ASSISTANCE

Adapted situation awareneSS tools and tallored training curricula for increaSing capabiliTie and enhANcing the proteCtion of first respondErs

European Commission

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Deliverable D9.6

D9.6: PCP and PPI preparation Plan for Commercialisation and Market Entry

[1] PU: Public; PP: Restricted to other programme participants (including the EC services); RE: Restricted to a group specified by the Consortium (including the EC services); CO: Confidential, only for members of the Consortium (including the EC services).

ASSISTANCE

Nowadays different first responder (FR) organizations cooperate together to face large and complex disasters that in some cases can be amplified due to new threats such as climate change in case of natural disasters (e.g. larger and more frequent floods and wild fires, etc) or the increase of radicalization in case of man-made disasters (e.g. arsonists that burn European forests, terrorist attacks coordinated across multiple European cities).

The impact of large disasters like these could have disastrous consequences for the European Member States and affect social well-being on a global level. Each type of FR organization (e.g. medical emergency services, fire and rescue services, law enforcement teams, civil protection professionals, etc.) that mitigate these kinds of events are exposed to unexpected dangers and new threats that can severely affect their personal safety.

ASSISTANCE proposes a holistic solution that will adapt a well-tested situation awareness (SA) application as the core of a wider SA platform. The new ASSISTANCE platform is capable of offering different configuration modes for providing the tailored information needed by each FR organization while they work together to mitigate the disaster (e.g. real time video and resources location for firefighters, evacuation route status for emergency health services and so on).

With this solution ASSISTANCE will enhance the SA of the responding organisations during their mitigation activities through the integration of new paradigms, tools and technologies (e.g. drones/robots equipped with a range of sensors, robust communications capabilities, etc.) with the main objective of increasing both their protection and their efficiency.

ASSISTANCE will also improve the skills and capabilities of the FRs through the establishment of a European advanced training network that will provide tailored training based on new learning approaches (e.g. virtual, mixed and/or augmented reality) adapted to each type of FR organizational need and the possibility of sharing virtual training environments, exchanging experiences and actuation procedures.

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Disclaimer

Executive Summary

This deliverable presents the exploitation and market analyses activities carried out during the last reporting period in order to take all ASSISTANCE results to the market. A 5-years strategic roadmap was designed for the Situational Awareness Platform (SAP) and the Advanced Training Platform, considering relevant market barriers, competing solutions, standards, stakeholders and financial indicators. Pre-Commercial Procurement and Public Procurement of Innovation were included in the roadmap to de-risk the commercialisation of the results. For this, a practical handbook was designed to support ASSISTANCE end-users to follow-up and conduct this interest.

After an introductory chapter, Section 2 provides a summary of the project foreground and exploitable results developed by each partner. While Section 3 provides a comprehensive analysis of the main competing solutions for each Key Exploitable Result (KER), Section 4 elaborates the Final Exploitation Plans for all business/commercial partners and academic/research partners – including the various exploitation routes considered. Taking into account all the aforementioned work, ASSISTANCE business and commercialisation plans are reported in Section 5 by means of the Business Model Canvas, a strategic roadmap to reach the market and the financial assessment.

The work performed in T9.3 was also integrated as part of this deliverable to ensure compliance of the KERs with the existing standardisation landscape. Key actions required for each KER are summarised in Section 6. Finally, Section 7 provides a handbook for ASSISTANCE end-users to activate procurement processes in the short-term supporting the market uptake of the results.

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0.6	Comments from reviewers integrated	All	All	26/07/22
1.0	Final version	All	All	27/07/22

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Acronyms

AB	Advisory Board
AHJ	Authorities Having Jurisdiction
API	Application Programming Interface
AR	Augmented Reality
ATN	Advanced Training Network
ASSISTANCE	Adapted situation awareneSS tools and taIlored training curricula for increaSing capabiliTie and enhANcing the proteCtion of first respondErs
C2	Command and Control
CBRNE	Chemical, Biological, Radiological, Nuclear and Explosive
CEN	European Committee for Standardization
CENELEC	European Electrotechnical Committee for Standardization
CIP	Critical Infrastructure Protection
CSA	Coordination and Support Action
CWA	CEN Workshop Agreement
D#.#	Deliverable number #.# (D1.1 deliverable 1 of work package 1)
DALR	Damaged Assets Location and Routing
DDP	Data and Digital Platform
DoA	Description of Action of the project
DRS	Disaster-Resilient Society
EC	European Commission
ETSI	European Telecommunication Standards Institute
ESA	European Space Agency
EU	European Union
FR	First Responder
GA	Grant Agreement
H2020	Horizon 2020 Programme for Research and Innovation
ICT	Information and Communication Technology
IEC	International Electrotechnical Commission
IPR	Intellectual Property Rights
ISO	International Organisation for Standards
ITU	International Telecommunication Union
JSON	JavaScript Object Notation
KER	Key Exploitable Result
M#	#th month of the project (M1=May 2019)
MQTT	Message Queuing Telemetry Transport
MR	Mixed Reality
NATS	Neural Autonomic Transport System

NPV	Net Present Value
LEA	Law Enforcement Agency
PC	Project Coordinator
PCP	Pre-Commercial Procurement
PIC	Project Implementation Committee
PPI	Public Procurement of Innovation
PSB	Project Security Board
PSC	Project Steering Committee
REST API	Representational State Transfer Application Programming Interface
ROI	Return of Investment
SA	Situation Awareness
SAP	Situational Awareness Platform
SAS	Sensor Abstraction Service
SDO	Standards Development Organisations
SF-SEC	Sector Forum for SECurity
SOA	Service Oriented Architecture
SotA	State of the Art
SW	Software
TC	Technical Committee
TETRA	TErrestrial Trunked RAdio
TL	Task Leader
TP	Technology Provider
TRL	Technology Readiness Level
UAV	Unmanned Aerial Vehicle
UGV	Unmanned Ground Vehicle
UI	User Interface
UAS	Unmanned Aerial System
UX	User Experience
VR	Virtual Reality
WP	Work Package
WPL	Work Package Leader

1. INTRODUCTION

1.1. Purpose of the Document

This document presents the results of Task 9.1: Exploitation and IP management (work performed after D9.2 release), Task 9.3: Standardisation, Task 9.4: PCP, PPI preparation and Business Plan application in ASSISTANCE. The main purpose of the document is to define the mechanisms that will be used to exploit the results obtained in the project, as well as actionable roadmaps to commercialise them. Emerging business plans based on the exploitable results have been designed to be materialized within 5 years after the project end. It is important to understand the market potential of the project results and the resulting interactions among the market players: First Responders, commercial/business partners, research/academic partners, etc. As part of such plan, a handbook is provided to ASSISTANCE end-users on how to move forward with the technologies developed after the end of the project through Pre-Commercial Procurement and Public Procurement of Innovation mechanisms. Furthermore, appropriate standards to maximise the exploitation potential of the project innovations have been identified to ensure the interoperability of the final products.

Exploitation activities have taken place in this last reporting period to finalize the characterization of the project's exploitable results, define the joint exploitation strategy and provide some preliminary inputs about the commercialization of the most mature ASSISTANCE results.

1.2. Scope of the Document

In order to define the roadmap to achieve commercialisation, the consortium performed an in-depth analysis and established the project Key Exploitable Results (KERs) in T9.1. These formed the core input of the competitive benchmark analysis (also leveraging the technology watch performed under T1.5) and exploitation plans in this document, which are the final versions of the ones presented in D9.2. Furthermore, this information was considered to build the ASSISTANCE Business Models and Commercialisation Strategy under T9.4, as well as the Standardisation Strategy under T9.3. Once the strategic framework for the next steps was defined, the consortium started to explore the specific mechanisms behind EU-funded PCP and PPI to work as an enabler of this roadmap. A handbook was produced under T9.4 to support the end-users interested in preparing the tender and launching the procurement.

1.3. Structure of the Document

The document is structured as follows:

- Section 1. Introduction: Presents a summary concerning the scope of the deliverable, its structure and relation to other tasks and deliverables.
- Section 2. Final exploitable results: Presents relevant aspects of the IPR Management and the final list of the ASSISTANCE Key Exploitable Results (KER).
- Section 3. Competitive benchmark analysis: Presents significant aspects of the competitive benchmarking analysis, emphasizing on the value added and innovative features of the ASSISTANCE solutions.
- Section 4. Final exploitation plans: Depicts relevant aspects regarding the partners' individual exploitation plans, applying a uniform approach.
- Section 5. Business Plan and Commercialisation Strategy: Presents the major components and features of the ASSISTANCE SAP and ATN Business Model Canvas, the commercialisation strategy and the significant aspects and findings regarding the monetization scenarios and cash flow analysis.
- Section 6. Standardisation strategy: An in-depth analysis of ASSISTANCE standardisation activities is reported, which includes the relevant standards to each KER.
- Section 7. ASSISTANCE handbook for Pre-commercial Procurement (PCP) and Public Procurement of Innovation (PPI) preparation: This section provides a step-by-step plan to ASSISTANCE end-users to bridge the gap between the maturity level of the results developed in ASSISTANCE and full commercial deployment.
- Section 8. Conclusions.
- Annex I: Technology watch setup: Information used to conduct automatic searches and identify key competitors in the market.
- Annex II: Standards and CWAs with potential relevance to ASSISTANCE partners
- Annex III: Standardisation activities workshop invitation and agenda
- Annex IV: Standards questionnaires for ASSISTANCE consortium
- Annex V: Keywords provided by ASSISTANCE consortium: Set of keywords used to analyse relevant standards to each KER
- Annex VI: Horizon Results Booster – Exploitation Roadmap: Report provided by the Horizon Results Booster for improving the exploitation plans of the project.

2. Final exploitable results

Deliverable 9.2: Updated Exploitation and Dissemination plan (M12), provided a detailed description of the exploitation strategy in the preliminary stages of the project. This included all background Intellectual Property (IP), as well as a first assessment of the foreground results. An IP management protocol was also established in liaison with T1.5 and T9.1 to avoid premature disclosure of details that could hinder patentability and overall exploitability.

During the last period, the ASSISTANCE consortium has worked on defining the actual exploitability of results. To this end, it was necessary to describe all the components developed during the project, to understand IP and ownership of the exploitable results (expressing the view of each project partner) and to detect interdependencies to create a map of the IPR since ASSISTANCE partners must mutually respect each other's rights on all background IP.

2.1. IPR Management

One key aspect of enabling exploitability is IPR management during the project. Since the last update of the IP repository in D9.2, the following methodology has been applied:

1) Follow-up on research and development to identify any additional results upon completion of the development phase (M24). Review the IP repository every 2 months.
2) Identify the Technology Readiness Level (TRL) at the end of the project and the timeline for exploitation.
3) Review and clarify on type of IP protection (patent filing, licenses, etc.) and sectors of application.

Several iterations took place to ensure a clear exploitation roadmap for the tools that have also been validated in WP7. As soon as ASSISTANCE results were available, they were reflected in the "Foreground table" and in the following step, the feasibility of considering them a KER or part of a KER was assessed.

2.2. Key Exploitable Results

ASSISTANCE partners have identified all relevant foreground results and listed them in the following table:

Ref.	Lead	Type of Exploitable Foreground	Description of Exploitable Foreground	Background needed to use Foreground	Exploitable product(s)
1	UPVLC	SOFTWARE	Evolution and adaptation of GESTOP to first responders needs	GESTOP System	GESTOP or GESTOP modules stand alone
2	UPVLC	SOFTWARE	Video fusion module	GESTOP System	Video fusion module
3	UPVLC	SOFTWARE	FRs Wearable Sensors	GESTOP System	FRs Wearable Sensors
4	UPVLC	SOFTWARE	Portable SA platform	GESTOP System	Portable SA platform
5	UC	SOFTWARE	Evacuation and intervention times and routes will be provided based on appropriate optimization and decision algorithms and real-time computer simulation models.	N/A	DARL (Evacuation Module)
6	UC	METHODOLOGY	GELS Toolkit for self-assessment, monitoring and analysis of gender, ethical, legal and societal aspects	N/A	GELS Methodology
7	CATEC	SOFTWARE	Autonomous UAV to neutralize in a fast and efficient way malicious drones while minimizing collateral damages	Intelligent navigation module from CATEC	DATAN (Drone Air-To-Air Neutralisation)
8	CATEC	SOFTWARE	Network coverage through the use of swarms of drones	Algorithms for cooperation and coordination among UAS	DSAC (Drone Swarm-Aided Coverage)
9	ETRA	DOCUMENTATION	Specification of SAS to be implemented in FR's methods	N/A	SAS

Ref.	Lead	Type of Exploitable Foreground	Description of Exploitable Foreground	Background needed to use Foreground	Exploitable product(s)
10	ETRA	SOFTWARE	Software system highly interoperable with each FRs organization, aimed to manage all the necessary data exchanges	N/A	SAS, Interoperability gateway for FR's
11	IFV	TRAINING CURRICULA	New training curricula for cooperation of different first responder organisations internationally for ADMS platform	ADMS is produced by USA based company called Environmental Tectonics Corporation	Multi-agency training scenarios for first responders' international cooperation
12	TNO	SOFTWARE	Hazard module	N/A	Hazard module
13	Łukasiewicz-PIAP	SOFTWARE	Software system that operates on mobile robots and specific payloads for disaster response scenarios that is interoperable with modules and toolkits developed in Assistance	Ł-PIAP robotic systems	Interoperable robots
14	THALES	SOFTWARE	PLANLIB, a library of mission planning algorithms (centralized task allocation between agents)	PATHOPTIM	Mission planer module
15	ETRA	SOFTWARE	Software platform to manage video streaming from drones and locate damaged assets	N/A	Damaged assets module
16	VIASAT	HARDWARE	Hybrid communication hub	Fixed and mobile antenna under development	Hybrid communication hub
17	VIASAT	SOFTWARE	Multi-mission multi-asset Mission Management Module	Basic single-mission single-asset mission management module	Multi-mission multi-asset Mission Management Module

Ref.	Lead	Type of Exploitable Foreground	Description of Exploitable Foreground	Background needed to use Foreground	Exploitable product(s)
18	UPV	TRAINING CURRICULA	New training curricula for cooperation of different first responder organisations internationally for SIMTAC platform	SIMTAC	Multi-agency training scenarios for first responders' international cooperation
19	CNBOP-PIB	TRAINING CURRICULA	New training curricula for the cooperation of different first responder organisations internationally for CNBOP platform	CNBOP VR platform	Multi-agency training scenarios for first responders' international cooperation
20	RISE	METHODOLOGY	Method of assessing the combined usability of a situation awareness system and the effects of the system on the overall situation awareness of the users.	N/A	Usability and situational awareness assessment method
21	CEL	METHODOLOGY	The methodology evaluates how best to fulfil ethics requirements arising from EC-funded projects, how best to acquire necessary information from partners, how it should be presented, and how updates should be given.	N/A	Methodology for fulfilling EC ethics requirements, human rights and resilience

Table 1: ASSISTANCE foreground Results

Based on this, ASSISTANCE partners followed several discussions to identify the most promising results considering a commercial product perspective, which involved all the industrial and research partners in the project. In this regard, the final list of Key

Exploitable Results (KERs) was produced, after the final analysis which also considered the evaluation of the project results, the innovativeness and how close to the market are the tools demonstrated:

KER nr	KER Name	Description	Type of KER	Partner/s involved
1	**Adapted Situational Awareness Platform (GESTOP)**	Platform allowing for the integration of several sensors data and offering advanced SA and Command and Control (C2) capabilities. It also includes the Portable SA Platform.	Software	UPV
2	**Video Fusion Module**	Software allowing for real-time video flows from UAVs to be overlapped in a GIS map, projecting the field of view on a 3D terrain.	Software	UPV
3	**Damaged Assets Location and Routing (DALR) Module**	This module includes 2 components: - Damaged Assets Location and Routing: Software platform to manage video streaming from drones, locate damaged assets and provide a routing service. - Evacuation Management: Evacuation and intervention times and rotes will be provided based on appropriate optimization and decision algorithms and real-time computer simulation models.	Software	ETRA, UC
4	**Hostile drone neutralisation Module**	Software allowing autonomous UAV to neutralize in a fast and efficient way malicious drones while minimizing collateral damages.	Software	CATEC
5	**Drones' swarms for improved network coverage**	Software allowing cooperative drones' flights to provide ad-hoc network coverage in hostile environments.	Software	CATEC
6	**Chemical Hazards Module**	Software platform allowing for current and predicted gas distribution, calculation and communication of danger zones, human-system interaction, etc.	Software	TNO
7	**Robots Management Module**	Software system that operates on mobile robots and specific payloads (CCTV camera, thermal camera, gas, radioactivity, EMF, …) for disaster response scenarios that is interoperable with modules and toolkits developed in Assistance.	Software	Łukasiewicz-PIAP
8	**Mission Management Module**	The KER includes 2 subcomponents: - PATHOPTIM: PLANLIB, a library of mission planning algorithms (centralized task allocation between agents) - THALES - Multi-mission multi-asset Mission Management Module - VIASAT	Software	THALES, VIASAT
9	**Hybrid communication hub**	Communication system (hardware) for land mobile and nomadic applications,	Hardware	VIASAT

		providing reliable and secure connectivity between the field units, field commanders and the C2 centres. It provides high availability in areas outside of coverage area of traditional communication networks.		
10	**ASSISTANCE system**	Includes all KERs described before.	Software &Hardware	UPV, ETRA, UC, TNO, PIAP, CATEC, THALES, VIASAT

Table 2: ASSISTANCE Key Exploitable Results

Once the previous list was defined, all end-users in the consortium were asked to rate all KERs for the following two aspects:

- **Topic 1:** Willingness to participate as end-user in the further development of the corresponding result after the ASSISTANCE project, leveraging other funding sources.
- **Topic 2:** Willingness to incorporate the market-ready result into your daily practice.

