EDF-2021-GROUND-D: Fleet upgrade and close combat

Proposals are invited against the following topics:

EDF-2021-GROUND-D-UGVT: Unmanned ground vehicle technologies

Budget

The Union is considering a contribution of up to EUR 41 000 000 to support proposals addressing any subject of interest for defence.

The budget earmarked on 2021 appropriations for this action will be completed by an amount of EUR 109 000 000 from 2022 appropriations. This complement is subject to the adoption of a separate financing decision.

Several actions, addressing different topics, may be funded under this call.

There are significant cooperation opportunities in the Union regarding unmanned systems, which could be based on a shared operational concept and the resulting harmonisation of requirements. Moreover, the CDP analysis identifies the need to deploy unmanned systems to reduce the danger to human personnel and manned platforms, as well as to increase robustness, sustainability and resilience of ground systems. A comprehensive set of unmanned systems should contribute to the capability of land manoeuvre in the joint operational environment to gain positional advantage in respect to the adversary. Purely unmanned tracked vehicles as funded under EDIDP will not be considered under this topic.

Specific challenge

Most military experts and strategists agree that the ability to conduct swarm operations is probably the best response to future threats whether symmetrical or asymmetrical. In this context, it is therefore vital to have the ability to design and conduct long-distance operations against a highly mobile and unpredictable enemy through the flexible use of a significant number of unmanned and coordinated ground and air systems.

Indeed, intelligent and effective cooperation between unmanned ground systems (UGS), manned military vehicles, operators and air systems is needed to increase the robustness, sustainability and resilience of these terrestrial systems while reducing loss of life, the risk of collateral damage and lowering the cognitive burden placed upon operators.

Deploying a swarm-based manoeuvring capability in a framework of cooperation between manned and unmanned systems (manned-unmanned teaming) but also inside the swarm of unmanned systems is undoubtedly the strongest requirement in system design in the field of safety research.

Therefore, rapidly developing a capacity implies an incremental approach capable of proposing capability milestones in line with the development milestones of current and future land systems and allowing upgrades of legacy systems.

Scope

Proposals should address the development of hardware or software modules designed to enable manned-unmanned operation modes and taking into account teaming and swarming, and to be integrated or embedded into a set of digitalised ground Armoured Vehicles (fielded, still under development or future) and showing the following capabilities:

- To interconnect in real time and in a fully secured way an extended set of systems supported by an intelligent management solution and by operational aid modules;
- To be integrated in a manned digitised vehicle to make it temporary unmanned for specific parts of the mission;
- To propose real-time "reflex actions" to increase force protection and impacts of actions;
- To cooperate with the rest of the combined armed company while being able to enter, remain and exit the company network and to interact with unmanned ground vehicles (UGV) and unmanned aerial vehicles (UAV);
- To enable a versatile use in order to be deployed for a large spectrum of operational missions and provide operation capability in hostile, harsh environment;
- To be compliant with ethics and regulations regardless of the operational context.

Targeted activities

The proposals must cover the following activities as referred in article 10.3 of the EDF Regulation, not excluding downstream activities eligible for development actions if deemed useful to reach the objectives:

- Studies, such as feasibility studies to explore the feasibility of new or improved technologies, products, processes, services and solutions;
- The design of a defence product, tangible or intangible component or technology as well as the definition of the technical specifications on which such design has been developed which may include partial tests for risk reduction in an industrial or representative environment;
- The development of a model of a defence product, tangible or intangible component or technology, which can demonstrate the element's performance in an operational environment (system prototype).

The proposals must address in particular the following objectives: Studies:

- Autonomous behaviour understanding (Risks, ethics, Rules of engagement, decision making support);
- Definition of targeted vehicles (fielded or under development or future);
- Analysis of civilian/military communication and data exchange standards of the targeted vehicles;
- Analysis of commonality of requirements and functionalities for the targeted vehicles;
- Definition of CONOPS (Concept of Operations) related to the relevant functions for the targeted vehicles.

Design:

- Definition of the relevant functions related to relevant manned-unmanned operation modes for teaming and swarming, environment understanding and advanced decision-making support;
- Definition of their implementation and integration into the system architecture of the targeted vehicles (hardware, software, networks);
- Definition of the security environment; development of solutions for manned to unmanned transformation, teaming, swarming, environment understanding and advanced decision-making support;
- Definition of open solutions able to embed future sensors and sensor systems;
- Proposal for a test case as a basis for demonstration, simulation and prototyping.

Prototyping for implementation of selected use cases (to be consolidated along the project implementation):

Integration of a system demonstrator for:

- Risk mitigation;
- Presentation of study results and execution of a demonstration with a test scenario.

