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AT THE FOREFRONT TO PROTECT CITIZENS, INFRASTRUCTURE AND THE ENVIRONMENT

Call for Proposals for the creation of an Extended Reality (XR) Table Top Exercise platform

A CONSORTIUM OF ITALIAN EXCELLENCE

REGIONE DEL VENETO

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ITALIAN NATIONAL AGENCY FOR NEW TECHNOLOGIES, ENERGY AND SUSTAINABLE ECONOMIC DEVELOPMENT

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rescEU-CBRN-DSIM-IT

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Context and introduction:

European Union Member States increasingly face events that threaten public safety and critical infrastructure security, including Chemical, Biological, Radiological, and Nuclear (CBRN) incidents. These events significantly disrupt essential services, public movement, and safety, causing substantial economic and psychological effects. In response, the EU has prioritized CBRN protection over the past decade, launching initiatives to strengthen national and regional CBRN governance and capabilities, with a particular emphasis on safeguarding public spaces and Critical Infrastructures (CIs) vital for societal functions and well-being.

Governments now recognize that public spaces, high-profile events, and infrastructures are interconnected, with vulnerabilities in one area potentially triggering cascading impacts. Prevention is key, but in the case of CBRN incidents, effective mitigation and recovery strategies are crucial to protect lives, the environment, and to contain the affected area. This has prompted EU Member and Participating States to enhance preparedness for cross-border CBRN disasters and emergencies. Against this background, the rescEU-CBRN-DSIM-IT project is a key initiative focusing on enhancing the EU's ability to prevent and respond to CBRN emergencies. This project is dedicated to developing advanced Detection, Sampling, Identification, and Monitoring (DSIM) capabilities for CBRN incidents. The newly created capability will be operated by firefighters, along with specialists coming from civil protection and scientists assigned by relevant public entities.

At its core, the project involves the creation of a specialized modular capacity to be deployed in the context of large-scale events, both for preventive and response actions. This modular, integrated capacity will consist of 11 vehicles, including one DSM Vehicle equipped with state-of-the-art technology for rapid and effective detection and monitoring; four Mobile Laboratories for sampling and analysis of Chemical, Biological, and Radiological/Nuclear agents and sources; five support and logistics vehicles providing equipment for operators; and a dedicated vehicle for innovative training of operators through Extended Reality (XR) technology. The creation of this modular capacity will be complemented by the definition of dedicated infrastructures for the storage of the capacity and training of its operators, with a defined roster of personnel ready for deployment. rescEU-CBRN-DSIM-IT is funded under the Union Civil Protection Mechanism program, with Grant Agreement (GA) 101122710 — rescEU-CBRN-DSIM-IT — UCPM-2022-rescEUCBRN-IBA.

PART 1 - Call requirements

As part of the project's augmented and virtual reality capabilities, a key focus is the development of dedicated Table-Top Exercises (TTXs) that go beyond traditional analog formats, which often lack interactivity and dynamic scenario-based injects. These "enhanced TTXs" aim to provide commanders and strategic operators with more immersive and impactful training for Command-and-Control tasks. In fact, the enhanced TTX will be crucial to develop quick thinking as well as strategic skills.

The expected solution will be a software dedicated to the delivery of an "enhanced TTX" environment which leverages augmented reality to improve the quality and effectiveness of tailored training sessions, by adding elements of realism to an otherwise static exercise.

Eligibility criteria

The following criteria will be applied to all candidates. The Call is open only to single operators; consortia composed of more than one operator are not to be considered eligible. The candidate must possess all requirements and no subcontracting (even partial) is allowed.

1) **Financial:**
   a) The average annual turnover of the candidate for the last 2 years must exceed 500 000 EUR; and
   b) Current ratio (current assets/current liabilities) in the last 2 years for which accounts have been closed must be at least 1.
   c) A Self-Declaration stating the financial figures for the last three years including calculation of the current ratio is requested.

