



## Smart@Fire – Pre-commercial Tender Scope - Abstract

### Overall objective:

A smart Personal Protective System (PSS) for individual fire fighters comprised of a Personal Protective Equipment (PPE) turnout gear and loosely coupled ICT system. The ICT system integrates safety critical functions of a personal protection system of individual fire fighters, and acts as communication node for additional personal protection equipment as well as interface to the local center of command. The system must be compliant with and needs to be fitted into the fire fighter turnout gear.

### Primary user requirements for the ICT system

- **Localization** of the firefighter and his team, in buildings and open areas, displayed on a **relative map**, made available to the intervention coordinating officer.
- **Remote parameter monitoring and historical logging**, making the info accessible via an **intuitive dashboard** for the intervention coordinating officer (e.g. a map), enriched with the status of the team, their PPS, and the environment, enabling to set thresholds, generate (automatic) alerts (depending on the available info).
- Interfacing with devices measuring the fire fighter's environment, more in particular **temperature, temperature evolution, presence of explosive gasses, and physiological parameters**.
- General requirements as robustness under potential mechanical friction, maintenance, repair, cleaning, with easy mounting/dismounting of the ICT and ideally with self-assessment.

### Key functional challenges to enable the primary use-cases

- A scalable, performant **communication network** between the fire fighters with sufficient indoor penetration to not lose connection and near real-time update rate (~1Hz) towards the intervention coordinating officer. The central data aggregation infrastructure may be integrated in the equipment of the intervention coordinating officer, on existing or additional (networked) infrastructure of the firefighter truck, in a virtual datacenter connected to the firefighter truck, or yet another configuration. It is strongly recommended though to keep the need for additional infrastructure to a minimum.
- A **localization engine** (preferably GPS + inertial) with limited indoor drift, feeding a relative track & trace map, enabling 'meet point' and 'recovery path' instructions. This implies an accuracy of 3-4m outdoor and 1m indoor under typical firefighting circumstances.
- **Intuitive user feedback** both towards the intervention coordinating officer and the fire fighter. For the intervention coordinating officer an intuitive UI dashboard, conform the way of working, ideally enriched with automated data interpretation and warning generation intelligence. For the firefighter a simple multimodal combination of audio, UI (button/lights) and haptic belt.
- **Coupling** via defined application interfaces (e.g. Bluetooth application profile) **with** (standalone) environmental temperature measurement device, physiological monitoring device, and optional when available, a (standalone), cheap, simple and robust explosive gas detector (e.g. indicating the presence of explosive gasses without measuring ppm details).
- **Easy integration** between the ICT system and the turnout gear focusing on cabling design, wireless interference issues, (non-military grade) electromagnetic shielding of the devices,...

### **Selected (high-level) functional requirements**

- Battery autonomy must be at least 45 minutes (in building conditions, coupled with additional environmental and physiological monitoring devices) and at least 3 hours (outdoor conditions).
- Overall weight of the ICT system is restricted to ~2 kg, well balanced around the body of the fire fighter.
- Speed of deployment and system start-up to fully operational mode is limited to less than 10 minutes (the average time to arrive on the intervention scene).
- Protection against commonly known jamming, tampering and spoofing of all communication
- Average life time of the system should be more than 8 years. Removal of parts of the PPS during turnout gear maintenance and cleaning is allowed.
- The non-removable parts of the PPS should be compliant to common washing procedures used on turnout gear
- The PPS must be resistant to chemicals, toxic gasses and hazardous substances common in during firefighting deployment of turnout gear
- The PPS must be compliant with common requirements on communication devices and electrical equipment, material requirements (e.g. RoHS, RTTE, REACH) en more specifically selected testing procedures related to PPE directive EN469.