The rating scale goes from 1 to 5:

1- Very low interest

2- Low interest

3- Medium interest

4- High interest

5- Very high interest

All end-users were aware of the functionalities and value added provided by each solution. The following results were obtained as the medium average:

ASSISTANCE Result	**Topic 1 rating (1-5)**	**Topic 2 rating (1-5)**
	Please rate your interest regarding topic 1	*Please rate your interest regarding topic 2*
Augmented Video Fusion Module	4.24	4.22
Chemical Hazards Module	4.14	3.84
Damaged Assets Location and Routing (DALR) Module	4.04	4.29
Robots Management Module	3.90	4.02
Drones' swarms for improved network coverage	3.84	3.98

ASSISTANCE Result	Topic 1 rating (1-5)	Topic 2 rating (1-5)
Adapted Situational Awareness Platform (GESTOP)	3.64	3.58
Hybrid communication hub	3.61	3.73
Hostile drone neutralisation Module	3.53	3.57
Mission Management Module	3.41	3.82

Table 3: ASSISTANCE KERs rate by end-users

The results, presented before, provide an indication of how urgent the need for specific modules is to reach the market, where there are others that should follow more research work, from the end-users viewpoint.

3. Competitive benchmark analysis

This chapter aims to provide a comprehensive benchmarking analysis of the main competitors relevant to ASSISTANCE KERs and highlight the differences and innovative features of the ASSISTANCE solutions. This analysis does not include KER#10, as it is the aggregation of the analysis performed on the rest of the KERs. Competitors were identified based on:

1) Technology watch performed under Task 1.5 – see Annex I,

2) Work implemented through the Horizon Results Booster Service 1-C – see Annex VI, and

3) Technical partners expertise.

In general, the analysis performed below highlights that most of the tools are innovative or even pioneers in the field. All tools have been developed according to the real needs and demands expressed by the First Responders from the beginning of the project, expanding their capabilities and automating existing ones to support enhanced situational awareness.

3.1. Adapted Situational Awareness Platform

Potential market competitors to this KER were investigated in detail, where the most relevant are described below:

- **DroneSense**. Based in Austin, TX, DroneSense offers a mission-critical software platform that enables users to improve situational awareness by centralizing and integrating massive data sets and creating the ideal environment for multiple

agencies to collaborate and work together effectively to face any public safety crisis.

- FlytNow. Multiple camera streams from drones can be viewed from a single operator dashboard, which can also be used to control multiple drones, payloads, camera gimbals, etc.
- Fotokite Sigma. The Fotokite Sigma consists of the Ground Station and the Kite. A tablet or computer runs the Fotokite Live App which shows the real-time thermal and low-light video streams, giving teams actionable information throughout their mission safely and reliably, with no piloting necessary.
- GINA. An interactive map provides constant real-time visibility of all units from a variety of sources including radios, smartphones, GSM or satellite trackers, UAVs and sensors combined in a single interface with advanced features such as the history of movement, data visualization, automatic reporting, video surveillance and data analysis.

Main solutions available focus on increasing situational awareness through the integration of various data streams coming from drones only and are mainly applied to the defence sector. However, the capacity of integrating information from robots, wearable sensors as well as the other innovative modules described below could not be found in the market up to date.

3.2. Video Fusion Module

Potential market competitors to this KER were investigated in detail, where the most relevant are described below:

- ARTEMIS platform. It facilitates the safe and rapid collection and analysis of critical geospatial data, which in turn improves the large-scale mapping capabilities of on-the-ground tactical units—providing them with important safety and efficiency benefits in the field.
- PIX4D. Drone mapping and photogrammetry software tools with a flight app, desktop and cloud platforms.
- Spectrabotics. A solution integrating video and images from a swarm of drones, including high-definition drone video (understanding the physical environment), thermal images, spectral sensors, and LiDAR (appreciation of how the disaster could spread more widely). The drones can synchronise, coordinate and share their data with each other while being controlled by one person or through pre-programmed autonomous features.

- ANAFI platform – SmartCam3D. It overlays valuable geospatial data such as Street Vectors, Road Names, Points of Interest, Polygons, and other pertinent map entities onto real-time, full-motion-video and live video streaming capabilities – providing mission personnel with advanced situational awareness as they perform critical drone operations

The solutions available offer different solutions to overlay video streamed by the drones with other available data, such as geographic information. However, there was no solution found with the capacity of overlaying the video streamed by the drone with the GIS information as a window to real-time reconnaissance of the field.

3.3. Damaged Assets Location and Routing (DALR) Module

To the best of the knowledge of the partners responsible for this innovation, there is no available similar solution in the market yet. This is a pioneering solution that can solve a very specific problem, which is to provide alternative routes based on traffic and damaged assets defined on the map by means of drone video footage. Up to now, available routing solutions just provide the route from point A to point B, not considering potential obstacles that may delay the evacuation of victims. No similar solutions were found in the technology watch performed in T1.5. In other fields, for example in logistics, it is possible to find technologies for route management though they are not suitable for this purpose.

3.4. Hostile drone neutralisation Module

Potential market competitors to this KER were investigated in detail, where the most relevant are described below:

- Milrem Robotics. Autonomous UGV with counter UAS system. This mobile solution provides frontline forces with an independent ability to accurately detect, classify and target loitering munition and other flying objects. It uses advanced Artificial Intelligence and Machine Learning models.
- DroneFox. An omnidirectional drone detection, identification, and mitigation system. DroneFox scans the environment for the radio frequency (RF) signals being transmitted by the drone and/or its controller and provides the user with the capability to detect, identify and mitigate drones.

Two patents were found regarding physical systems for capturing drones:

- WO2020239584A1- SYSTEM METHOD FOR CAPTURING DRONES AND C-UAS - HELMUT SCHMIDT UNIV/UNIV DER BUDERWEHR HAMBURG. - CPC: B64C39/024;F41H11/04;B64C2201/182. The invention relates to a system for

capturing device secured thereon, wherein the capturing device comprises a plurality of capturing means, wherein the plurality of capturing means hang or can be hung, in particular in a curtain-like manner, below the C-UAS, such that a drone to be captured can be caught in the capturing means, and wherein the capturing device is designed to transport a drone, after it has been captured, below the centre of gravity (21,46) of the system and/or the C-UAS. Ref: https://worldwide.espacenet.com/patent/search/family/070847365/publication/WO2020239584A1?q=C-UAS

- WO2020072801A1- ANCHORED AERIAL COUNTERMEASURES FOR RAPID DEPLOYMENT AND NEUTRALIZING OF TARGET AERIAL VEHICLES. - CPC: B64C39/024; IPC- B64C27/08; B64C27/20; B64C39/00; B64C39/02; A system for neutralization of a target aerial vehicle comprises one or more counter-attack unmanned aerial vehicles (UAVs) and an aerial vehicle capture countermeasure tethering the counter-attack UAV(s) to a structure or ground. The counter-attack UAV(s) are operable to capture and neutralize the target aerial vehicle with the aerial vehicle capture countermeasure (e.g., a net). The system comprises an on-board aerial vehicle detection system, and optionally an external aerial vehicle detection system, each detection system having at least one sensor configured to detect the target aerial vehicle in flight. The counter-attack UAV(s) and the associated detection systems may be autonomously operated for detecting and neutralizing a target aerial vehicle. The aerial vehicle capture countermeasure can be moved from a stowed position to a deployed position in response to the coordinated flight of the counter-attack UAV(s). Associated methods and systems are provided. Ref: https://worldwide.espacenet.com/patent/search/family/068345030/publication/WO2020072801A1?q=COUNTER%20UAV

Main available solution focus on the neutralisation of drones via jamming, which is activated once the malicious drone is detected. On the other hand, there are several physical devices that can be used by a drone to neutralise a target aerial vehicle. In all cases, there is no available solution that allows a captor drone to autonomously neutralise a malicious drone.

3.5. Chemical Hazards Module

Potential market competitors to this KER were investigated in detail, where the most relevant are described below:

- EFFECTS. Advanced Process Hazard Analysis. Determine the effects and consequences of any loss-of-containment scenario in the chemical industry.
- SAFER One. Real-time, predictive information to proactively respond to a chemical release and reduce the risk to your people, plant, and community.

The main available solutions do not use real-time weather data, do not take into account uncertainty nor integrate measurements provided by sensors. Such capabilities are incorporated by the Chemical Hazards Module developed by TNO.

3.6. Robots Management Module

There are some mobile robot manufacturers in the EU and worldwide that offer competitive solutions, e.g. Teledyne FLIR, QinetiQ, Telerob, ICOR Technology or ECA Group. Most of them offer closed solutions in a finalized form. Łukasiewicz-PIAP developed a software system that operates on mobile robots and specific payloads for disaster response scenarios and is interoperable with other systems which allows them to be used in cooperation with multiple entities involved in the mitigation. This is a step beyond the current State of Play of mobile security robots that are operated as standalone devices and the data from robots is available only to the operator that is operating the platform. In ASSISTANCE the solution has been targeted at a single robot use case. However, additional care is taken to make sure all features translate well into a multirobot environment. Additional features for dual operation, multirobot coordination and cross-organization cooperation are planned.

3.7. Mission Management Module

Potential market competitors to this KER were investigated in detail, where the most relevant are described below:

- Skyward. Supporting first responders know where they can fly, deploy safely in volatile situations, and quickly track and report flight information.
- RescueTrack. Supporting first responders. More relevant for manned vehicles than the ASSISTANCE solution

There are several solutions commercially available providing drones flights planning. To the best of the solution developers, there is no available solution handling multiple agents, assets and missions in a single planning tool. One other big feature is to be able to integrate easily different types of algorithms (from third parties) for the computation of the mission.

3.8. Hybrid Communication Hub

Potential market competitors to this KER were investigated in detail, where the most relevant are described below:

- Satellite ISPs with Network integration capabilities as StarLink. Viasat system can be deployed with fully Viasat owned terminals, radios, failover, satellite and network. Unified solution under a single ISP, providing end to end support.

4. Final exploitation plans

This section provides the final version of each of the partners' individual exploitation plans, which have been developed during the course of T9.1: Exploitation and IP management. A preliminary version of these exploitation plans was provided in D9.2, hereafter updated. Annex VI includes the report provided by the Horizon Results Booster Services with an interim version of the exploitation plans for the five KERs on top of the list in Table 3. The exploitation plans developed in this section were built based on these inputs. The plans have been ranged in two major groups: Business/Commercial partners and Academic/Research.

On top of the **individual exploitation** of the KERs by each partner owning the IP, the consortium also considers the possibility for the **joint exploitation** of the results on a large scale. The joint exploitation of specific solutions developed in the project is reported in Section 5.

4.1. Business / Commercial partners

4.1.1. ETRA Investigación y Desarrollo, S.A. (ETRA)

ETRA I+D is the high-tech unit of GRUPOETRA, one of the leading industrial groups in Spain. The company business focuses on the implementation and commercialisation of advanced real-time control and information management systems applied to the sectors of energy, mobility, security and public services. ETRA currently offers these solutions to its customers, mainly Public Administrations, but the analysis and management of the

massive heterogeneous information streams generated or processed by those systems is becoming more and more important and an added value that will significantly benefit the customers of ETRA.

The delivery of security solutions for public administration is at the core of the technical and business interests of ETRA, which currently has an annual turnover of approximately 120M€, expected to grow by a 10% per year over the next 5 years. ASSISTANCE is expected to have a direct impact on this business area. We see that the results from the project can be easily targeted to some of the customer segments such as fire brigades, rescue teams, civil protection, LEAs, etc…

Commercial exploitation (i.e. new products and services)

Name	**Description**	**Exploitable outcome**	**Availability**
Sensor Abstraction Service (SAS)	Software system highly interoperable with each FRs organization, aimed to manage all the necessary data exchanges to increase situation awareness during the mitigation of a big disaster	Middleware, interoperability gateway that can be part of various platform managing data during a crisis	TRL6, Current research, it is planned to have a final product two years after finalization of the project
Damaged assets module	Software platform to manage video streamings from drones and locate damaged assets	Module that can be easily integrated as part of a Command-and-Control Platform	TRL6, current research to expand the type and number of assets to be included. Final product expected two years after finalisation of the project

Further R&D potential

Goal	**Means to achieve it**	**Beneficiaries**	**Specific targets**	**Timeline**
Further R&D&I projects	ETRA's personnel involved in ASSISTANCE results are experienced technology developers and business analysts. They are part of the staff to get involved in future	R&D&I team, other companies in ETRA Group	- Participation in Horizon Europe/ISF proposals - Participation in national/regional proposals (already won some relevant proposals during	After the end of the project

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
	R&D&I opportunities.		ASSISTANCE runtime)	
Pre-commercial Procurement/ Public Procurement of Innovation	ETRA's personnel involved in ASSISTANCE results are experienced technology developers and business analysts. They are part of the staff to get involved in future R&D&I opportunities.	- R&D&I team, other companies in ETRA Group - Procures (First Responders/LEAs)	- Participation in public tenders at regional/national level	Done

Knowledge transfer and collaborations

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Partnerships-cooperation in future relevant projects and calls	Partnerships	ETRA	Participate in calls related to our exploitable outcomes	After the end of the project

Contributions to standards

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Promote standard that can facilitate the adoption of ASSISTANCE solutions	CEN Workshop Agreement on "Collaborative Emergency Response – Communication and sharing of operational information among multiple public safety agencies"	Commercial/Business partners and end-users in ASSISTANCE	Support the definition of the CEN Workshop Agreement (CWA)	Ongoing, expected to be finalised 1 year after the project approx.

4.1.2. THALES

THALES, as the main research centre of Thales, aims at transferring the ASSISTANCE results inside the Business Units (BU) that could industrialize and exploit the results. Thales BU has a local and international portfolio with CI operators (airports, energy and critical sites like the health facilities), transport operators (subways, tramways, buses), security forces and medium or large towns and is a major player in CI protection like for Mexico City. Thales expects an increase of 2% of the market share on C4I (Computerized Command Control Communications & Information) systems in the security domain. The global C4I market of $38 billion forecast infrastructure security spending by governments between 2010 and 2020 with 6.2% predicted annual growth in government infrastructure security spending to 2020 (CAGR 2008-2015). The increase is expected few years after the end of the project thanks to innovations from the ASSISTANCE results integrated into Thales products serving as key differentiators in front of our competitors.

Commercial exploitation (i.e. new products and services)

Name	**Description**	**Exploitable outcome**	**Availability**
Mission planner module	PLANLIB, a library of mission planning algorithms (centralized task allocation between agents)	This is a subcomponent of the mission management module	Ready at the end of the project.

Further R&D potential

Goal	**Means to achieve it**	**Beneficiaries**	**Specific targets**	**Timeline**
Further R&D Research	Add Decentralized algorithms for agents' tasks allocation	Thales Research lab	Participation in Horizon project	2023

Knowledge transfer and collaborations

Goal	**Means to achieve it**	**Beneficiaries**	**Specific targets**	**Timeline**
Transfer technology to business lines	Technology transfer agreement	Thales Avionics System	PLANLIB library transfer	2023

4.1.3. VIASAT ANTENNA SYSTEMS, S.A. (VIASAT CH)

Viasat customers among others are public authorities, large system provider companies and UAV operators who use communication services to run mission-critical and sometimes life-critical operations. Viasat expects to integrate some of the ASSISTANCE building blocks inside its system portfolio once industrialized. It will be commercialized within its European business units selling services to public authorities and first responders.

The results coming out of the ASSISTANCE project are expected to be a key driver to develop a vehicular mission kit for emergency vehicles. Before ASSISTANCE, VAS already started to develop communication solutions for land vehicles by integrating its connectivity solutions on ambulances (ESA Satcare project) and on Border Patrol vehicles (BES 2016 Camelot project). Through ASSISTANCE, VAS is intending to build partnership with Vehicle manufacturers willing to enable their vehicles to ensure more efficient missions in the emergency mitigation domain. The ASSISTANCE project is also a good opportunity to validate end to end communication system within demonstration with the ASSISTANCE end user community. Once the technology is on a relatively high TRL level and has been successfully demonstrated in prototypes, Viasat seeks cooperation with the industry for commercialization.

Commercial exploitation (i.e. new products and services)

Name	Description	Exploitable outcome	Availability
Hybrid communication hub	Mobile antenna that can be used for land mobile applications, nomadic applications (FRs, transportation, military, etc…)	Hybrid communication hub	Under development, when the project finishes it will be a tested prototype (TRL6). 1-2 years after the project needed for exploitation
Multi-mission multi-asset Mission Management Module	Mission management system that can be used for robots, drones, as well as multiple agents	This is a subcomponent of the mission management module which is able to manage different type of assets. This subcomponent is also able to manage algorithm workflow to compute different type of missions (based on targets, areas constraints)	Under development, when the project finishes it will be a tested prototype (TRL6).