A detailed planning of the potential subsequent project phases must be generated, including the identification of implementation priorities, according to the operational needs of the EU and its Member States.

Functional requirements

Development of functions that enables upgrading a set of current vehicles or to be integrated into vehicles under development or future vehicles with the ability to embed advanced multi-technology sensors networks and advanced effectors networks around a common and standardised manned/unmanned teaming capability.

This set of modular components will provide Armoured Fighting Vehicles programs with the capacities to operate within connected hybrid manned/unmanned teams with the following main functional requirements around a common and standardized manned-unmanned teaming core function:

- Ability to timely and swiftly shift a vehicle in an unmanned configuration;
- Ability to manoeuvre the unmanned vehicles as needed for the relevant functions both in autonomous and remote way since:
    - an unmanned vehicle can be remotely driven from any position (manned vehicles, possibly moving, operational station, etc.);
    - the operators must have a comprehensive understanding of the environment of remote unmanned vehicles;
    - the operators must rely on operation aids, autonomous functionalities with a special care in the reduction of collateral damage risks**.**

- Ability to interact and manoeuvre within a manned-unmanned swarm and possibly to resort to advanced interaction modes;
- Ability to understand the operational and tactical environment to speed up the decision-making process of the operators by delivering a user-friendly and reliable decision-

making support tool that enables them (him/her) to remotely operate all the payload from any of the manned vehicles by:
    - providing real-time trustable situational information and information sharing inside the swarm;
    - allowing to remotely operate the effectors the relevant vehicles (manned and unmanned) in order to gain a tactical advantage and generate tactical options, taking into account the tactical required effects, the collateral damage constraints and the ethical aspects.
- The ability to seamlessly and securely add external UGV or UAV in order to enhance drastically capabilities in the following domains:
    - force protection against a large spectrum of threats by using UGV especially dedicated to a specific domain;
    - integration of Beyond Line Of Sight (BLOS) detection capabilities.
- The ability to increase force protection and resilience through:
    - Indistinguishability between manned and unmanned platforms:
        - to prevent external identification of an uninhabited or inhabited vehicle to target it as a priority (doesn't apply to vehicles designed to be only used in unmanned mode);
        - to give access to this capacity without increasing the logistic footprint;
    - the improvement of sensors' efficiency and real-time communication.
- The diversity of sensors to ensure the availability of information;
- State-of-the-art system with modern, customizable and intuitive user interfaces that support operators in all their operational, technical and training needs. Deployability must be the cornerstone of system design, enabling rapid adaptation, implementation, operation and training;
- The ability to operate in all relevant European climate zones or in all area where relevant EU missions could be conducted;
- The functions must be dynamic, scalable and resilient, efficiently embeddable in most of existing ground combat vehicles systems, compliant with their different programme roadmaps and their modules' obsolescence lifecycles;
- The functions as designed must be able to support specified availability requirements to contribute to an open, scalable, highly available and transparent failover architecture;
- The functions as designed must be proof against diminution of environmental sensing capability, hostile countermeasures, including the application opportunity in Global Navigation Satellite System (GNSS) denied operation environment;
- Cybersecurity aspects must be taken into account along all project phases, from requirements capture to system design and implementation, in order to ensure adequate resilience, survivability and information protection;
- The functions as designed must be able to work simultaneously in different security environments and handle the information security requirements to properly control the information flows between these domains and with external systems. The system must be able to be integrated into environments that impose different security constraints on the exchange of information while remaining usable in an environment with low security constraints;
- The function must be designed in accordance with the modularity principle in order to enable integration of new technological solutions and to enable obsolescence management;
- A human operator must remain in the loop prior to the employment of any effectors while passive sensors can potentially be employed autonomously to increase the potential capacity to gather data and increase situational awareness;

- The functions as designed must comply or be able to comply with the operational procedures of the targeted vehicles, with ethical and environmental constraints as well as with logistic and defence program efficiency requirements.

Expected impact

- Develop critical enablers for Common Security and Defence Policy (CSDP) operations and EU Battlegroup missions;
- Enhance force protection;
- Reduce the minimum reaction time for deployment of EU military missions;
- Reduce the possible number of casualties on friendly forces;
- Interoperability milestones for Member States' ground capacity programs;
- Improve situational awareness, resilience and security of EU operations;
- Create a reference for manned-unmanned teaming modes and functions that will improve the capabilities of the European defence industry to develop and supply state-of-the-art ground systems;
- Reinforce interoperability of EU Member States' armed forces;
- Strengthen the EU's strategic autonomy in military capabilities;
- Increase interoperability and synchronization between manned and unmanned platforms, and soldier systems;
- Reduce the cost of European military missions;
- Reduce the impact of the logistic footprint.