

EDF-2022-RA-MCBRN-HICP: Diagnostics, treatment, transport and monitoring of highly contagious, injured and/or contaminated personnel

Budget

The Union is considering a contribution of up to EUR 25 000 000 for this topic under the call EDF 2022-RA.

Number of actions to be funded: up to one action may be funded for this topic.

Objectives

General objective

Research and development in detection, diagnostics, treatment, transport and monitoring of highly contagious, injured and/or contaminated personnel (HICP) provides for new life-saving techniques, concepts and strategies for soldiers on the battlefield, including surgical robots, ultra-portable telemedicine devices and diagnostics sensors, Chemical Biological, Radiological and Nuclear (CBRN) containment systems, ‘porter’ or load-carrying Unmanned Vehicles (UVs) and battlefield casualty extraction devices. Battlefield logistics are a challenge regardless of the mission. Adversaries, terrain, and the environment all serve to complicate the process of delivering supplies to the wounded and sick. The medical support to a force must be capable of maintaining the necessary quality and quantity of supply, treatment and evacuation activities during peace, crisis, and conflict. This requires having on hand or in reserve appropriate medical equipment, supplies, integrated medical evacuation capabilities and remote casualty care capacity, as well as having the ability to resupply and to replace medical personnel on a continuous basis.

Specific objective

The limited ability to rescue HICP, while under fire or into a hazardous environment, is itself a major cause of poor outcome and death.

In the CBRN contaminated battlefield, combat-related injuries are “combined” – related to both, trauma and contamination. The time to aid a victim is crucial. This is even true for combination injuries. Hence there is a need to provide solutions for autonomous battlefield triage, safely extraction of HICP from the battlefield, providing instant availability information about vital signs, rapidly diagnosing life-threatening injuries, remote access of medical personnel to the casualty and delivering life-saving interventions. Extraction robots and dedicated evacuation vehicles may decrease the risk to the soldier and combat medic by life-saving robotic-assisted interventions, and by safely moving wounded soldiers out of the line of fire. Tele operated and autonomous surgical robots may deliver expert surgical care within the “golden hour” on the battlefield as well as during transport to military treatment facilities. In CBRN situations, notably under radiation exposure, further restrictions have to be dealt with such as limited accessibility of the affected areas and concerns regarding the safety of the rescuing personnel.

Scope and types of activities

Scope

Proposals must address extraction, treatment, and evacuation systems, including detection, diagnostics, integrated life-support systems and transport of HICP. Proposals must in particular address:

- design of a dedicated CBRN casualty extraction device and/or adaptation and integration of existing capabilities, 'porter' or load- carrying UV/RGP¹ capable to locate, lift (scoop) and rescue, operating in hazardous and uneven/rough conditions,
- patient on-board life support and containment system supported by automated recording of vital signs to perform preliminary diagnostics and movement of casualties, containing ventilator, defibrillator, in-/out protection, and devices to monitor the physiological status of the patient to perform preliminary diagnostics,
- decontamination technologies for safe treatment and/or transport of HICP,
- robotics-assisted life-saving intervention, such as automated administration of anti- dots and/or haemostats or tourniquets,
- solutions for quick location of casualties and initial diagnosis, including triage, in case of CBRN events, for example based on wearable (bio)sensors or other sensor solutions.

In addition, proposals should also address:

- methods and concepts for seamless interoperability and complementarity of CBRN casualty extraction devices, whereas casualties could be evacuated by unmanned vehicles and robotic platforms and transported to medical treatment facilities,
- compatibility between transport types with plug & transport solutions leading to an enhanced responsiveness and resilience. E.g., by a modular platform system as a basis for multiple (unmanned) aerial or ground vehicles: (roll-on / roll-off platform system),
- integration of CBRN casualty extraction devices into health monitoring platforms and/or CBRN DIM2 systems,
- harmonization of the different concepts of operation (interoperability) fostering the collaboration of EU Member States and associated countries with a standardized solution,
- investigation of new possibilities to transport and assist HICP,
- semi-autonomous or 'supervised' surgical capabilities, concepts for material, structure design, ventilation and medical supply logistics for the safe transport and assistance (including treatment) of contaminated or contagious casualties in CBRN hazard area,
- evaluate the designated materials, the components and the final system during transport and assistance of contaminated/contagious casualties,
- selection of material and components, and evaluation according to suitable simulation and testing procedures.