Further R&D potential

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
New R&D project	Engineers involved in this project learn a lot on this type of project can bring this knowledge on others H2020	R&D teams	Participation in other H2020 programs	After the project
New features on Mission Management Module	Work with partners to integrate other type of algorithms. Improve the capabilities of integration with partners in terms of algorithms Develop our own algorithm for mission computation	Viasat product	Participation in other H2020 programs	After the project

Knowledge transfer and collaborations

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Partnership cooperation in order to make relevant evolution in the workflow of the mission computation	Partnership	Viasat	H2020 programs	After the end of this project
Partnership cooperation to add relevant constraint to algorithm. Develop a flexible user interface (web based) to allow user to define targets, areas constraints, …) for the computation of the mission	Partnership	Viasat	H2020 programs	After the end of this project

4.1.4. CYBERETHICS LAB SRLS (CEL)

CEL will advance its methodology for assessing relevant projects in the future from the ethical standpoint, particularly with reference to the ethics models to assess R&D in the field of DRS technologies. More in detail, in WP8 CEL has designed and created an ethics checklist to be used during the pilot's deployment with two scopes: (1) a self-assessment tool for the leaders of pilots to control the compliance with EU ethics frameworks, and (2) a tool for social researchers to assess the respect of human rights and the degree of resilience with respect to the ASSISTANCE technology. This methodology will enrich CEL offering in the social research field as well as in the consultancy for its clients and will create new opportunities for enlarging market segments and customer targets for its consultancy services.

Commercial exploitation (i.e. new products and services)

Name	**Description**	**Exploitable outcome**	**Availability**
Methodology for fulfilling EC ethics requirements, human rights and resilience	The methodology evaluates how best to fulfil ethics requirements arising from EC-funded projects, how best to acquire necessary information from partners, how it should be presented, and how updates should be given.	Methodology for fulfilling EC Ethics Requirements as well as assessing the respect of human rights and the degree of resilience with regards to the ASSISTANCE technology	This methodology has already been implemented in other projects similar to ASSISTANCE. It has been tailored down for the specific project domain.

Further R&D potential

Goal	**Means to achieve it**	**Beneficiaries**	**Specific targets**	**Timeline**
Further R&D projects	- Tailor down the methodology to the specific project domain - Create a network of stakeholders for future research opportunities	CEL	- Participation in Horizon Europe - Participation in national founding programs	After the end of the project
Increase services offering	- Increase the maturity and completeness of the assessment method	CEL	- Direct contact with national public authorities/practitioners	After the end of the project

	- Create a network of potential partners/customers		- Partnerships with companies already present in the market - Participation to conferences and fairs	

Knowledge transfer and collaborations

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Increase awareness about ethics and human rights	Papers, videos, participation to conferences	- Research community - First responders - Decision makers - Technology providers	- Academic staff/Research organisation in the field - Public authorities and practitioners in the filed - Technology providers of situational awareness solutions	During and after the end of the project

4.2. Academic / Research partners

4.2.1. Universidad Politécnica de Valencia (UPV)

UPVLC as an academic partner will use the knowledge gained during the ASSISTANCE project for improving and updated some of the subjects and masters that the distributed real time systems lab (DRTSL) members teach at UPVLC telecommunications school (real time video draping on GIS, integration of IP sensors using advanced network capabilities, etc.)

In addition, DRTSL will establish collaboration agreements with local and national FRs organizations and public bodies for tailoring some of their modules developed during ASSISTANCE to their specific needs.

Finally, DRTSL will try to include some of their project results in the current portfolio of Tiempo Real Sistemas (TRS) Company. TRS is a small technological company (spin off) lead by the DRTSL members that needs to offer really competitive product to its customers in order to make them more competitive in the security market lead by large companies. The DRTSL participation in ASSISTANCE will improve the innovative solutions proposed for TRS products portfolio, especially to evolve the current solution offered on SA applications for FRs.

Exploitable results

Name	Description	Exploitable outcome	Availability
GESTOP or GESTOP modules stand alone	Evolution and adaptation of GESTOP to first responders needs	ASSISTANCE Situational Awareness Platform. Integrates information from all modules, robots, sensors and drones.	TRL6 by the end of the project. It will require extra investment after the project to reach TRL 7 and become ready for transferring it to the industry or to the Ministry of Defence through specific agreements already in place with UPV.
Video fusion module	Video fusion module	Innovative module allowing first responders to overlap drone video on the GIS map	
FRs Wearable Sensors	FRs Wearable Sensors data management	Specific module allowing the visualisation and management of data collected from wearable sensors	
Portable SA platform	Portable SA platform	Instantiation of the ASSISTANCE SA platform on a rugged tablet for use on field	
New training curricula for SIMTAC platform	New training curricula for cooperation of different first responder organisations internationally for SIMTAC VR platform	Multi-agency training scenarios for first responders' international cooperation	Ready by the end of the project

Further R&D potential

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Further R&D projects	Identify partners with interest and experience in similar or related fields of research	UPV	- Participation in Horizon Europe - Participation in national proposals	After the end of the project

Educational/Academic impact

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Increase academic/educational impact of researchers	Publication of articles in academic journals	Research community	-Technical journals -Workshops/ Conferences -UPV Researchers	During and after the end of the project
Increase awareness about the need and added value of ASSISTANCE technologies	Workshops, conferences, webinars, and online events	First Responders Organisations	- Certified system integrators -Academic staff/Research organisation in the field -Technology providers of situational awareness solutions	During and after the end of the project

Knowledge transfer and collaborations

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Transfer technology to spin-off	Technology transfer agreement	TRS	1 exploitable result transferred	2023
Partnerships-collaborations in future relevant projects	Partnerships	UPV	Participate in calls related to our exploitable outcomes	After the end of the project

4.2.2. Fundación Andaluza para el Desarrollo Aeroespacial (FADA-CATEC)

For CATEC, the project is a great opportunity to develop new technologies related to security applications taking into consideration the use of UAS. This will increase our positioning in security applications with UAS applying new technologies that are not yet on the market. CATEC expects that this increase in positioning will have a first exploitation result for us, which is to increase our participation in further R&D projects (both national and European) related to security.

CATEC research centre is committed to the increase of the technology level of new developments. However, CATEC as a research centre does not industrialize or commercialize any solution or system directly by itself. Our approach is to increase the TRL of technologies internally, maintaining IP rights, and once the technology is close to TRL 6 and has been successfully demonstrated in relevant scenarios, CATEC will start looking for a company to industrialize and commercialize a solution based on the new technology. Then, the final objective, once the technology is mature enough, is to get an agreement where the transfer of technology is performed in return for licence fees or royalties. However, there is no standard procedure since it is studied case by case.

In ASSISTANCE since the new technologies to be developed (autonomous neutralization drone and network coverage using a swarm of drones) do not have yet a high TRL, the idea is to increase the TRL of these technologies during the project, and also increase the awareness of the existence of these technologies (through demonstration and the project dissemination activities) among potential industries that can exploit them commercially.

Then, the first step of the exploitation plan for CATEC is to attract the attention of potential industries for the commercialization of the technology. Once this happens, the next steps are: to sign an exploitation agreement, start a new project where a pre-commercial version of the system is validated in an operational scenario (TRL 7), and support the company in the and adaptation of the technology to the different identified business cases.

Exploitable results

Name	**Description**	**Exploitable outcome**	**Availability**
Hostile drone neutralisation Module	Software system allowing autonomous UAV to neutralize in a fast and efficient way malicious drones while minimizing collateral damages.	Software component that can be part of dedicated platform for malicious drone neutralisation	TRL 6 at the end of the project. Extra investment will be required after the project to reach TRL 7 and become ready for transferring it to the industry
Drones' swarms for improved network coverage	Software allowing cooperative drones' flights to provide ad-hoc network coverage in hostile environments.	Software component interoperable with various drone types, working as a gateway to extend the network	

Further R&D potential

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Further R&D projects	Identify possible partners and contact related known companies as: Leonardo, Thales, ESA Space Solutions or Airbus BizLab	CATEC	- Collaboration with related known companies. - Participation in national and european proposals	After the end of the project

Educational/Academic impact

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Contribute to the research community with new publications	Publication of articles in academic journals and conferences	Research Community	-Technical Journals -Workshops/ conferences	During and after the course of the project

Knowledge transfer and collaborations

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Transfer technology to spin-off or existing company with industrial scope	Find funding for a spin-off or contact related known companies as: Leonardo, Thales, ESA Space Solutions or Airbus BizLab	CATEC, Spin-off/ interested company	DATAN and DSAC	After the end of the project

4.2.1. Sieć Badawcza Łukasiewicz – Przemysłowy Instytut Automatyki i Pomiarów PIAP (Łukasiewicz-PIAP)

Łukasiewicz-PIAP is a leading Polish research institute active in the fields of robotics, automation, machine vision and measurements systems, with vast experience in developing unique solutions in the field of industrial automation, security and defence technologies, information technology, industrial and mobile robotics as well as measuring devices.

For over 15 years Łukasiewicz-PIAP is a successful developer of mobile robots used in EOD/IED and SAR missions. Research performed at Łukasiewicz-PIAP facilities is concentrated on mobile autonomous systems, manipulation and manipulator construction, innovative human machine interfaces, data fusion, image processing, CBRNe detection and environmental sampling systems.

Łukasiewicz-PIAP as the research and industry partner will exploit the ASSISTANCE results both by implementing further R&D works in the area of robotics for security and defence and by introducing in the portfolio of the commercial products offered by Łukasiewicz-PIAP – mobile robots and accessories for special forces.

Łukasiewicz-PIAP main customers are public authorities and LEAs in Poland, the EU and worldwide and its products are showcased regularly at the biggest trade events in Europe (eg. EUROPOLTECH, MSPO, MILIPOL, Eurosatory) and beyond (eg. Asia, Middle East). Apart from the large events, Łukasiewicz-PIAP is also very active in establishing bilateral contacts with end user organisations and closely monitors all the procurement opportunities, successfully delivering its mobile robots and special equipment to security end-users for over 10 years. The relevant results of ASSISTANCE will be included in the marketing activities of Łukasiewicz-PIAP's line of products for security and pushed towards commercialisation.

Commercial exploitation (i.e. new products and services)

Name	**Description**	**Exploitable outcome**	**Availability**
Robots Management Module	Software system that operates on mobile robots and specific payloads for disaster response scenarios and is interoperable with other systems which allows them to be used in cooperation with multiple entities involved in the mitigation.	Software (upgraded system on top of the regular security inspection robots) that operates on mobile robots and specific payloads (sensors, end effectors, etc.)	TRL6, ongoing research, estimated time to market is between 2 years for early adopters to 4 years for general availability of market proven solutions.

Further R&D potential

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Further R&D&I projects	Łukasiewicz-PIAP's team developing the ASSISTANCE results are experienced technology developers, involved also in creation of future R&D&I opportunities.	Łukasiewicz-PIAP's R&D&I team R&D&I community, including security/first response practitioners	- Participation in Horizon Europe/ISF proposals - Participation in national/regional proposals	After the end of the project

Knowledge transfer and collaborations

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Partnerships-cooperation in future relevant projects and calls	Partnerships	Łukasiewicz-PIAP	Participate in calls relevant to the exploitable outcomes	After the end of the project

4.2.2. NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (TNO)

The TNO exploitation strategy for the knowledge acquired during the participation in ASSISTANCE is twofold. On the one hand, TNO as a research partner will improve its skills and knowledge in the systematic development and evaluation of design knowledge for creating human-centred systems, as well as the development of the hazard module, to leverage existing and future projects. It is anticipated that developing this module for hazard calculations of dynamic and uncertain data will provide additional competence for TNO; second, TNO, as a research institute, does not commercialize any solution or system itself, but, once the technology is on a relatively high TRL level and has been successfully demonstrated in prototypes, TNO seeks cooperation with industry for commercialization.

TNO will use the networking opportunities provided by the ASSISTANCE consortium to find new projects and form new consortia.

Exploitable results

Name	Description	Exploitable outcome	Availability
Chemical Hazard Module	Software platform allowing for current and predicted gas distribution, calculation and communication of danger zones, human-system interaction, etc.	Software solution interoperable with data collected by drones/robots and existing C2 solutions	TRL 6 at the end of the project. Extra investment will be required after the project to reach TRL 7 and become ready for transferring it to the industry.

Further R&D potential

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Further R&D projects	Identify partners with interest and experience in similar or related fields of research	TNO	- Participation in Horizon Europe	After the end of the project

Educational/Academic impact

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Increase educational impact of researchers	Publications of articles and presentations in workshops	Research community, first responders	-First responder community	During and after the end of the project

Knowledge transfer and collaborations

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Partnerships-cooperation in future relevant projects and calls	Partnerships	TNO	Participate in Horizon Europe calls or other relevant calls	After the end of the project

4.2.3. INSTITUUT FYSIEKE VEILIGHEID (IFV)

The Institute for Safety (IFV) exploitation strategy is to use the knowledge gained from the ASSISTANCE project, particularly in the form of what the effects are for the FR's when using these new SA capabilities. The Dutch FR's are willing to use new aids like

drones, sensors and robots but have a real need for a suitable SAP. The ASSISTANCE project will provide complementary technological possibilities with regard to the developed SAP.

Secondly IFV, would like to offer her Virtual Reality platform to First Responders within Europe and, in return, would like to use other VR platforms available in Europe for the Dutch FR's.

IFV will use the networking opportunities provided by the ASSISTANCE consortium to find new projects and form new consortia.

Exploitable results

Name	**Description**	**Exploitable outcome**	**Availability**
New training curricula for ADMS platform	New training program for the collaboration of various first responders in a single scenario.	New training curricula in the ADMS virtual reality platform	Ready after the end of the project

Further R&D potential

Goal	**Means to achieve it**	**Beneficiaries**	**Specific targets**	**Timeline**
Further R&D projects	Identify partners with interest and experience in similar or related fields of research	IFV	- Participation in Horizon Europe calls - R&D programmes funded by Ministry of Justice and Safety in the Netherlands - Exchange with Swedish medical, fire and police departments of tools and ideas	After the end of the project

Educational/Academic impact

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Training for first responders in the NT with curricula developed	Engage agencies interested in the program	IFV	Dutch first responders	Already in progress
Increase awareness about ASSISTANCE results internally	Workshops/meeting with presentations and demos about the training curricula developed	IFV	IFV board members	After the end of the project

Knowledge transfer and collaborations

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Partnerships-collaborations in future relevant projects	Partnerships	IFV	Participate in calls related to our exploitable outcomes	After the end of the project

4.2.4. CENTRUM NAUKOWO-BADAWCZE OCHRONY PRZECIWPOZAROWEJ IM. JOZEFA TULISZKOWSKIEGO - PANSTWOWY INSTYTUT BADAWCZY (CNBOP-PIB)

CNBOP-PIB is a research institute of the State Fire Service, whose mission is to ensure the general safety of the state, in particular in the field of fire protection, environmental engineering and civil protection.

CNBOP-PIB has over 40 years of experience in the market of training services in the field of fire protection, crisis management and civil protection. The institute organises open and closed trainings, conferences and seminars and workshops. Trainings are characterized by an optimal selection of issues - both for beginners and more advanced in the area in question. The institute conducts training for staff performing public tasks in cooperation with state organizations and universities. All trainings in CNBOP-PIB offer, are conducted on the basis of current legal acts and European standards.

CNBOP-PIB would like to use knowledge gather during ASSISTANCE project especially regarding use of Virtual trainings. Polish end-users are willing to use tools proposed in ASSISTANCE project both in active and training way. Polish end-users are aware of the

current shortcomings, especially in the field of situational awareness, that can be resolved through ASSISTANCE elements such as wearables, UAVs and robots.

CNBOP-PIB will use the networking opportunities provided by the ASSISTANCE consortium to find new projects and form new consortia.

Exploitable results

Name	Description	Exploitable outcome	Availability
New training curricula for CNBOP-PIB platform	New training program for the collaboration of various first responders in a single scenario.	New training curricula in the CNBOP-PIB virtual reality platform	Ready after the end of the project

Further R&D potential

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Further R&D projects	Identify partners with interest and experience in similar or related fields of research	CNBOP-PIB	Participation in Horizon Europe calls	After the end of the project

Educational/Academic impact

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Training for first responders in Poland with curricula developed	Engage agencies interested in the program	CNBOP-PIB	Polish first responders	After the end of the project
Increase awareness about ASSISTANCE results	Engage others First responders during meetings, conferences etc.	CNBOP-PIB	First responders	After the end of the project

Knowledge transfer and collaborations

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Partnerships-collaborations in future	Partnerships	CNBOP-PIB	Participate in calls related to	After the end of the project

relevant projects			our exploitable outcomes	

4.2.5. Universidad de Cantabria (UC)

Being an academic institution the University of Cantabria will focus its effort on a twofold exploitation strategy:

1. Reinforcing the **Scientific presence** through papers, posters, publications in JCR journals, lectures, etc., and the **communication to the public** by other means like social media channels. Fostering UC's research at the scientific and social level will contribute to better positioning for achieving available funds.
2. **Integrating the results into further research** with the intention of using the results in publications and contributions to the scientific community and eventually into new research proposals, projects and activities involving domains such as critical infrastructures, policy making, etc.

Nevertheless, a regular commercial strategy will not be diminished by searching for further ways of reaching society for example:

3. **IPR licensing.** The UC's exploitable results will be included in the university portfolio of outcomes to be devoted to the transfer of scientific knowledge to society. Furthermore, and taking into consideration the evident commercial constraints that universities have to make direct commercial exploitation, they can be profited as part of ASSISTANCE or other project results as DALR, to maximize the market uptake and take advantage of the synergies between consortium partners.

Exploitable results

Name	Description	Exploitable outcome	Availability
Evacuation Module	Evacuation and intervention times and routes will be provided based on appropriate optimization and decision algorithms and real-time computer simulation models.	This is a subcomponent of the Damaged Assets Location and Routing (DALR) solution	TRL 6 at the end of the project. Extra investment will be required after the project to reach TRL 7 and become ready for transferring it to the industry.
GELS Methodology	GELS Toolkit for self-assessment, monitoring and analysis of gender, ethical, legal and societal aspects.	Methodology that can be easily applied to any organisation/project.	Ready at the end of the project.