2) **Technical:** The reference period is to the three years prior to the submission deadline.
   a) The candidate has adequate staff dedicated to the conduction of the project, including, *inter alia:*
      i) Project Coordinator
      ii) Developers (both frontend and backend).
      iii) 3D artists and environmental artist.
      iv) Cybersecurity expert
   b) The candidate has documented experience in the development of solutions in Virtual and Extended Reality.
   c) The candidate has documented experience in the development of 3D objects and 3D environments.
   d) The candidate has participated at least to two projects in fields relevant for the project (XR applications for emergency response, CBRN, firefighters, etc…), that match with the following requisites:
      i) Minimum overall contract value: 150.000€
      ii) In case of projects implemented by a consortium: the portion that was carried out within the project by the candidate must be equal at least to 30% of the project overall value OR €100.000 (for ongoing projects, only the portion of budget/activities completed at the date of application are to be considered eligible), whichever is higher.

      iii) At least 1 project/contract as a sole contractor – not as a member of a consortium.

  e) It is desirable that the candidate is capable of complying with NIS2 requirements in the delivered solutions.

3) Exclusion Criteria: candidates shall confirm that they <u>do not fall</u> in any of the exclusion criteria listed below:

  a) The candidate is bankrupt, subject to insolvency or winding-up procedures, where its assets are being administered by a liquidator or by a court, or it has entered an arrangement with its creditors, where its business activities are suspended, or it is in any analogous situation arising from a similar procedure provided for under national laws or regulations;

  b) It has been established by a final judgment or a final administrative decision that the candidate is in breach of its obligations relating to the payment of taxes or social security contributions in accordance with the law of the country in which it is established, with those of the country in which the contracting authority is located or those of the country of the performance of the contract; (c) it has been established by a final judgment or a final administrative decision that the candidate is guilty of grave professional misconduct for having violated applicable laws or regulations or ethical standards of its profession, or for having engaged in any wrongful conduct which has an impact on its professional credibility and implies wrongful intent or gross negligence, including, by way of example, any of the following:

      i) fraudulent or negligent misrepresentation of information required to verify the absence of grounds for exclusion or the fulfilment of selection criteria or in the performance of a contract;

      ii) execution of an agreement with other economic operators with the aim of distorting competition;

      iii) violation of intellectual property rights;

      iv) attempt to influence the decision-making process of SAFE during the procurement procedure;

      v) attempt to obtain confidential information that may confer upon it undue advantages in the procurement procedure;

  c) It has been established by a final judgment that the candidate is guilty of any of the following:

      i) fraud, within the meaning of Article 1 of the Convention on the protection of the European Communities' financial interests, drawn up by the Council Act of 26 July 1995;

      ii) active corruption, as defined in Article 3 of the Convention on the fight against corruption involving officials of the European Communities or officials of Member States of the European Union, drawn up by the Council Act of 26 May 1997, and in Article 2(1)(a) of Council Framework Decision 2003/568/JHA, as well as corruption as defined in the law of the country where the contracting entity is located, the country in which the candidate is established or the country of the performance of the contract;

      iii) participation in a criminal organization, as defined in Articles 1 and 2 of Council Framework Decision 2008/841/JHA;

      iv) money laundering or terrorist financing, as defined in Article 1(3), (4) and (5) of Directive (EU) 2015/849 of the European Parliament and of the Council;

      v) terrorist-related offences or offences linked to terrorist activities, as defined in Articles 3 and 4 and in Title III of Directive (EU) 2017/541 of the European Parliament and of the

Council, respectively, or inciting, aiding, abetting or attempting to commit such offences, as referred to in Article 14 of that Directive;

vi) child labour or other forms of trafficking in human beings as defined in Articles 2 and 3 of Directive 2011/36/EU of the European Parliament and of the Council;

d) The candidate has shown significant deficiencies in complying with main obligations in the performance of a contract financed by the budget, which has led to its early termination or to the application of liquidated damages or other contractual penalties, or which has been discovered following checks, audits or investigations by an authorizing officer, OLAF or the Court of Auditors;

e) It has been established by a final judgment or final administrative decision that the candidate has committed an irregularity within the meaning of Article 1(2) of Council Regulation (EC, Euratom) 2988/95.