¹ Unmanned vehicle/Robotic ground platform

² Detection, identification, monitoring

Types of activities

The following types of activities are eligible for this topic:

Types of activities (art 10(3) EDF Regulation)		Eligible?
(a)	Activities that aim to create, underpin and improve knowledge, products and technologies, including disruptive technologies, which can achieve significant effects in the area of defence (generating knowledge)	Yes (optional)
(b)	Activities that aim to increase interoperability and resilience, including secured production and exchange of data, to master critical defence technologies, to strengthen the security of supply or to enable the effective exploitation of results for defence products and technologies (integrating knowledge)	Yes (optional)
(c)	Studies , such as feasibility studies to explore the feasibility of new or upgraded products, technologies, processes, services and solutions	Yes (optional)
(d)	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, including partial tests for risk reduction in an industrial or representative environment	Yes (mandatory)
(e)	System prototyping of a defence product, tangible or intangible component or technology	No
(f)	Testing of a defence product, tangible or intangible component or technology	No
(g)	Qualification of a defence product, tangible or intangible component or technology	No
(h)	Certification of a defence product, tangible or intangible component or technology	No
(i)	Development of technologies or assets increasing efficiency across the life cycle of defence products and technologies	No

The proposals must substantiate synergies and complementarity with foreseen, ongoing or completed activities in the field of MEDEVAC³ and RSS⁴, notably those performed or foreseen in the context of EDIDP, EDF 2021, Horizon 2020 and Horizon Europe.

Functional requirements

The proposed activities should address technologies to provide the following functional requirements:

- adaptable UxV evacuation vehicle and/or platforms for different operations (for example short/medium/long range transport of HCIP);
- air filtration system with air quality monitoring capability to be applied during transport, which would be adaptable for different CBRN conditions – HICP with different agents;
- option for transport of casualty/patient required ICU⁵;
- integrated decontamination system/capabilities;
- operate in extreme environments (including hazardous environments) and provide combat casualty care as close as possible to the point and time of injury;
- robust, light and small as possible, resisting fog, mud or dust and extreme temperatures, in order to assure a correct service in hostile environments and over debris surfaces;
- track, record, transmit and act upon continuous near-real-time measurement of physiological/health data rendered by wearable biosensors;
- locate and evacuate HICP from the battlefield using UxV evacuation platforms;
- carry / integrate a payload of medical supplies including a life support and surgical system capable to perform automated and/or robotic assisted lifesaving interventions, e.g., administer CBRN medical countermeasures using a robotic arm;
- (semi-) autonomous deployable surgical platform, including miniaturized surgical devices for robotic surgery to fit in casualty extraction UxV;
- integration of diagnostic, imaging and therapeutic capabilities (e.g., digital x-ray, portable ultrasound, intubation);
- smart textile sensor integration and wearable biosensors;
- carry / integrate into CBRN DIM system to provide early information as to the possible toxic hazards in the environment;

³ Medical evacuation

⁴ Reconnaissance and surveillance services

⁵ Intensive care unit

- remote assistance, including tele-medicine, such as technologies to communicate with a reach-back human medical team, imaging technologies and/or augmented reality technologies;
- protect the HICP during transport;
- for design of platforms, a manual with all tested and evaluated procedures should be prepared.

Expected impact

- Provide substantial improvements to the CBRN / medical defence domain for Member States and Norway armed forces that can revolutionize battlefield care by safely extracting casualties and patients from harm's way, rapidly diagnosing life-threatening injuries, delivering life-saving interventions and ensuring their safe transport (short- medium or long range) to dedicated medical facilities;
- Facilitate the development of CBRN / medical defence capabilities that each Member State, associated country, individual government or industry cannot face alone;
- Strengthen European sovereignty and contribute to the EU strategic autonomy;
- Develop EU autonomous industrial segments.