Further R&D potential

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Further R&D projects	Identify partners with interest and experience in similar or related fields of research	UC	- Participation in Horizon Europe and other potential calls like Union Civil Protection Mechanism (UCPM). Participation in National/regional calls	After the end of the project

Educational/Academic impact

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Increase academic/educational impact of researchers	Publication of articles in academic journals	Research community	- Technical/societal journals -Workshops/ Conferences -UC Researchers	During and after the end of the project
Increase awareness about the need and added value of ASSISTANCE technologies	Workshops, conferences, webinars, and online events	First Responders Organisations, Local authorities	-Academic staff/Research organisation in the field -Technology providers of emergency preparedness and planning solutions	During and after the end of the project

Knowledge transfer and collaborations

Goal	Means to achieve it	Beneficiaries	Specific targets	Timeline
Partnerships-collaborations in future relevant projects	Partnerships	UC	Participate in calls related to our exploitable outcomes	After the end of the project

4.2.6. RISE RESEARCH INSTITUTES OF SWEDEN AB (RISE)

The RISE Safety and Fire Research exploitation strategy is to use the knowledge gained from the ASSISTANCE project, particularly in the form of new measurement/evaluation methodologies and in human factor influences for technological development, to leverage existing and future projects. RISE has already begun work on a future technology evaluation platform designed to link rescue services, researchers, and industry to find the best possible solutions for fire-based incident response challenges. The ASSISTANCE project will provide complementary technological depth to this platform. It is anticipated that new measurement and analysis techniques for evaluating the usability, usefulness, and cost effectiveness of situation awareness technology for first responders will provide additional competence for RISE Fire Research.

RISE will use the networking opportunities provided by the ASSISTANCE consortium to find new projects and form new consortia. In the first 10 months of the project, there have been three invitations from ASSISTANCE partners to respond to EU calls for proposals.

Exploitable results

Name	**Description**	**Exploitable outcome**	**Availability**
Usability and usefulness assessment method	Method of assessing the combined usability of a situation awareness system and the effects of the system on the overall situation awareness of the users.	RISE will use this methodology in future projects.	Ready at the end of the project.
Cost-benefit analysis method	Method of assessing the value of an SA system to society.	RISE will use this methodology in future projects.	Ready at the end of the project.

Further R&D potential

Goal	**Means to achieve it**	**Beneficiaries**	**Specific targets**	**Timeline**
Further R&D projects	Identify partners with interest and experience in similar or related fields of research	UC, GB, UPV	Participation in Horizon Europe projects	After the end of the project.

Educational/Academic impact

Goal	**Means to achieve it**	**Beneficiaries**	**Specific targets**	**Timeline**

Improvements in fire safety science	Methodology for assessing usability, usefulness, and the cost effectiveness of new SA technology will contribute to first responder capabilities, effectiveness and safety.	First responders, students, researchers	Fire fighters, students and researchers doing fire safety research.	During and after the end of the project.

Knowledge transfer and collaborations

Goal	**Means to achieve it**	**Beneficiaries**	**Specific targets**	**Timeline**
Partnerships-collaborations in future relevant projects	Partnerships	UC, GB, UPV, TNO	Participate in calls related to our exploitable outcomes	After the end of the project

Contributions to standards

Goal	**Means to achieve it**	**Beneficiaries**	**Specific targets**	**Timeline**
Promote standards that can facilitate the adoption of ASSISTANCE solutions	CEN Workshop Agreement on "Collaborative Emergency Response – Communication and sharing of operational information among multiple public safety agencies"	Commercial/Business partners and end-users in ASSISTANCE	Support the definition of the CEN Workshop Agreement (CWA)	Ongoing, expected to be finalised approximately 1 year after the project ends.

5. Business Plan and Commercialisation Strategy

This section contains the ASSISTANCE Business Plan embedding the individual partners' exploitation plans of the project Key Exploitable Results, defined in Section 2.2. Public procurement will act as the main tool to reach the commercialisation of the two main results:

1) ASSISTANCE Situational Awareness Platform (SAP), and

2) ASSISTANCE Advanced Training Network.

Pre-commercial procurement will be needed as an enabler to increase the TRL of the ASSISTANCE SA Platform and facilitate commercial deployment, while Public Procurement of Innovation will facilitate the participation of end-users throughout Europe in the Advanced Training network. These aspects have been considered in this section.

5.1. Business Model Canvas

5.1.1. Customer analysis

5.1.1.1. ASSISTANCE Situational Awareness Platform (SAP)

As preliminary discussed in D9.2, **firefighters** are the primary first responder customer of the ASSISTANCE SAP. In 2020, 262 200 persons were employed as firefighters in the 22 EU Member States with available data, representing 0.1% of total employment in these countries[2]. The vast majority of them were men (97%) and almost half of them were aged 35-49 (47%). Those aged less than 35 accounted for around one quarter (27%) as well as those aged 50 years old or over (26%). Among the 22 EU Member States with available data, Romania and Estonia recorded the highest shares of firefighters in their workforces (all 0.4 % of total employment). France leads the ranking with 42,000 professional firefighters, followed by Italy (26,000), Spain (19,886), the Czech Republic (10,797) and Belgium (5,250)[3].

Even though firefighters are the primary customer of the ASSISTANCE SA Platform, there are potential adaptations and extensions that can be made to make the results marketable to other first responder organisations such as Law Enforcement Agencies, Medical Emergency Services, Civil Protection, etc… In fact, **Law Enforcement Agencies and Medical Emergency Services** are included in the consortium and familiarised with the ASSISTANCE results.

[2] https://ec.europa.eu/eurostat/web/products-eurostat-news/-/edn-20210504-1
[3] https://www.epsu.org/article/numbers-firefighters-country-and-category

- Law enforcement Agencies (LEAs): There are over 1.5 million police officers in the EU[4]. Italy leads the ranking with nearly 274k police officers, followed by Germany (248k), France (176k), Spain (168k) and Greece (51k)[5].
- Medical Emergency Service: The annual number of emergency calls processed by medical emergency services rise to 8.5M calls in the UK, 3.5M in Belgium, 3.5M in Turkey, 2.2M in the Czech Republic and 2M in Hungary[6].

Regarding the needs of each customer segment described above, they were collected and used as technical requirements (see D2.2) for the development of the ASSISTANCE SA Platform. In general, the need is to have suitable technology allowing the collection, processing and understanding of relevant disaster information for quick and efficient decision-making.

5.1.1.2. ASSISTANCE Advanced Training Network

The Advanced Training Network developed in ASSISTANCE supports collaborative training of the various first responders involved in a disaster. For this reason, the same customer segments described in the previous section apply here as well. However, since the objective, in this case, is their training, their needs are also different. Based on the end-user requirements evaluation in deliverable D2.2, the following main needs were identified:

- Better engagement of the end-user through the use of a wide variety of methods and tools, including virtual and/or augmented reality
- Incorporation of feedback loops into the training curricula
- Improve perception capabilities when using virtual or augmented reality

It should be noted that ASSISTANCE focuses on the (non-technical) development of new training curricula allowing the collaboration of different first responders from different countries in Europe.

[4] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Police,_court_and_prison_personnel_statistics#:~:text=In%202019%2C%20there%20were%20about,been%20largely%20stable%20since%201999.
[5] https://www.statista.com/chart/16515/police-officers-per-100000-inhabitants-in-the-eu/
[6] https://www.nivel.nl/sites/default/files/bestanden/Rapport_ambulance_care_europe.pdf

5.1.2. Key Stakeholders

The key identified stakeholders that will allow the industrialisation of the ASSISTANCE solutions are the following:

1) System integrators of Command and Control (C2) solutions
2) Drone manufacturers
3) Robot manufacturers
4) Virtual/Augmented/Mixed Reality providers
5) Certified Training and Education Centre

Within the consortium, some of the commercial/business partners are part of one or more of the above-mentioned categories and, therefore, could consider the possibility of establishing a joint exploitation / licensing agreement with the relevant research partner. Some of the benefits brought by ASSISTANCE to the stakeholders mentioned above are:

- Expanded situational awareness metrics, measures and devices supported at Command and Control systems,
- Increased deployment capacity to a large set of scenarios, including limited network coverage,
- Support collaboration of different first responder organisations when mitigating a disaster.

In fact, the Virtual Reality technology behind the Advanced Training Network is owned by specific technology providers in this sector. This is the reason why the training curricula developed in ASSISTANCE would be ready to be deployed as a service right after the end of the project. There are already some Certified Training and Education Centres within the end-user organisations in the consortium that can deliver such services.

5.1.3. Value proposition

ASSISTANCE value propositions have been defined and validated based on the needs and requirements expressed by the customers in deliverable D2.2, but also the financial potential that will be presented in Section 5.3 and the market environment as reflected in Section 3.

ASSISTANCE Situational Awareness Platform (SAP) is open and interoperable, being easily deployed with legacy systems at the end-user premises and with other situational awareness modules not in the scope of this project. The following value propositions have been identified:

- Real-time processing and analysis of heterogeneous data streams,
- Activate/improve network coverage in hostile environments to support communication between agents deployed on the field and with the control centre,
- Integration of multiple data sources, including robots, drones and wearable sensors,
- Real-time reconnaissance of the disaster area and follow-up of ongoing mitigation actions,
- Optimal evacuation routes considering ongoing disaster effects,
- Seamless management of multiple drones, robots and agents' deployment during a mission,
- Remote, quick and effective malicious drone neutralisation.

On the other hand, the **ASSISTANCE Advanced Training Network** consists of immersive capabilities such as virtual reality technology where collaborative training curricula on different disaster scenarios have been implemented. The following value propositions have been identified:

- Cooperation of multiple first responder's organisations on a single disaster scenario,
- Multilingual training curricula,
- A large number of complementary scenarios,
- Transnational training capabilities with first responders from various countries.

5.1.4. Business models

This section provides the final version of the ASSISTANCE Business model through the different components, usually reflected in a Business Model Canvas, in the two sections outlined below, comprising the SAP and the Advanced Training Network. The most suitable business model solution was initially proposed in the DoA and considered as a preliminary step in the procurement by first responders' agencies in Europe, assuming that the ASSISTANCE SAP would need to follow a PCP process where participating members would have royalty rights in the commercialisation phase. Such royalties won't be applicable to the Training Network, since the R&D phase is completed and only deployment effort is required. More details about both processes are given in Section 8 and Section 9.

The final version presented in this section considers the results and findings from the pilot demonstrations and the end-user evaluation of the ASSISTANCE solutions. For the ASSISTANCE SAP and the Advanced Training Network, the following questions were addressed in each box of the Business Model Canvas:

- **Customer Segments.** Who are your customers? Describe your target audience in a couple of words [Described in more detail in Section 5.1.1.]
- **Channels.** How are you going to reach your customers?
- **Customer Relationships.** How often will you interact with your customers?
- **Key Partners.** What are your key partners to get a competitive advantage? [Described in more detail in Section 5.1.2.]
- **Key Activities.** What are the key steps to move ahead with your customers?
- **Value Propositions.** How will you make your customers' life happier? [Described in more detail in Section 5.1.3.]
- **Key Activities.** What are the key steps to move ahead with your customers?
- **Key Resources.** What resources do you need to make your idea work?
- **Revenue Streams.** How are you planning to earn money (e.g. revenues from sales, fees for commercial use by third-parties, consultancy, training, etc…)
- **Cost Structure.** What are you planning to spend on product development and marketing (e.g. Personnel costs for R&D, sales & marketing, customer support (including development, customization, training, consultancy, technical support) and management teams, licenses, Cloud/server hosting, etc…)?

5.1.4.1. ASSISTANCE Situational Awareness Platform (SAP)

The table below lists all components of the Business Model Canvas for the ASSISTANCE Situational Awareness Platform (SAP):

<table>
<tr>
<td rowspan="2">Key Partners
1) System integrators of Command and Control (C2) solutions
2) Drone manufacturers
3) Robot manufacturers</td>
<td>Key Activities
• Finalise development and adaptation according to the final end-user feedback in ASSISTANCE project
• Complete integration and deployment in the end-user premises
• Validation in a real operational demonstration
• Training and consultancy
• Legal compliance and certification
• Build transferability framework to ease the customisation and deployment across Europe</td>
<td rowspan="2">Value Propositions
• Real-time processing and analysis of heterogenous data streams
• Activate/improve network coverage in hostile environments to support communication between agents deployed on field and with the control centre
• Integration of multiple data sources, including robots, drones and wearable sensors
• Real-time reconnaissance of the disaster area and follow-up of ongoing mitigation actions
• Optimal evacuation routes considering ongoing disaster effects
• Seamless management of multiple drones, robots and agents' deployment during a mission
• Remote, quick and effective malicious drone neutralisation</td>
<td>Customer Relationships
• Commercial demonstration and hands-on training sessions
• Customer support including consultancy activities, customisation, integration with legacy systems, software updates and maintenance</td>
<td rowspan="2">Customer Segments
1) Firefighters as main target customer
2) Law Enforcement Agencies
3) Medical Emergency Service
* Customer analysis provided in section 5.1.1</td>
</tr>
<tr>
<td>Key Resources
• Cloud or local server hosting infrastructure
• Access to devices already used by first responders, such as wearable sensors, drones, etc…
• Marketing and commercial expertise
• IPR expertise</td>
<td>Channels
• Engagement with EU buyers through pre-commercial procurement
• Direct procurement (sales) to first responders
• Procurement (sales) cooperation with system integrators, drone manufacturers or robot manufacturers</td>
</tr>
</table>

Cost Structure	**Revenue Streams**
• Deployment, integration and maintenance costs, including technical team, equipment and certifications • Sales&Marketing, customer support, management teams • Software licenses • Cloud/server hosting costs for the ASSISTANCE platform • PCP end-user participants royalty fee	• Upfront fee from direct sales (procurement) of the ASSISTANCE SAP • Subscription fee (yearly) from maintenance, consultancy and training for ASSISTANCE SAP buyers • Royalty fee from system integrators, drone or robot manufactures sales

Table 4: ASSISTANCE SAP Business Model Canvas

5.1.4.2. ASSISTANCE Advanced Training Network

ASSISTANCE aims to establish a training network for FRs at European Level based on innovative training curricula using existing technologies such as: mixed, virtual and augmented reality. In this regard, the exploitable result will be the established network with the training curricula developed, while the VR hardware and software will be licensed by the technology provider to the Certified Training and Education Centre that provides the training service.

<table>
<tr>
<td rowspan="2">Key Partners
• Virtual Reality providers
• Certified Training and Education Center</td>
<td>Key Activities
• Build ASSISTANCE community of first responders in the Training Network
• Increase number of users in the network through demonstrations and free trial sessions.
• Develop detailed sales and marketing strategy</td>
<td rowspan="2">Value Propositions
• Cooperation of multiple first responder’s organisation on a single disaster scenario
• Multilingual training curricula
• Large number of complementary scenarios
• Transnational training capabilities with first responders from various countries</td>
<td>Customer Relationships
• Commercial demonstration and hands-on training sessions
• Customer support including consultancy activities, customisation of scenarios, software updates and maintenance</td>
<td rowspan="2">Customer Segments
1) Firefighters as main target customer
2) Law Enforcement Agencies
3) Medical Emergency Service
* Customer analysis provided in section 5.1.2</td>
</tr>
<tr>
<td>Key Resources
• Cloud or sever hosting infrastructure
• Virtual reality hardware and software
• Marketing and commercial expertise</td>
<td>Channels
• Engagement with EU buyers through Public Procurement of Innovation
• Direct service sales to first responders
• Sales cooperation with Virtual Reality providers and/or additional Certified Training and Education Centres (who may use the developed training curricula)</td>
</tr>
<tr>
<td colspan="3">Cost Structure
• Sales&Marketing, customer support, management teams
• Virtual Reality Software and Hardware license, including cloud/server costs</td>
<td colspan="2">Revenue Streams
• Training service fee per each participating first responder (external to the network)
• Royalty fee from Virtual Reality providers or Certified Training Centres
• Consultancy and premium end-users</td>
</tr>
</table>

Table 5: ASSISTANCE Advanced Training Network Business Model Canvas

5.2. Commercialisation Strategy

As presented in previous sections, the business plan and go-to-market strategy have been segmented into the two main results of the project:

1. **ASSISTANCE Situational Awareness Platform (SAP)** targets Firefighters as the main customer, and Law Enforcement Agencies and Emergency Medical Services as secondary customers. Key partners to reach these customers will be System integrators of Command and Control (C2) solutions, as well as drone and robot manufacturers.
2. **ASSISTANCE Advanced Training Network** targets the same customer segments as SAP. However, the key partners to reach the customers, in this case, would be Virtual/Augmented/Mixed Reality providers and Certified Training and Education Centres.

The Commercialisation Strategy will be based on the ASSISTANCE Business Model defined hereinbefore in Section 5.1. The exploitable results described in Section 2 had a major impact on the business plan prepared and will be also considered within the commercialisation strategy presented in this section. Another key factor when defining the pathway for market uptake is a comprehensive risk assessment to identify those elements that could make the plan fail and enforce appropriate mitigation actions. This is presented in the following.