Contract details

Maximum Budget:

- Maximum estimated contract value: €150,000 VAT excluded. This budget refers only to the services to be carried out by the contractor to deliver the TTX software, and does not include hardware costs that SAFE will have to undertake to ensure full functionality of the solution delivered. Proposals are required to outline, separately from the budget for services, an estimate of hardware features and related costs - only the pricing of services will be taken into consideration to assign the score to the financial proposal, while the estimate of hardware costs will be utilized as internal evaluation tool for potential hardware procurement.

Timeline for project implementation:

- Deadline for requesting clarifications: 10/02/2025

- Deadline for presentation of proposals: 14/02/2025

- Contract signature and start of project: 01/03/2025

- Intermediate monitoring: 31/05/2025

- Project completion date: 31/08/2025

Award Criteria and execution of contract

- Technical proposals will be assessed on a scale 0-100. Proposals obtaining less than 70 points will be declared not eligible and excluded from further evaluation steps. Eligible proposals will be assessed on a best price-quality ratio, with 80% of the overall score assigned to technical proposal and the remaining 20% to financial proposal.
- The highest scoring candidate will be informed by email and will be invited to a negotiation phase to define the final technical and financial features of the service contract. If the negotiation with the highest scoring candidate is not successful, the next best candidate may be invited to a negotiation, or the Call may be relaunched.
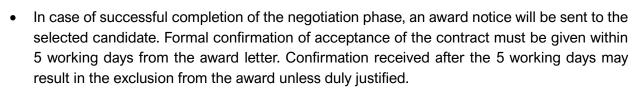
- In case of successful completion of the negotiation phase, an award notice will be sent to the selected candidate. Formal confirmation of acceptance of the contract must be given within 5 working days from the award letter. Confirmation received after the 5 working days may result in the exclusion from the award unless duly justified.

IP Rights

- All right title and interest in and to the Intellectual Property Rights related to the software developed directly during the implementation of the Project and to their use and commercialization in any possible way and combination to the maximum extent and duration permitted by the Italian law shall ipso facto vest solely in Fondazione SAFE.

Application format and details to be provided

The candidates must submit applications vie electronic format at safe@safe-europe.eu – no other means of submission will be accepted. Applications must contain:

- <u>Technical proposal</u>: it is a presentation of the proposal idea in PPT/PDF format, providing the presentation of the candidate, general approach, methodology of delivery, proposed timeline with clear indication of milestones and indicative hardware proposal.
- <u>Financial proposal</u>: it outlines the pricing of the proposed solution, as well as an estimate of the hardware costs necessary to run the proposed solution. Only the pricing of services will be taken into consideration to assign the score to the financial proposal, while the estimate of hardware costs will be utilized as internal evaluation tool for potential hardware procurement.
- Documentary evidence of the technical and financial capacity, including a declaration of honour on the absence of exclusion criteria.

Any additional documentation (brochures, letters, etc.) sent along with an application will not be taken into consideration.

Alteration or withdrawal of applications

Candidates may alter or withdraw their applications by written notification prior to the deadline for submission of applications. No application may be altered after this deadline.

Upon submission of the application, each candidate will automatically confirm the validity of its technical and financial proposals for a period of 60 calendar days.

PART 2 – Technical requirements

General technical requirements of the TTX Software

The software needs to generate Table-Top Exercises (TTXs) that move beyond traditional analog formats, which are often limited in interaction, immersion, and the ability to deliver dynamic, impactful scenario injects. To achieve this, the following criteria should be considered, with the understanding that the system aims to create a TTX environment for training purposes, rather than a high-level simulation tool for real-life operational planning, which would require more advanced modeling and algorithms.

