high power laser effector

PADR-EF-02-2018

Towards a European high power laser effector

Background information subject to end-user restrictions:

- The call aim is to fund research projects that will generate substantial availability to military end users
- End-user restrictions on background could severely reduce the impact of the proposal on this point
- The description on the agreement on background (section 3.5 of the technical annex of the proposal template) should carefully cover such restrictions
- To propose development of alternatives that could lift such restrictions as part of the project.

Other Questions?

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Thanks for your attention