5.2.1. Risks analysis and mitigation measures

Two Risk Assessment Maps are provided in this section, corresponding to each of the main ASSISTANCE results. The description of risks included an assessment performed by the consortium on the degree of criticality of the risk related to the achievement of the exploitation of the result, as well as the probability of the risk happening. A potential intervention to mitigate the risk is suggested, including the estimated feasibility of such intervention. The priority map shows the results of the risk assessment scores calculated, where the following interpretation should be considered:

1) **No action** – risk severity is low and no action is required,

2) **Control** – risk should be monitored in case external factors modify the initial assessment performed,

3) **Action** – Appropriate mitigations should be implemented to prevent obstacles in the market uptake,

4) **Warning** – Critical risk that could hinder market uptake.

ASSISTANCE SA Platform Risk Assessment Map							
	Description of Risks	**Degree of criticality (1 low- 10 high)**	**Probability of risk (1 low - 10 high)**	**Risk Grade**	**Potential intervention**	**Estimated Feasibility/Success of Intervention (1 low- 10 high)**	**Conclusion**
Partnership Risk Factors							
1	Partners do not follow the exploitation schedule due to lack of business competencies	*6*	*4*	**24**	Regular meetings of the Joint Venture will be held to track, monitor and support the exploitation plan	*7*	**Control.**
2	Partners carry out low quality exploitation activity	*7*	*3*	**21**	Regular meetings to improve performance and update partners on new developments, exchange on experiences etc	*6*	**Control.**
3	Partners quits executing the exploitation plan (technical or end-user)	*9*	*2*	**18**	Partners are committed and already seeking additional opportunities to follow-up with the platform development	*5*	**Between Control & No Action**
Technological Risk Factor							
4	Clients do not like the platform and thus also the trainings are not of interest	*7*	*5*	**35**	Adapt the trainings so that they are more methodological and focus less on one specific software	*8*	**Control.**
5	Integration in third parties' software is problematic	*7*	*3*	**21**	ASSISTANCE platform is highly interoperable and can be easily adapted to other third-party services	*8*	**Control.**

6	User interface and experience do not cover all end-user usability needs	*9*	*6*	**54**	Redesign/customise UI and UX to conform the end-user usability needs and run usability tests	*9*	**Action!**
7	The system is not scalable and fails to provide some of its capabilities when deployed with a large number of missions/assets/agents	*8*	*5*	**40**	Extend the solution to more complex scenarios or limit the application to scenarios where the solution fits the requirements of the end-users	*8*	**Control.**
Market Risk Factors							
8	Nobody buys the product: too expensive costs	*8*	*4*	**32**	Review cost structure and licensing strategy	*4*	**No Action'**
9	Unsuitable marketing force	*8*	*3*	**24**	Increase advertising and hire an account manager to approach customers and suitable key stakeholders enabling commercialisation	*6*	**Control.**
10	Fail to find system integrators/ drone and robot manufacturer interested in integrating the developed solutions by research partners	*9*	*7*	**63**	ASSISTANCE consortium already includes large system integrators, and drone and robots manufacturers who can take this role to enter the market	*8*	**Action!**
IPR/Legal Risk Factors							
11	Legal problems - IPR violation	*7*	*3*	**21**	Liaise with IPR experts and establish appropriate legal/commercial agreements	*7*	**Control.**

12	Legal problems - fail to establish a licensing agreement with system integrator	*8*	*5*	**40**	Liaise with IPR experts and review the framework of the agreement to find alternative economic or legal provisions to address the issues identified	*7*	**Control.**
Financial/Management Risk Factors							
13	Marketing and distribution fails due to a weak strategy	*7*	*4*	**28**	ASSISTANCE consortium counts with partners with strong commercial expertise that can support/revise/ optimise the market uptake of the solution	*6*	**Control.**
14	Marketing and distribution fail due to a lack of resources	*8*	*6*	**48**	a.) Adapt strategy to low-cost activities b.) Dedicate staff more specifically	*8*	**Control.**
15	Lack of endorsement from top management	*7*	*3*	**21**	The management teams in the consortium have always supported the project initiative. The investment needed to exploit the research results after the end of the project will be sought through public funding sources such as PCP	*9*	**Control.**

Environmental/Regulation/Safety risks							
16	Fail to comply with existing standards and procedures in place for first responders	*8*	*3*	**24**	ASSISTANCE analyse the standardisation landscape and is actively participating in a CWA relevant to the project results. In case noncompliance occur, review activities will be conducted to identify gaps and needs	*8*	**Control.**
17	Fail to comply with applicable legislation at specific countries	*8*	*4*	**32**	Liaise with legal experts in local applicable legislation. ASSISTANCE consortium includes partner with wide expertise in the analysis of legal and ethical aspects related to the tools developed that could support the further identification of legal requirements	*8*	**Control.**

Table 6: ASSISTANCE SAP Risk Assessment Map

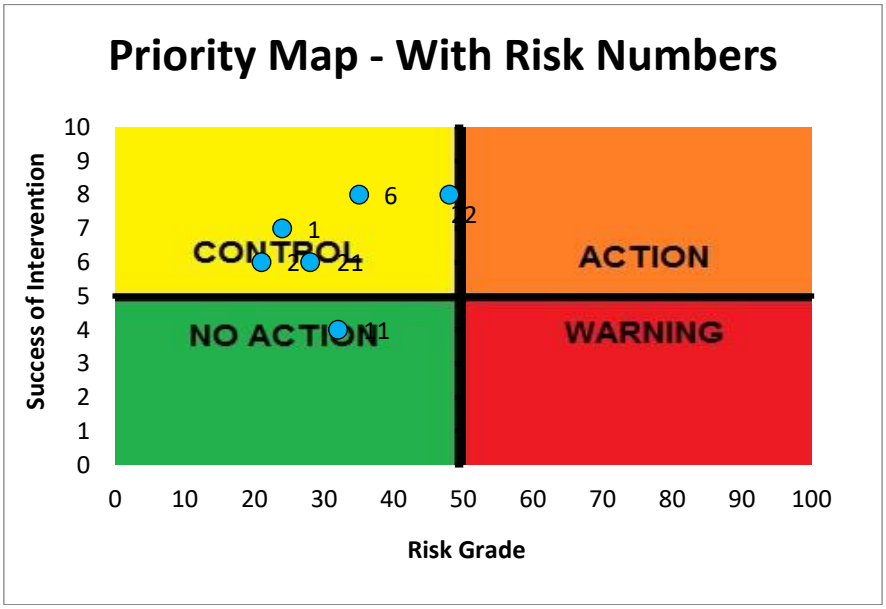


Figure 7: ASSISTANCE SAP Priority Map

The main risks identified relate to the integration of the solutions developed by research partners through system integrators/ drone and robot manufacturers, which will require early interaction with such key stakeholders. There are already large Command and Control system integrators in the consortium who might be interested in such an agreement. On top of that, the Horizon Results Booster Report also identified additional system integrators that could support the industrialisation in Annex VI.

Another main risk identified is the user interface and experience, related to the usability of the solution developed. In the strategic steps before market uptake, further usability tests should be considered to customise/redesign such aspects of the final solution.

ASSISTANCE Advanced Training Network Risk Assessment Map							
	Description of Risks	**Degree of criticality (1 low- 10 high)**	**Probability of risk (1 low - 10 high)**	**Risk Grade**	**Potential intervention**	**Estimated Feasibility/Success of Intervention (1 low- 10 high)**	**Conclusion**
Partnership Risk Factors							
1	VR provider quits the exploitation agreement	*8*	*4*	**32**	Regular meetings to improve deployment and activate commercial/marketing activities with the Network	*7*	**Control.**
2	Certified Training and Education Centre quits the Training Network	*6*	*4*	**24**	The early adopters of the Advanced Training Network will be the first responders in the consortium. Partners are committed and already seeking additional opportunities to follow-up with the commercialisation of the network	*7*	**Control.**
3	Partners do not follow the commercialisation schedule due to lack of business competences	*7*	*5*	**35**	Regular meetings of the Joint Venture will be held to track, monitor and support the exploitation plan	*5*	**Between Control & No Action**

Technological Risk Factors							
4	Users do not find the training curricula interesting or tailored to their needs	*10*	*4*	**40**	The innovative curricula developed in ASSISTANCE was based on the needs expressed by end-user representatives from various EU countries. Further customisation or adaptation of the training programme is possible	*9*	**Control.**
5	Users find challenging the use of VR technologies	*7*	*4*	**28**	Dedicated specialised staff will be present during the training sessions to give support to the users and facilitate adoption of the AR/VR technology	*6*	**Control.**
Market Risk Factors							
6	Unsuitable marketing force	*7*	*6*	**42**	Increase advertising and hire an account manager to approach customers and suitable key stakeholders enabling commercialisatio n	*6*	**Control.**
7	Fail to find AR/VR/MR providers interested in exploiting the training curricula developed	*10*	*3*	**30**	Early adopters in the consortium are already in close contact with various AR/VR/MR providers that can cooperate in the large-scale deployment of the Advanced Training Network	*7*	**Control.**
8	The fast evolvement of VR technology market make the training curricula developed obsolete	*7*	*6*	**42**	The consortium will implement a technology watch activity to periodically review market trends and adopt the most suitable ones into the Advanced Training Network	*6*	**Control.**

IPR/Legal Risk Factors							
9	Legal problems - fail to establish/follow -up a licensing agreement with AR/VR/MR provider	*8*	*5*	**40**	Liaise with IPR experts and review the framework of the agreement to find alternative economic or legal provisions to address the issues identified	*7*	**Control.**
10	Legal problems - IPR infringement	*7*	*3*	**21**	Liaise with IPR experts and protect the intellectual property of the curricula developed	*7*	**Control.**
Financial/Management Risk Factors							
11	Marketing and distribution fails due to a weak strategy	*7*	*3*	**21**	Strategy will be revised and expert consultancy will be required if needed	*7*	**Control.**
12	Marketing and distribution fail due to a lack of resources	*8*	*2*	**16**	Initial procurement of the ASSISTANCE Advanced Training Network will be facilitated through the Public Procurement of Innovation Mechanism. Such public funding endorsement will boost the market uptake and attract more end-users	*8*	**Control.**
13	Lack of endorsement from top management	*7*	*5*	**35**	The management teams in the consortium have always supported the project initiative and is engaged on the improvement of training activities for the operational staff	*9*	**Control.**

Environmental/Regulation/Safety risks							
14	Fail to comply with applicable legislation at specific countries	*8*	*2*	**16**	Liaise with legal experts in local applicable legislation. ASSISTANCE consortium includes partner with wide expertise in the analysis of legal and ethical aspects related to the tools developed that could support the further identification of legal requirements	*8*	**Control.**

Table 8: ASSISTANCE Advanced Training Network Risk Assessment Map

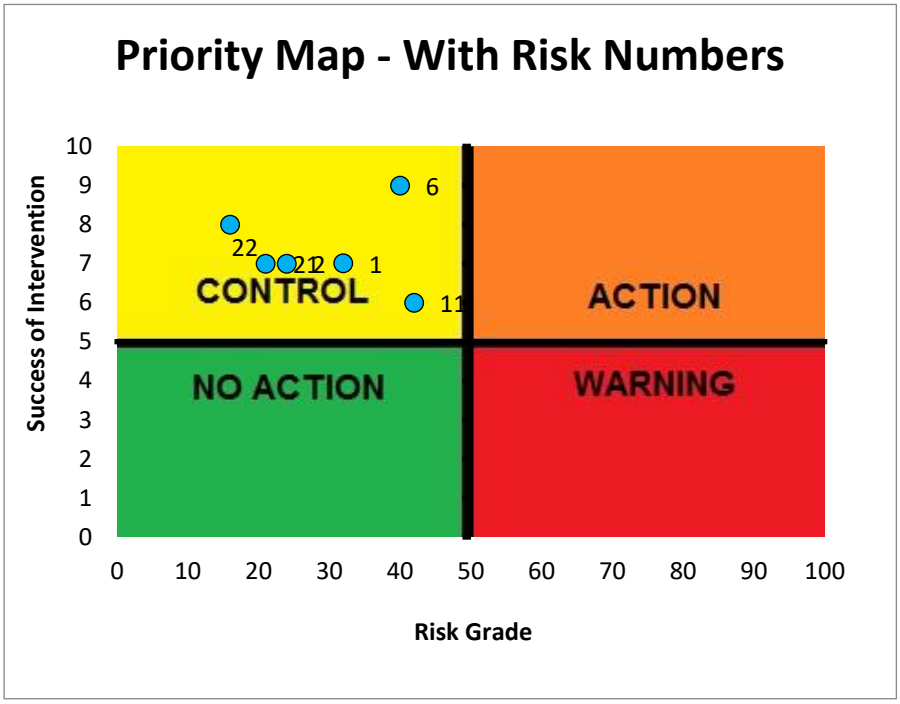


Figure 9: ASSISTANCE Advanced Training Network Priority Map

As presented in the Figure above, all risks are below the threshold where no immediate action is required. However, there are certain risks that should be monitored closely to prevent undesirable outcomes in the procurement process – mainly through the definition of a suitable marketing force and the implementation of a technology watch activity to periodically review the VR market and prevent the training curricula of becoming obsolete.

5.2.2. Strategic steps for commercialisation

In this section, we present a set of strategic steps to be performed **AFTER the project** for bringing the ASSISTANCE solution (platform, tools) to market through the joint effort of the Consortium partners. The following indications were based on the system's initial exploitation plan defined in D9.2, which has evolved based on the information and analyses presented in this deliverable:

YEAR 1– Phase I of Industrialisation of ASSISTANCE SAP – (Sept 2022 to Aug 2023)

1. Based on the information provided in the Pre-Commercial Procurement preparation plan in section 7.3, ASSISTANCE end-users (EU Buyers) will seek the support of the European Assistance for Innovation Procurement (EAFIP) services, or an alternative service, to conduct the tender process. This would include:
    - Preparing and conducting an EU wide published open market consultation
    - Drafting tendering documents
    - Launching an EU wide published call for tender
    - Answering questions from potential tenderers during the process
    - Signature of contracts with the selected vendor(s)

2. In parallel, ASSISTANCE commercial/business partners will develop a comprehensive marketing strategy for FRs applications:
    - Review market needs
    - Review customer cost-benefit trade-offs
    - Review risks and plans to overcome market barriers
    - Review standards/ certification/ qualification/ compliance requirements for ASSISTANCE and plan how to ensure they are met
    - Review the business case for industry investment in ASSISTANCE development and market entry and confirm it remains strong (GO/NO-GO decision)
    - Introduce ASSISTANCE solutions to customer end-users and local authorities using test version demonstrations at pilot demos

3. At the same time, ASSISTANCE research partners will establish exploitation agreements with relevant system integrators/robots and drone manufacturers (inside/outside the consortium) to transfer the technology to the industry.

YEAR 2– Phase II of Industrialisation of ASSISTANCE SAP – PCP project - (Sept 2023 to Aug 2024)

1. Pre-Commercial Procurement project (2 years) is expected to be launched, with the primary objective of scaling ASSISTANCE products and obtaining more mature solutions. The following activities are foreseen during the first year:
    - Customisation and adaptation of the User Interface and User Experience to the specific end-user usability needs.
    - Scale the ASSISTANCE solution to the management of large-scale missions with a wide number of assets and agents deployed on the field.
    - Develop additional modules/features required by the end-users.
    - Perform technical verification and validation of the system

YEAR 3– Phase III of Industrialisation of ASSISTANCE SAP – PCP project - (Sept 2023 to Aug 2024)

1. For the second year of the PCP project, the following activities are foreseen:
    - Full integration and deployment with legacy systems at the end-user premises to allow full interoperability and information exchange.
    - Perform pilot demonstrations at real operational scenarios with the deployment of all hardware/software capabilities of the system
    - Perform the certification of the system according to the required standards

2. In parallel, ASSISTANCE commercial/business participating in the PCP project will update the customer engagement plan, and the marketing strategy and define a transferability framework to be able to deploy the solution to the largest possible number of first responders in the EU.
3. Presentations, press releases and publications about the benefits that ASSISTANCE can bring to FRs (compared with currently available tools).