- **Setting of the scenario**: the scenario should be based on real maps (satellite imagery, ideally with worldwide capabilities). Integration of 3D buildings and morphologic features should be included. Use of real data (e.g., presence of real hospitals, fire stations, police stations) is desirable.

- **Interaction with injects**: different types of injects (text, photos, videos, various types of 3D assets, changes to weather conditions, etc) should be readily available to the instructor(s) in the scenario. Injects should be accessible through a dedicated library, allowing the trainer(s) to set-up the scenario in advance as well as modify it during TTX implementation (i.e. real time modifications).

- **Dynamic reactions to trainers and trainees inputs**: key variables of the TTX shall react in real-time to decisions taken by trainees as well as trainers. As an example, this could include environmental variables (change of scenario features if some weather conditions are modified by the trainer), contaminated areas, channeling of the crowds based on containment measures, etc.

- **View**: the trainer and trainees should be able to interact with the 3D scenario through a bird-eye view and, ideally, zooming-in function up to first-person view.

- **Dispersion models for CBRN substances**: as reported above, the aim of the system is to provide adequate immersiveness and interactivity with the scenario, and not an accurate simulation tool. To reproduce the dispersion of CBRN substances or agents, a gaussian puff model could be considered or, ideally, more accurate simulation and dispersion tools (inter alia based on NATO standards). An assessment on the possible interaction of the models listed above with environmental factors such as wind (weak/medium/strong) and rain (weak/medium/strong) should be included. Where possible, AI based dispersion models should be taken into account along with variations caused by randomized weather conditions.

- **Crowd simulation**: a visual representation of a crowd as static, interactive element is deemed adequate for the scope of the system. No complex algorithms replicating crowd movements and interactions with the environment are required. The behavior of the crowd is not to be governed by AI and Behavior Trees.

- **Health effect models**: no complex algorithms replicating health effects of CBRN exposition and progression of the health state of individuals are considered necessary. Following a given CBRN event, a random value of involved people (including dead and wounded) can be displayed in order to give the trainee sufficient elements to conduct the training, with an evolution of dead and wounded based on actions implemented by trainees as well as

time/dispersion models features. Integration of the ADAM software tool[1] can be assessed (if technically and commercially feasible).

- **Interactions with NPCs**: given the TTX setting, the focus is to be on injects rather than interaction with NPCs. No natural language processing algorithm is required. No advance pathfinding or navigation algorithms are required for the assets -as they are manually guided, nor adaptive NPC Behavior.

Proposed list of interactive elements:

In order to meet a suggested initial list of *desiderata* from end-users, Fondazione SAFE intends to include the graphic elements, animations, and interactions listed below. Additionally, Fondazione SAFE will provide, where possible, all supporting documentation (i.e. pictures, videos, technical sheets) of the 3D elements to be created.

This list is intended as tentative and will be refined with input from entities directly involved in the training sessions to better meet the needs of the end-users.

Environmental interactions:

- Chemical and biological dispersion model and visual effects.
- Dispersion model/intensity level of a generic radioactive source with custom values.
- 3D replica of rescEU DSIM vehicles and deployed personnel.
- Chemical/biological/radiological risk symbol for the scenario.
- Simulation of fires and explosions are desirable.
- Overlay against chosen map with possibility of indicating red/yellow/green areas in both concentric and free drawing modes to signal contaminated areas.
- Crowd models at visual rendering level and indicator of people involved in a CBRN event (parameter editable by trainer and evolving based on other scenario variables) at different level of contamination, injuries, combination of the two.
- Possibility to call-in stockpile reserves to avoid depletion of PPE, water, and other replenishable assets during the intervention. In that sense, an indicator could be represented (in the form of a status bar) over assets requiring materials to function properly.
- Possibility to decontaminate vehicles, operators, and crowd. The decontamination procedure should also present the need to replenish its capability over time to avoid the depletion of necessary resources.