YEAR 4– ASSISTANCE SAP Market launch - (Sept 2024 to Aug 2025)

1. After the PCP project finalisation, the business partners selected will establish a salesforce and a marketing team to launch the solutions to the market through early adopters – those participating in the PCP. Specific procurement mechanisms will be launched from the end-user side to adopt the solution.
2. A customer support and maintenance team will be established by the business partners to guarantee the uptake of the solution.
3. Further training activities will be performed with the end-user to facilitate adoption.
4. Demonstrations at relevant security-related events attended by FRs

YEAR 5-Investigate other stakeholders' groups (Sept 2025 to Aug 2026)

1. Investigate markets and stimulate customer interest using pilot demos and/or specific fairs attendance
2. Identify new lead customers for ASSISTANCE solution and their user requirements
3. Produce a business case (from the supplier perspective) to justify investment in industrialisation for other markets
4. Stimulate customer interest using the test version
5. If the business case for supplier investment is strong:
    - Develop and demonstrate a prototype solution tailored to the lead customer requirements
    - Produce cost/benefit analyses to target these customers
    - Develop an industrialisation plan for other communities non-FRs for implementation in Year 6

The set of strategic steps for market entry described above refers to the ASSISTANCE SAP. The same information is provided below for the **ASSISTANCE Advanced Training Network (ATN)**:

YEAR 1– Phase I of Industrialisation of ASSISTANCE ATN – (Sept 2022 to Aug 2023)

1. Based on the information provided on the Public Procurement of Innovation preparation plan in section 7.4, ASSISTANCE end-users (EU Buyers) will seek the support of the European Assistance for Innovation Procurement (EAFIP) services, or an alternative service, to conduct the tender process. This would include:
    - Drafting tendering documents
    - Early announcement of the intention to buy
    - Launching an EU wide published call for tender
    - Answering questions from potential tenderers during the process
    - Signature of contracts with the selected vendor(s)

2. In parallel, ASSISTANCE partners having competencies as Certified Training and Education Centres will develop a comprehensive marketing strategy:
    - Perform standardisation/certification/qualification/compliance activities (if relevant) to ensure the solution is ready for starting the deployment during the PPI
    - Review customer cost-benefit trade-offs
    - Review risks and plans to overcome market barriers

YEAR 2– Phase II of Industrialisation of ASSISTANCE ATN – PPI project - (Sept 2023 to Aug 2024)

1. Public Procurement of Innovation project (2 years) is expected to be launched, with the primary objective of performing the procurement of the innovative network service by several EU buyers. The following activities are foreseen during the first year:
    - Scale the ASSISTANCE ATN for managing a wider range of users logged at the same time, according to the expected customers engagement.
    - Deploy the ATN to the EU buyers engaged in the process and perform commercial demonstrations

YEAR 3 – ASSISTANCE ATN – PPI project – Market Launch (Sept 2023 to Aug 2024)

1. For the second year of the PPI project, the following activities are foreseen:
    - Monitoring the correct performance of the platform on service in all locations
    - Implementation of minor adaptations and bug fixes (if necessary)
2. In parallel, ASSISTANCE partners having competencies as Certified Training and Education Centres will update the customer engagement plan and the marketing strategy.
3. Presentations, press releases and publications about the benefits that ASSISTANCE can bring to FRs (compared with currently available training tools).
4. A customer support and maintenance team will be established by the engaged Certified Training and Education Centres to guarantee the uptake of the solution.

YEAR 4 – ASSISTANCE ATN - Market expansion - (Sept 2024 to Aug 2025)

1. Second year of commercialisation will be characterised by strong marketing activities with additional FRs that may be interested in the subscription to the ASSISTANCE ATN.
2. Other certified Training and Education Centres will be approached at strategic locations in Europe where a larger customer base exist, such as France, Italy and Spain.

YEAR 5 - Investigate other stakeholders' groups (Sept 2025 to Aug 2026)

1. Investigate alternative markets and stimulate customer interest using pilot demos and/or specific fairs attendance
2. Identify new lead customers for ASSISTANCE ATN (e.g. Second Responders) and their user requirements
3. Produce business case (from the Certified Training and Education Centres perspective) to justify investment in industrialisation for other markets
4. Stimulate customer interest using the test version
5. If the business case for supplier investment is strong:

- Develop and demonstrate a prototype solution tailored to the lead customer requirements
- Produce cost/benefit analyses to target these customers
- Develop industrialisation plan for implementation in Year 6

The complete market strategy, integrating the core business model and a proposal of financial simulation, is reflected hereinafter, in section *5.3. Financial analysis & revenue predictions*.

5.3. Financial analysis & revenue predictions

In this section, a summary is provided regarding the business analysis that has been carried out to elaborate the business plan of the **ASSISTANCE Situational Awareness Platform**. The summary depicts the incomes from the exploitation of the project up to five years after the ASSISTANCE project closure, the IRR, and the expected ROI. The following general assumptions were included in the calculation:

- Pre-Commercial Procurement (Y1&Y2) budget is estimated at €1,076,400 as shown in Section 7.3. The funding is considered 100% under Horizon Europe (max rate).
- Direct sales (procurement) to first responders are based on an upfront + yearly subscription fee model, as depicted in the business model canvas. The selected price considers the feedback provided by the end-users regarding cost evaluation in D7.6.
- Number of sales consider a total of 8 EU buyers engaged during the PCP project, who will be the early adopters, and increasing steadily in the forecasting period.
- Additional revenues will come from licensing contracts arranged with large-scale system integrators who will leverage their network to reach a wider customer base, starting at Y2, where the average income expected is €100k.
- EU 28 Member States reported investing over €258 billion in public order and safety[7]. Considering this as an approximate market value, ASSISTANCE SAP will reach a fairly conservative amount of the overall market in the first years.
- Cost structure includes personnel costs (management, maintenance and customer support, SW updates, marketing and commercial), software licenses, royalties share per FR who participated in the PCP and General Expenses. Royalty share is estimated at 2.5%.

[7] https://ec.europa.eu/eurostat/en/web/products-eurostat-news/-/DDN-20170816-1

ASSISTANCE Situational Awareness Platform			**Year**			
Financial analysis	**0**	**1**	**2**	**3**	**4**	**5**
Incomes	-	-	-	320,000	580,000	960,000
Direct sales to end-users (upfront fee) - Complete platform (#)	0	0	0	8	10	13
Royalty fee from system integrators, drone or robot manufacturers sales (#)	0	0	0	0	1	3
Yearly maintenance and Consultancy services (subscription fee) (#)	0	0	0	8	18	31
Market reached	0.0000%	0.0000%	0.0000%	0.0001%	0.0002%	0.0004%
Financing		-	430,560	645,840	-	-
Costs	-	-	-	157,000	290,600	478,600
EBITDA calculation	-	-	645,840	593,560	289,400	481,400
NOPAT. Net operating Profit After Tax	-	-217,280	338,562	297,261	56,975	208,655
NOPAT (%)	-	-	-	93%	10%	22%
Investments	-	655,840	430,560	-	-	-
Net cash-flow	-	-655,840	125,282	514,541	274,255	425,935

Table 10: ASSISTANCE SAP Financial Analysis

For evaluating profitability, NPV (Net Present Value), and ROI (Return on Investment) were calculated based on the financial outcomes described above. An estimated discount rate of 10% (composed of an Average Cost of the capital without risk of 2% more than the risk price estimated at 8%) was used to calculate the NPV. The results show the financial viability of the commercialisation strategy developed, with a yearly turnover of nearly **€1M in year 5, an IRR of 33%, a NPV of €350k, and a ROI of 46%** (considering the funding received). Break-even is achieved in Y3 (first year of commercialisation). As these results highlight, the risk is very much reduced thanks to the PCP funding and the active involvement of 8 EU buyers.

The same financial analysis should be performed on the preparation of the PPI post-project to understand the viability of the commercial exploitation of the Advanced Training Network.

5.4. Joint Exploitation

The joint exploitation aims at fostering the further development and commercialisation of key exploitable results developed in different areas of the project architecture where synergies between results developed by 2 or more partners exist. The following table provides a first indication of which results present such synergies and the partners who own the IP:

	Joint Result	**Relevant components of the IP repository (Table 1)**
JR1	Hybrid communication hub coverage extended with drone swarm-aided coverage	VIASAT: 16 CATEC: 8
JR2	Evacuation management informed by toxic plumes location	UC: 5 ETRA: 15, 10 TNO: 12
JR3	Multi-asset mission management in areas with limited network coverage	VIASAT: 16, 17 THALES: 14 CATEC: 8 PIAP: 13 ETRA: 10
JR4	Situational awareness platform and forward command deployable in areas with limited network coverage	UPV: 1, 2, 3, 4 VIASAT: 16
JR5	Holistic training platform for multi-agency cooperation on international scenarios	UPV: 18 IFV: 11 CNBOP-PIB: 19

Table 11: ASSISTANCE Joint Results

5.5. ASSISTANCE Final Exploitation Event

The project already started to move forward with prospective customers thanks to the Exploitation Event formulated during the last demo in Linares. Several first responder organisations were invited to the event to raise awareness about the ASSISTANCE project solutions. The event was also promoted through social media and ASSISTANCE website. Valencian Local Police (also representing the Respond-A Project) and SSG group – the largest ambulance service in Spain, attended the event.

The agenda of the event included the following points:

- **8:30-9.00** Introduction to ASSISTANCE project and Key Exploitable Results
- **9:00-12.00** Final Pilot Demonstration exercise
- **12:00-13.00** 1-to-1 discussions between Stakeholders and Technology Providers
- **13:00-14.00** Lunch

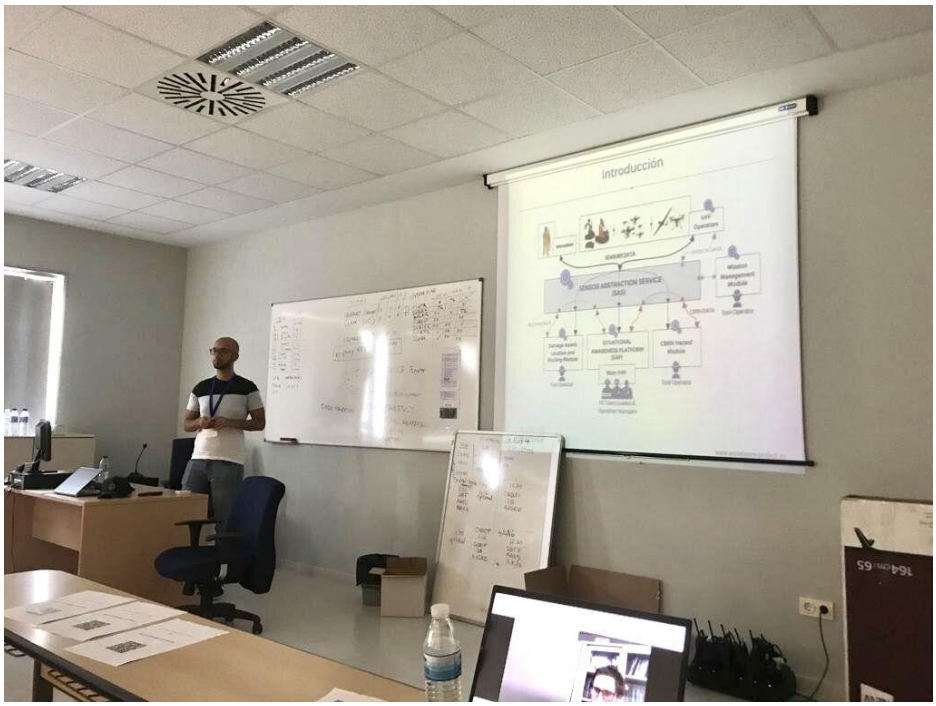


Figure 1: ETRA presenting the project to the attendees to the event

Figure 2: 1-1 discussions between Valencia Local Police and technical partners

It should be also noted that collaboration with other end-users was done in other pilots. Izmir fire department (Turkey) and Rotterdam ambulances (Netherlands) were involved in each respective pilot.

6. Standardisation Strategy

6.1. Introduction

There are many types of standards that serve a wide variety of purposes for their intended users. In a very general sense, standards exist to specify requirements or characteristics or to provide guidance related to terminology, testing of product performance, qualification of personnel, good practices, and standard operating procedures for services and systems[8]. Standards can be developed privately by companies and used as in-house protocols, or they can be created by local, national, regional or global standards development organisations (SDOs) for implementation by private or public entities.

Standards are similar to legislation in the sense that their formal development is consensus driven and they provide guidance about how certain activities should be done; the difference is that legislation is developed by policymakers and is imposed by law to protect the public. Standards are generally created by technical committees comprised of experts from industry, practitioners, scientists, and other stakeholders and are used voluntarily or as required by authorities having jurisdiction (AHDs).

There are three widely recognized products of the standardisation process: a standard, which uses normative language to specify the activities or characteristics that indicate compliance; a technical specification, which does not use normative language and is frequently the target document type for a text that is not ready to become a full standard but still provides useful guidance information; and a technical report, which is intended to provide explanatory or other supplementary information.

From an innovation project perspective, standards can be used for such activities as project management, technology development, dissemination, exploitation, and commercialisation. The goal of the standardisation activities in the ASSISTANCE project is to maximize the exploitation of the project's technological results.

There are two fundamentally different, but not mutually exclusive perspectives to consider in this work: first, the standardisation needs of the first responders (FRs); and second, the ability of the technology providers (TPs) to meet these needs. FRs primarily depend on standards to ensure that new technology will perform as expected and will be compatible with existing equipment or systems. Both these points are particularly important in large, possibly cross-border crisis situations where FRs from more than one organisation or country need to work together. Technology providers want to maximize their markets by providing technology that has innovative and useful new

[8] There is, in fact, a standard (EN 45020) that defines the types of standards.

functionalities. An example of how these two perspectives can be reconciled is to use standardised data transfer and communication schemes to introduce new technology while maintaining interoperability with existing systems.

6.1.1. Benefits and challenges of standardisation

Standards are intended to help stakeholders realize their goals in ways that provide the most benefit to everyone. Ideally, this means that FRs can expect standards to ensure a specified level of quality and performance for their equipment, physical interoperability with other equipment, and the ability to communicate and share data among themselves and with other FRs. However, standardisation challenges exist as well. Some general benefits and challenges related to standardisation are listed in Table 12 below. The benefits and challenges specific to the standardisation needs of the ASSISTANCE project key exploitable results (KERs, described in the next section) will be explored further in the Approach section of this chapter.

Table 12: Examples of standardisation benefits and challenges

Benefits	Challenges
Improved equipment and operating procedure compatibility and interoperability	Standards must be used to be effective; both FRs and TPs don't always understand the benefits of using standards
Practitioner participation can guide standards development to meet their needs	Timeframe for standardisation process is usually longer than the product development time, creating a lag between the standardised product and state of the art (SotA)
Research results can be used to support standards development	Standardisation processes are often complicated and tedious
Networking opportunities with other stakeholders during standardisation process	Stakeholders (especially practitioners) frequently don't have the resources to participate in standardisation process
Recognition that a compliant solution is ready for the market	Classified or proprietary data cannot be published in a standard
Transparency of standards process promotes practitioner trust in compliant solutions	Competition among stakeholders can drive standardisation process
Consideration of innovative technologies in the development of standards can facilitate market uptake, especially for the public sector	

6.1.2. Basic standards development processes

The basic process begins with a proposal for standards work that anyone can submit to an SDO. The proposal can be for a new standard, technical specification or technical report. Ordinarily, the proposal would be submitted to a national SDO. The responsible technical committee (TC) discusses the need for the proposed work item and the most

appropriate level (national, regional or global) for the work to be conducted. The proposal may be redirected to a different SDO, e.g., to a mirror committee at the regional or global level. A public announcement is made if the proposal is accepted as a new work item. A draft document is produced and published for comments. Each comment is discussed and resolved by the TC and a vote occurs to determine whether the work should continue. It may be necessary to revise the proposed document and vote on it again. Most SDOs have timelines regarding the stages of the standards development process; it may be necessary to start the process again at an earlier stage if the clock runs out before the final stage. Eventually, the proposed work is either published as a final document or abandoned at some point in the process. From start to finish, the process of developing a new standard takes at least several years; the time needed depends heavily on the quality of the initial proposal.

6.1.3. Pre-standardisation work

Ideally, a proposed standard would clearly resolve an important stakeholder need that is not already covered by existing standards. It would be written using the proper standards language in a format that can easily be adapted to the requirements of the SDO and it would address all the concerns of the stakeholders. In this case, the standards development process can proceed efficiently with a high possibility of success.

The European Committee for Standardization (CEN) offers a way to improve the quality of a standards proposal through the CEN Workshop Agreement (CWA) process. A CWA is a document published by CEN that is developed and approved via a CEN Workshop. The workshop is open to anyone with an interest in the topic. The resulting document is analogous to a proposed work item as described above, although it has the advantage of consensus among the participants of the workshop and thus might have a higher quality starting point for the formal standards development process. CWAs can exist for up to 6 years; they must be either approved as a new work item or withdrawn when this time expires, although the agreement document may exist e.g., online, indefinitely.

European research projects also have the possibility to cooperate with CEN and the European Electrotechnical Committee for Standardization (CENELEC) via a liaison arrangement in which the project consortium members can participate in the TCs. Thus, they can create proposed work items, provide input on existing standards, and be well informed about current and future trends.

CEN/CENELEC has also recently formed a Sector forum for security (SF-SEC) to facilitate the implementation of standards. SF-SEC brings together TCs, national SDOs, the European Commission, and other European organisations to exchange information, coordinate activities, and provide roadmaps for standardisation activities.

6.1.4. Existing standards committees and applicable standards

Since ASSISTANCE is a European project with partners from 7 member states and 1 associated state (Turkey), the focus of the standardisation efforts will be on European and global standards. National SDOs, however, are also important players in the standardisation process because their mirror committees have voting rights in the development of European and global standards.

The principal global (or international) SDOs and TCs of interest to the ASSISTANCE project are the International Organisation for Standards (ISO), TC 292 Security and resilience and TC 262 Risk management; the International Electrotechnical Commission (IEC); and the International Telecommunication Union (ITU). The principal European SDOs and TCs of interest are CEN, TC391 Societal and citizen security; CENELEC; and the European Telecommunication Standards Institute (ETSI).

While many standards and CWAs have been found that could be useful to various aspects of the ASSISTANCE project, this task is focused on supporting the exploitation of the KERs. The standards and CWAs that have been identified as being relevant specifically to the ASSISTANCE KERs are listed in Annex II. These standards and CWAs will be discussed in terms of their potential use for the KERs in section 6.4.

6.1.5. Standards work in other projects

Several existing projects, listed in

Table 13, have been identified that could potentially provide support to the standardisation efforts in Task 9.3. Fortunately, most of these projects are either ongoing or have left a legacy of public reports. Note that SF-SEC is not an EU project but is included in this list because it provides support in a similar way.

Table 13: Projects with standardisation aspects relevant to ASSISTANCE

Project Name	**Description**
aqua3S (H2020) https://aqua3s.eu/	aqua3S combines novel technologies in water safety and security, aiming to standardize existing sensor technologies complemented by state-of-the-art detection mechanisms.
DRIVER+ (FP7) https://www.driver-project.eu/	DRIVER+ developed a pan-European Test-bed for crisis management capability development, a portfolio of crisis management solutions, and facilitated a shared understanding of crisis management across Europe.
ILEAnet (H2020) https://www.ileanet.eu/	ILEAnet allows organisations and individuals to connect, become informed, engage and collaborate with other people in the community and benefit from the shared information and knowledge resources.

ResiStand (H2020) http://resistand.eu/	ResiStand identified and catalogued existing and planned standards related to first responders. A new screening tool for standardisation ideas was also created.
SF-SEC https://www.cencenelec.eu/areas-of-work/cen-sectors/defence-and-security-cen/sector-forum/	The role of SF-SEC is to coordinate standardization work programmes, establish liaisons with professional and technical associations and analyse the different policy initiatives, best practices, and security technologies to work out how standardization can enhance the EU security industry's competitiveness, dissemination of security products, systems and services and ensure a higher level of internal security in Europe.
Stair4Security (H2020) http://cen-stair4security.eu/	This project, led by CEN, developed a platform to coordinate research related standardisation activities in the security sector.
STRATEGY (H2020) https://strategy-project.eu/	STRATEGY brings together standardisation bodies, policy makers, technology suppliers and first responders from several EU countries to improve the interoperability of crisis management solutions both within and between countries.

The aqua3S project is an H2020 Critical Infrastructure Protection (CIP) project having a cross-over aspect with Disaster-Resilient Society (DRS) projects in which many types of sensors, some of which are bespoke, are integrated into an SA system. The aqua3S project and ASSISTANCE co-hosted a standardisation activities workshop in November 2021. The aqua3S project has initiated several CWAs, which were communicated to the ASSISTANCE partners that might have an interest in joining.

The DRIVER+ project produced, among other things, many very useful reports about relevant standards, standardisation activities, and lessons learned.

Most of the projects listed above were presented at a workshop on standards for law enforcement agencies hosted by ILEAnet in June 2021. This workshop was instrumental in providing insight and networking opportunities related to the emergency response standards community and it set the stage for most of the following activities in Task 9.3.

Discussion with the coordinator of the ResiStand project led to the acquisition of a tool for identifying and rating the soundness of standardisation needs, as well as several very useful reports. The ResiStand project also produced a searchable database of standards relevant to emergency response; unfortunately, this database was not available. The ResiStand coordinator also provided further information about the SF-SEC.

The Stair4Security project produced a platform upon which researchers and practitioners could share information about their standardisation activities and needs with a focus on disaster resilience and Chemical, Biological, Radiological, Nuclear and

Explosive (CBRNE) threats. This project ended in 2021 and, unlike ResiStand and DRIVER+, provided no public reports or contact information.

The aim of the STRATEGY project is similar to that of SF-SEC: to explore ways to bring the standardisation needs of stakeholders together. ASSISTANCE joined the STRATEGY CWA on communication and sharing of information among multiple public safety agencies. ASSISTANCE will be finished before the end of the CWA but two ASSISTANCE partners will continue to participate in the CWA until it has ended in 2023.

6.2. Approach

The approach taken was to collect information about:

- the standards needs and knowledge of the ASSISTANCE partners,
- the past and present activities of similar projects,
- existing standards and SDO activities,
- opportunities for collaboration on standards work.

After an initial request for information from the partners, a standardisation activities workshop was conducted to educate the ASSISTANCE partners so that they could provide informed answers to questionnaires about their standards needs. All of this information was combined, assessed, and used to identify opportunities and suggest courses of action for the KER owners to help them exploit their results.

6.2.1. Input from project partners

To start, informal queries were made during project meetings and via emails about the consortium's familiarity with, use of, and need for standards. Questions were asked about compatibility issues with existing equipment, known communication and interoperability standards, the benefits of standards to marketing/purchasing activities, gaps in existing standards and needs for new standards. The results of these queries indicated that it would be useful to provide some basic educational information to the consortium to facilitate further discussion.

6.2.2. Standardisation activities workshop

A half-day online standardisation activities workshop jointly hosted by ASSISTANCE and the aqua3S project was conducted in November 2021. In addition to the ASSISTANCE and aqua3S partners, other Cluster 3 projects were invited to participate. Altogether, 44 people participated in the workshop and six Cluster 3 projects (ASSISTANCE, aqua3S, CURSOR, FASTER, PRAETORIAN, and STRATEGY) were represented.

The aim of the workshop was to give attendees a basic understanding of standards, the standardisation process, and how standards can benefit their projects. Available supporting resources and lessons learned from the standard activities of other projects

were also presented. The workshop was divided into two sessions: a public introductory educational session and, afterwards, a private session for the ASSISTANCE partners to discuss the standardisation needs for their KERs and begin to formulate a plan on how to fulfil them. The presenters are listed in Table 14, and further information about the workshop is provided in Annex III.

Table 14: Presentations during the standardisation activities workshop

Presenter	Affiliation	Title of presentation
Livia MIAN	CEN/CENELEC	How the standardization process works and benefits research projects
Philippe QUEVAUVILLER	DG HOME.B4	Standardisation-related research in support of disaster resilience and CBRN-E policies
Janne KALLE	Sector Forum on Security	What is SF-SEC?
Monica CARDARILLI	DG JRC-ERNCIP	European Reference Network for Critical Infrastructure Protection (ERNCIP project)
Peter FRENZ	DVGW	CEN TC 164 Water Supply
Anastasios KARAKOSTAS	EGM (aqua3S project)	The policy and standardization aspect
Saskia MARESCH	DIN (DRIVER+ and CURSOR projects)	Standardisation in R&I projects
Dimitris DIAGOURTAS	SATWAYS (STRATEGY project)	STRATEGY project
Francine AMON	RISE (ASSISTANCE project)	Adapted Situation Awareness tools and tailored training scenarios for increasing capabilities and enhancing the protection of First Responders

Prior to the workshop a targeted list of potentially relevant standards and CWAs for each KER was sent to the ASSISTANCE consortium with instructions that the KER owners review them and prepare to discuss them during the private focus group part of the workshop. These standards were selected from lists generated by the ResiStand and DRIVER+ projects and from searching the CEN and ISO websites.

The ASSISTANCE focus group participants were asked to answer these questions:

- Which key exploitable results could benefit from standardisation?
- What are your standardisation needs?
- How shall we find relevant standards (keywords)?
- Are there existing pre-standardisation opportunities?
- What can the project do to facilitate your work?

Following the workshop two questionnaires were sent to the ASSISTANCE partners, one for the FR partners and the other for the TP partners, to collect further information

about their standardisation needs. The information collected using these questionnaires is analysed in section 6.3.2.

6.2.3. Identify gaps between standardisation needs and existing standards

Altogether, information was obtained from the ASSISTANCE partners, the workshop focus group, the questionnaires, a CERIS event in March 2022[9] that included a day on standardisation for DRS projects in which ASSISTANCE was invited to join as a panel member, and searches of the literature, deliverable reports from previous projects, existing standards and past and current CWAs. As a final action within Task 9.3, this information was collated, prioritized, and provided to the KER owners to help them proceed with the exploitation of their results.

6.3. Results and discussion

The initial input received from the project partners indicated that there is a wide range of technology implementation among the FR partners. The FR partners that currently use an SA platform expressed the desire for standards designed to make it easier to expand platform capabilities or integrate multiple systems. Currently, it is difficult to modify existing systems due to changes in security protocols and a lack of access to proprietary parts of the technology. This situation makes it very important that the "new" system can adapt to the interfaces of the old systems easily.

The TErrestrial Trunked RAdio (TETRA) communication standard produced by the ETSI European standards organisation was recognized as important for radio-based communication. Common data transfer protocols such as MQTT, DDP, REST API, NATS, SOA, and JSON were used as de facto standards[10] for sharing data between the sensor abstraction service (SAS, the core of the ASSISTANCE platform) and the ASSISTANCE applications.

Several standards gaps were identified by the partners as potential opportunities for future standards work (not all of them related to the KERs):

- A standard for virtual/augmented/mixed reality (VR/AR/MR) training for verification of obtained skills.
- A good practices guidance document for the measurement of a chemical substance with the use of unmanned aerial vehicles (UAVs).
- A standard for drones and robots (alone or in swarms), and wearable sensors used as situation awareness sensors, communications networks, and FR tools

[9] See https://www.cmine.eu/events/73793, the standards day was 24 March, 2022.
[10] A de facto standard or protocol is a custom or convention with a dominant preference by users.

- A standard for how and what information is sent to/by dispatching, tracking, communicating etc.
- Open and standardised application programming interfaces (APIs).
- Validation of evacuation modelling and location of damaged assets.

6.3.1. Standardisation activities workshop focus group results

The standardisation activities workshop focus group was attended by all the KER owners and half the FR partners. The comments/answers received from the participants are listed below:

Question: Which key exploitable results could benefit from standardisation?

- No need to prioritise the KERs concerning standards activities. Provide as much support as possible to all of them.

Question: What are your standardisation needs?

- The PCP phase of technology development, after the end of ASSISTANCE, is the best time to be concerned with standards regarding data transfer formats. In the meantime, the de facto standards are the best solution because they can be adapted to conform to other data exchange standards later.
- Regarding interoperability between organisations, should the SAS messages be standardised? Specifically, for the CHT, a standard is needed for hazard measurement data (time, place, concentration, etc) so that this information can be readily used across platforms.
- The process for video fusion is not currently developed enough to warrant standardising it. Only a few organisations would be interested in supporting it.
- It would be useful when using drone swarms for network coverage to standardise the messaging so that other organisations using different platforms can use it.

Question: How shall we find relevant standards (keywords)?

- Two questionnaires (one for FR partners, one for TP partners) will be sent after the workshop. Keywords will be collected using the questionnaires.

Question: Are there existing pre-standardisation opportunities?

- The STRATEGY project has many streams of pre-standardisation activities that are open to join. One of them, a CWA entitled “Collaborative Emergency Response – Communication and sharing of operational information among multiple public safety agencies” is relevant both for SAS messaging (as discussed

above in terms of the CHT) and the drone swarm coverage using different platforms.

- The aqua3S project is hosting a CWA on standardising data exchange between bespoke sensors in a network. This might be of interest to an ASSISTANCE partner (Łukasiewicz-PIAP), which has developed a sensor for use on a robot.

Question: What can the project do to facilitate your work?

- Provide information about standards.
- Facilitate cooperation with other projects.

After the workshop, ETRA (representing ETRA) and RISE (representing the ASSISTANCE project until the end of the project and then RISE after ASSISTANCE ends) joined the STRATEGY CWA on collaborative emergency response. CATEC is also considering joining this CWA.

6.3.2. Questionnaire results

As abovementioned, there are two fundamental perspectives to consider standardization within the project: the standardization needs of the FRs and the ability of the TPs to meet these needs.

Following the initial round of gathering information from partners, as described in 6.2.1, and the standardization activities workshop, as described in 6.2.2, a third step was carried out to gain an in-depth understanding of the level of knowledge of ASSISTANCE partners regarding standardisation; this step was structured as a short questionnaire. It was intended to be released after the standardization workshop to allow the partners less familiar with standards the opportunity to learn more at the workshop and have an overall idea of how to respond.

Considering the different standardization perspectives of the project partners (FRs and TPs), two questionnaires with three independent sections were designed as follows:

- **Section 1:** General info. This part involves an anticipatory strategy to identify the partners' overall knowledge about standards.
- **Section 2:** Specific details about ASSISTANCE. Including questions regarding the project and its developments and how standards could be of influence.
- **Section 3:** Specific details about the KERs. This was intended to gather insights related to the specific KERs and to identify potential gaps to be covered.

The first section was common to both models and the second and third sections were included for FR and TP partners, respectively, as shown in Figure 3. The questions for both questionnaires are found in Annex IV.

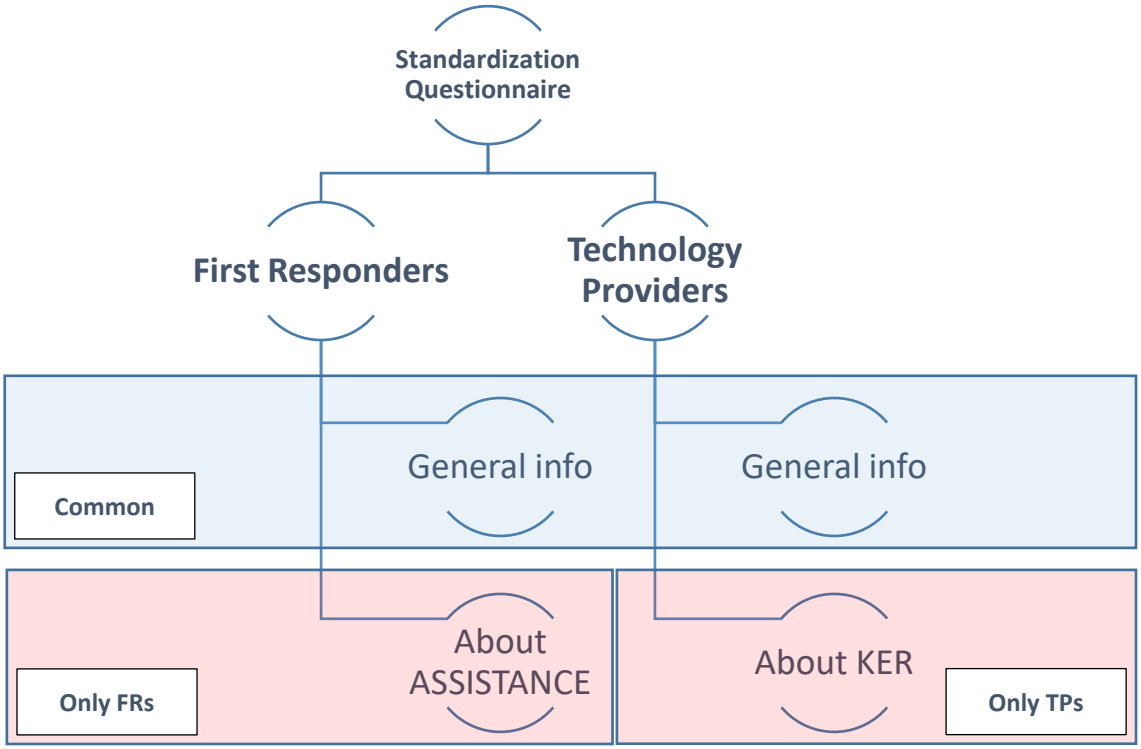


Figure 3: Structure of the Standardization Questionnaire

The main findings of the questionnaires are presented below. The questionnaire was available online via Google Forms, an email was sent to the whole consortium asking for their participation and the forms were open for one month. No personal data were collected, which was communicated to the participants. During this period, a total of 13 answers were collected (8 from First Responders and 7 from Technology Providers). Although the results are not statistically relevant, they provided useful information about how the consortium viewed and used standards and the keywords helped search for standards documents.

6.3.2.1. Use of standards by partners

In the questionnaire, partners were asked about their awareness in relation to standardization, using a Likert-Type Scale from “1- Not aware at all” to “5-Totally aware”; their answers are shown in

Figure 4 and summarized as follows.

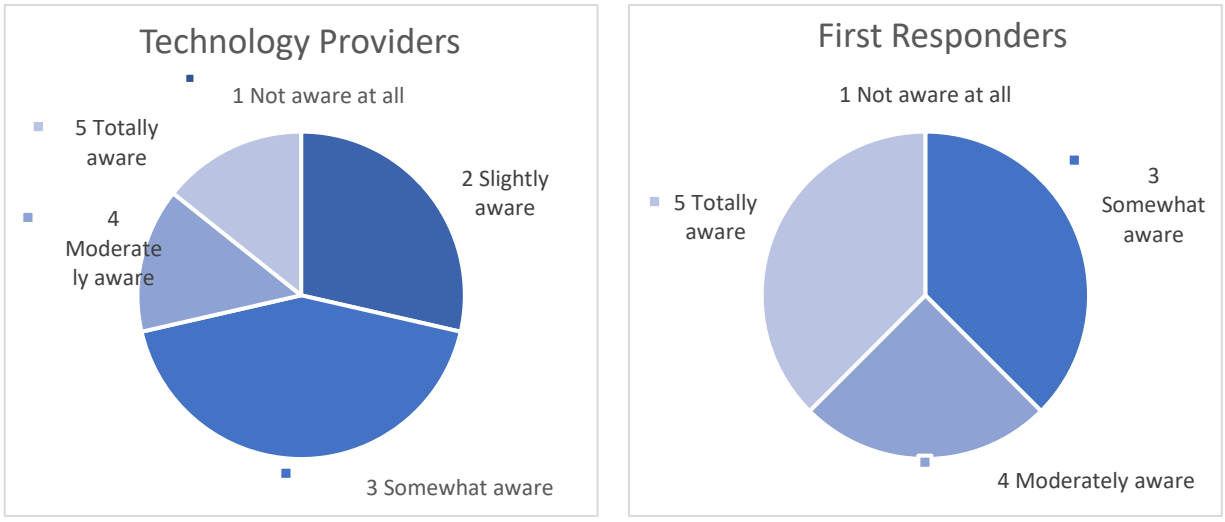


Figure 4: Standards awareness of ASSISTANCE partners

A larger proportion of FRs seem more confident with standards, as over half of the respondents stated they were totally or moderately aware. TPs comparatively selected lower options of the Likert Scale, between slightly and aware.