Library of vehicles, personnel, objects:

- 3D models of vehicles part of the rescEU capacity (approximately 20 models in total, with animation).
- 3D models of mobile labs (3 labs, with animations).
- 3D models of field facilities related to logistics support capability.

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[1] https://adam.jrc.ec.europa.eu/en/adam/content

- 3D models of generic vehicles belonging to fire brigade, police, emergency medical personnel, civil defense (minimum 15 models, with animation).
- 3D models of personnel of Fire Department, police, scientific personnel and medical personnel.
- 3D model of decontamination line.
- 3D assets required to populate the scenario with contextual elements (i.e. CBRN equipment, drones, UAVs, UGVs, movable barriers, sand bags, civilian vehicles, etc) – minimum 50 types of assets
- (Optional) 3D model of assets to complement the rescEU capability in case of intervention, such as firefighting helicopter, k9 units, ROLE 2 structures. Given the additional complexity, those models can be represented by simplified 3D designs (symbology to be defined).

Miscellaneous:

- Platform to support 4x trainees + 1 trainer simultaneously.
- Full-offline version with locally installed software preferred.
- Bi-lingual platform with English and Italian.
- Role selection (1) Trainer, (2) Firefighter, (3) Civil Defense personnel, (4) Medical personnel, (5) Technical personnel or (6) customized role.

Roles to be integrated in the scenario:

The following list of potential roles to be integrated in the scenario has been drafted together with end users to better reflect the respective tasks and responsibilities that shall be replicated in the TTX software:

1. **Trainer**
   a. Role: training of first responders on: communication strategies, safety procedures and PPE, use of detection systems, rescue and decontamination procedures, methods and strategies.
   b. Interactions: pop-up text and video windows for injects; ability to insert assets in the rolling scenarios (before and during TTX implementation), including generation of threats; mobile-labs; DSM vehicles; sani-vehicle; decontamination systems.
   c. Capacity to collect data for evaluations, including real-time visualization on a computer screen of the scenario, with bird-eye view and options for zoom-in in specific locations.

2. **Firefighter**
   a. Role: communication with authorities, advisors, and decision makers; communication with the generic public; ensure his own personal safety; scene assessment; detection of threats; first characterization of threats; risk assessment; camp setup; request of technical resources after a first screening; fight of fires; rescue of unharmed, injured, and dead involved populations; rescue of goods; safeguard of environment; reactivation of services and infrastructures, decontamination of personnel and vehicles.

b. Interactions: fire truck; DSIM vehicle; mobile-labs; generic fire brigade vehicles; field facilities; decon-line; possibility to identify and establish a hot zone and a cold zone based on offered parameters (type of threat, environmental conditions).

3. **Civil Defense personnel (*to be added upon confirmation*)**
   a. Role: support to the other first responders to safeguard the civilian population; communication with authorities, advisors, and decision makers; communication with the generic public; ensure his own personal safety; camp setup for civilian and medical services; setup and management of an incident command (reference point); rescue of goods; safeguard of environment; reactivation of services and infrastructures
   b. Interactions: generic Civil Defense vehicles, generic field facilities.

4. **Medical personnel**
   a. Role: coordinate the work of the mobile labs; communication with authorities and advisors; ensure his own personal safety; organize and carry on in situ triage; estimation of number and kinds of casualties (in accordance with the medical care priority); request of suitable medical goods; first health care relief of contaminated or injured people; sorting of the most seriously injured among the various local and national health facilities; conduct initial testing on victims of suspected contaminations (swabs); conduct initial decontamination.
   b. Interactions: Mobile LABS; decontamination line; sani-vehicle; generic medical vehicles; field triage facility; field medical care facility; generic field facilities

5. **Custom**
   a. Ad-hoc trainee, with role based on specific scenario setting
   b. Interactions: possibility to choose interactions from any of the previously outlined role