About their purpose for using standards, Figure 5 shows the main interests in standards as stated by partners.

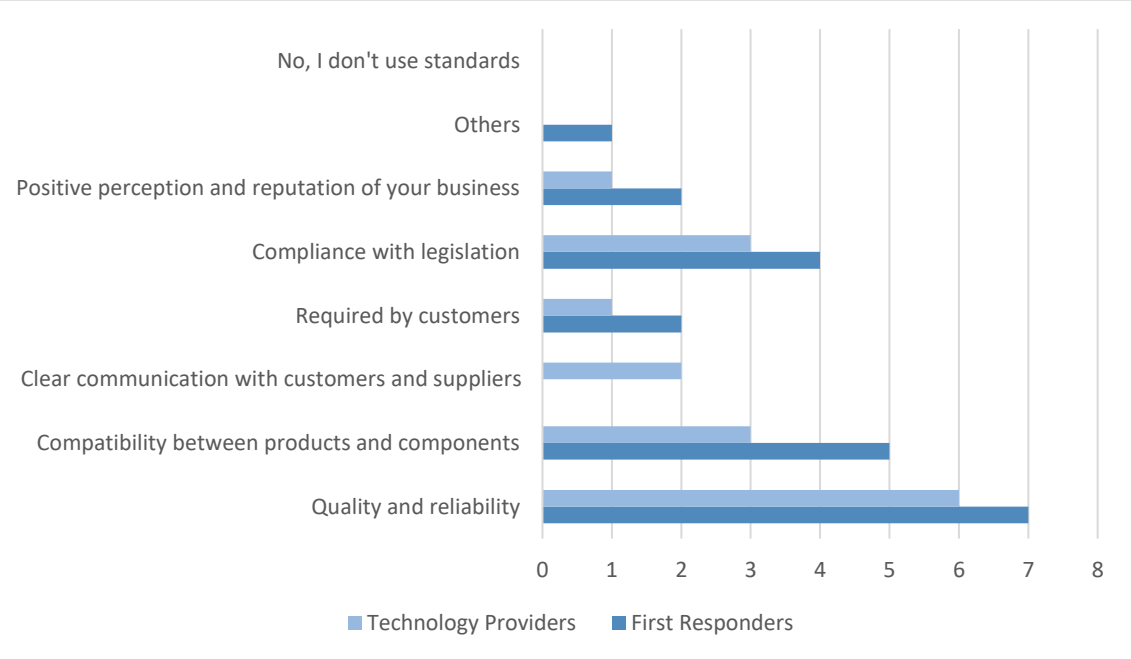


Figure 5: Purpose for using standards

The results may reflect a general trend toward "Quality and reliability"; although "Compatibility between products and components" and "Compliance with legislation" received a significant number of positive answers as well. In addition, other comments specified the importance of using standards to lower equipment acquisition costs, quality insurance, component tests, certification, or as part of their entity's strategy plan.

As for the geographical scope of application, Figure 6 shows that most partners have a preference for international standards; however, FRs are more prone to apply European and national standards than TPs, who tend to apply international standards and de facto standards such as those listed in section 6.3.

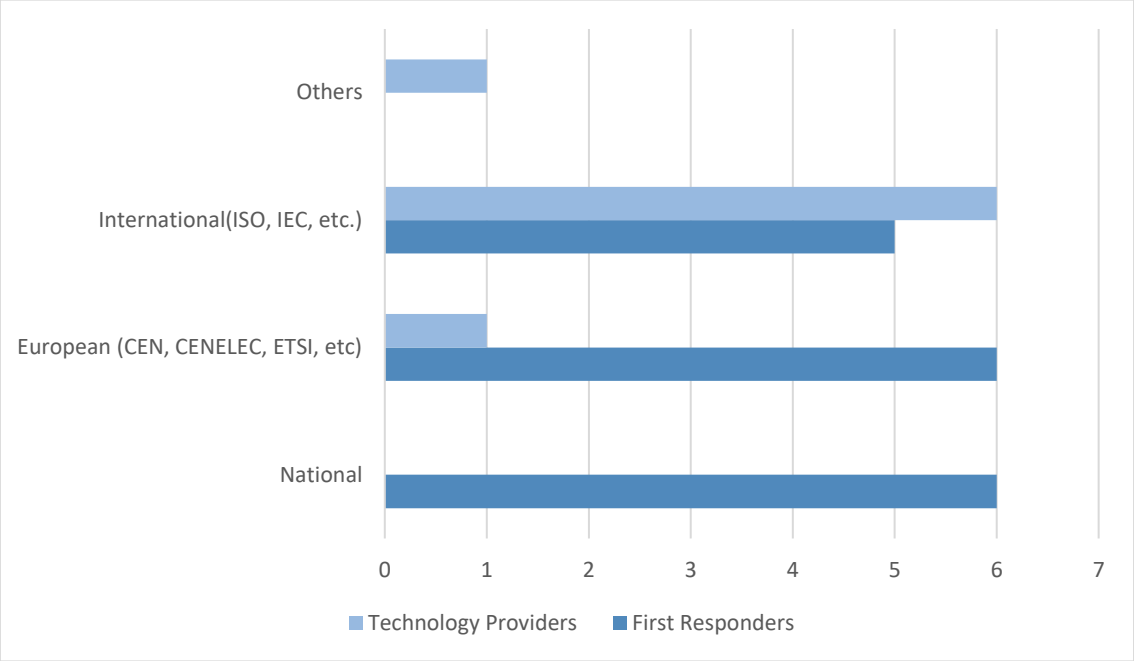


Figure 6 Geographical scope of application

Regarding ASSISTANCE technology developments, TPs were asked "Will your KERs be affected by standards?". The geographical options they chose were the international and other standards as being applicable in the future. Some of the answers to this question also referred to de facto standards, for example, JSON technology, standards related to network infrastructure and those required by customers.

Concerning standard topics of interest, several fields were itemized, with an emphasis on security, safety and defence. Other areas were also mentioned, such as information and communication technology (ICT), interoperability, CBRNE, Smart Cities, mobility, emergency planning and response.

6.3.2.2. Relevant standards identified by partners

Partners were asked about relevant standards in relation to ASSISTANCE. Table 15 synthesises the references for standards identified by partners, the results of the research performed to collect the related standards and a preliminary impact rating.

Reference	Related Standard/Initiative	Impact
CEN 1789	European Union standard for ambulances and medical transportation vehicles. This European standard specifies requirements for the design, testing, performance and equipping of road ambulances used for the transport and care of patients	Low
CSN-EN13718-2	Medical vehicles and their equipment - Air ambulances - Part 2: Operational and technical requirements for air ambulances	Low
EN15090	EN 15090:2012 Footwear for firefighters	Low
EN17249 level 2 or 3	ISO 17249:2013: Safety footwear with resistance to chain saw cutting	Low
EN ISO20345:2001 S1 SRC, S3 HRO SRC	Revised by ISO 20345:2021: Personal protective equipment - Safety footwear	Low
pr 4709 regarding drones	DIN EN 4709-001 Aerospace series - Unmanned Aircraft Systems - Part 001: Product requirements and verification; English version prEN 4709-001:2021 (Draft) DIN EN 4709-002 Aerospace series - Unmanned Aircraft Systems - Part 002: Direct Remote Identification (Draft) DIN EN 4709-003 Aerospace series - Unmanned Aircraft Systems - Part 003: Geo-awareness requirements; English version prEN 4709-003:2020 (Draft) DIN EN 4709-004 Aerospace series - Unmanned Aircraft Systems - Part 004: Lighting requirements; English version prEN 4709-004:2020 (Draft)	Medium
UGV IOP (also known as RAS-G IOP, or JAUS IOP), JAUS	UGV Interoperability Profile (UGV IOP), Robotics and Autonomous Systems – Ground IOP (RAS-G IOP) – Initiative from the United States (Department of Defence) to organize and maintain open architecture interoperability standards for Unmanned Ground Vehicles	High
STRATEGY project	STRATEGY is preparing something in the topic of Command and Control, which will be relevant to the data exchanges performed by the SAS	High
ISO 14001	ISO 14001 certification for environmental management systems	Low
ISO 18001	Mabe referred as OHSAS 18001 has been withdrawn and replaced by Occupational health and safety management systems — Requirements with guidance for use	Medium
ISO27001	ISO/IEC 27001:2013 Information technology — Security techniques — Information security management systems — Requirements	Medium

Table 15: Relevant standards identified through questionnaires

6.3.2.3. Standardisation needs and gaps

The aim of the questionnaires was to assess the standardisation needs of the ASSISTANCE consortium and identify gaps in relation to the KERs. Emphasis was placed on identifying where further work would add value to the deployment of the

technologies developed in the project. In this regard, an inventory of keywords was compiled to help in the analysis. The keywords are listed in Annex V.

6.4. Summary of actions for each KER

The most relevant existing standards, pre-standardisation activities, standards needs, and any other useful information collected from various sources during Task 9.3 are summarized in the following subsections for each of the KERs. This information was sent to each KER owner as guidance for future standards work that could support the exploitability of their KERs. It is anticipated that the KER owners will decide whether to comply with existing standards and/or pursue the pre-standardisation opportunities after the ASSISTANCE project is complete. Note that descriptions of these standard documents are provided in Annex II.

6.4.1. Augmented Video Fusion Module

The owner of this KER is UPV. The existing standards relating to this KER are:

- EN ISO 19111:2019 Geographic information — Spatial referencing by coordinates (ISO TC 211)
- EN ISO 19112:2019 Geographic Information - spatial referencing by geographic identifiers (ISO TC 211)
- EN ISO 19118:2011 Geographic information – Encoding (ISO TC 211)

Keywords: none

Standards needs: none at this time

Comments: no information was received about this KER prior to the standardisation activities workshop. Discussion during the private part of the workshop revealed that the general state of development of this process/technology is still quite early, so there are not many opportunities for standardising procedures or technology yet.

It would be useful to monitor the ISO TC 211 activities and check for new work items that might have a bearing on the development of this KER in the future.

6.4.2. Chemical Hazards Tool

This KER is owned by TNO. The existing standards relating to this KER are:

- EN ISO 7731:2003 Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO TC 159 SC5)
- EN ISO 9241-303:2011 Ergonomics of human-system interaction — Part 303: Requirements for electronic visual displays (ISO TC 159 SC4)

- EN ISO 19111:2019 Geographic Information - spatial referencing by geographic identifiers (ISO TC 211)
- EN ISO 19112:2019 Geographic Information - spatial referencing by geographic identifiers (ISO TC 211)
- EN ISO 19118:2011 Geographic information – Encoding (ISO TC 211)
- ISO 22311:2012 Societal security - Video surveillance – Export Interoperability (ISO TC 292)
- ISO 22316:2017 Security and resilience – Organizational resilience - Principles and attributes (ISO TC 292)
- ISO 22396:2020 Security and resilience – Community resilience – Guidelines for information exchange between organizations (ISO TC 292)
- ISO 22397:2018 Societal security – Guidelines for establishing partnering Arrangements (ISO TC 292)
- ISO/TR 22351:2015 Societal security - Emergency management – Message structure for exchange of Information (ISO TC 292)
- ISO/IEC 27035 (Series of 4 documents) Information technology – Security techniques – Information security incident management (ISO/IEC JTC 1/SC 27)

Keywords: none

Standards needs: a good practices guidance document for the measurement of a chemical substance with the use of unmanned aerial vehicles (UAVs) and a standard for how and what information is sent to/by dispatching, tracking, communicating were both identified as standards needs by the partners. For the CHT, a standard is needed for hazard measurement data (time, place, concentration, etc) so that this information can be readily used across platforms.

Comments: TNO is also a partner in the STRATEGY project and is therefore aware of the ongoing pre-standardisation activities that are relevant to this KER. The STRATEGY CWA on Collaborative Emergency Response is particularly interesting to all the KERs that require messaging between teams in the field and a central SA platform.

It would be useful to monitor the ISO TC 292, ISO TC 211, TC 159 SC4/5 and ISO/IEC JTC 1/SC 27 activities and check for new work items that might have a bearing on the development of this KER in the future.

6.4.3. Damaged Assets Location and Routing (DALR) Module

This KER is jointly owned by ETRA (Damaged Assets Location & Routing) and UC (Evacuation). The existing standards related to this KER are:

- EN ISO 19111:2019 Geographic information — Spatial referencing by coordinates (ISO TC 211)

- EN ISO 19112:2019 Geographic Information - spatial referencing by geographic identifiers (ISO TC 211)
- EN ISO 19118:2011 Geographic information – Encoding (ISO TC 211)
- ISO 22311:2012 Societal security - Video surveillance – Export Interoperability (ISO TC 292)
- EN ISO 22315:2018 Societal security – Mass evacuation – Guidelines for planning (ISO/TC 292)
- ISO 22396:2020 Security and resilience – Community resilience – Guidelines for information exchange between organizations (ISO TC 292)
- ISO 22397:2018 Societal security – Guidelines for establishing partnering Arrangements (ISO TC 292)
- ISO/TR 22351:2015 ISO/TR 22351:2015 Societal security - Emergency management – Message structure for exchange of Information (ISO TC 292)
- ISO/IEC 27035 ISO/IEC 27035 (Series of 4 documents) Information technology – Security techniques – Information security incident management (ISO/IEC JTC 1/SC 27)

Keywords: Mass evacuation simulation (pedestrian and vehicular), Sheltering (resilience and response) Routing for intervention, Evacuation

Standards needs: validation of evacuation modelling and location of damaged assets were identified as standards needs by the partners.

Comments: ETRA has joined the STRATEGY CWA on Collaborative Emergency Response. It would be useful to monitor the ISO TC 292, ISO TC 211 and ISO/IEC JTC 1/SC 27 activities and check for new work items that might have a bearing on the development of this KER in the future.

6.4.4. Robot Management Module

The owner of this KER is Łukasiewicz-PIAP. The existing standards related to this KER are:

- ISO 22311:2012 Societal security - Video surveillance – Export Interoperability (ISO TC 292)
- UGV IOP (also known as RAS-G IOP, or JAUS IOP), JAUS UGV Interoperability Profile (UGV IOP), Robotics and Autonomous Systems – Ground IOP (RAS-G IOP)

Keywords: Unmanned ground vehicle, UGV, UGV OCU, UGV HMI, UGV IOP, autonomous mobile robot

Standards needs: a standard for drones and robots (alone or in swarms), and wearable sensors used as situation awareness sensors, communications networks, and as FR tools was identified as a need by the partners.

Comments: the aqua3S project is hosting a CWA on bespoke sensors in a sensor network that might be of potential interest to Łukasiewicz-PIAP.

It would be useful to monitor the ISO TC 292 and UGV IOP activities and check for new work items that might have a bearing on the development of this KER in the future.

6.4.5. Drone Swarms for Improved Network Coverage and Hostile Drone Neutralisation Module

CATEC is the owner of these two KERs. The standards results are very similar for these KERs, based mostly on drones, so they will be summarised together. The existing standards related to these KERs are:

- DIN EN 4709 Aerospace series - Unmanned Aircraft Systems - Part 001: Product requirements and verification; Part 002: Direct Remote Identification; Part 003: Geo-awareness requirements; Part 004: Lighting requirements
- ISO TC20 SC16 Unmanned aircraft systems
- ISO/TR 18317:2017 Intelligent systems for transport- Communication network pre-emption for the rescue in case of disaster and emergency communication. Use case scenarios. (ISO TC 204)

Keywords: Mission interoperability, Drone swarming communication, Drone swarming interoperability; Drone swarming standard control, Standard network coverage device, Communication of video streaming during an emergency

Standards needs: needs for standards that specifically apply to drones and robots (alone or in swarms), and wearable sensors used as situation awareness sensors, communications networks, and as FR tools were identified by partners. This includes the need for a standard about how and what information is sent to/by dispatching, tracking, communicating so that other organisations can use the systems.

Comments: note that ISO TC20 SC16 is the ISO subcommittee responsible for drones. There are 7 published standards and 26 standards under development in SC16 at this time. DIN EN 4709 is a series of draft standards that also address drones. Both these efforts are focussed on commercial drones, not on drones used in emergency response.

It might be of interest for CATEC to join the STRATEGY CWA on Collaborative Emergency Response, as this CWA addresses interoperability of systems. It would also be useful to monitor the ISO TC 20, TC 204 and DIN EN 4709 activities and check for new work items that might have a bearing on the development of this KER in the future.

6.4.6. GESTOP Adapted Situational Awareness Platform, Hybrid Communication Hub, and Mission Management Module

The owners of these KERs are UPV (GESTOP Platform), VIASAT (Hybrid Communication Hub) and both THALES and VIASAT (Mission Management Module). For the latter KER, THALES is responsible for the library of mission planning algorithms and VIASAT is responsible for the rest of the module. The standards results are very similar for these three KERs, based mostly on data exchange, so they will be summarised together. The existing standards related to these KERs are:

- ASTM F 1221:89 (2014) Standard Guide for Interagency Information Exchange
- ETSI Terrestrial Trunked Radio (TETRA) Note: applies only to the hybrid communication hub module
- FD X50-253:2011 FD X50-253:2011 Management des risques - Processus de management des risques – Lignes directrices pour la communication (Risk management - Risk management process - Guidelines for communication)
- ISO 22311:2012 Societal security - Video surveillance – Export Interoperability (ISO TC 292)
- ISO 22396:2020 Security and resilience – Community resilience – Guidelines for information exchange between organizations (ISO TC 292)
- ISO 22397:2018 Societal security – Guidelines for establishing partnering Arrangements (ISO TC 292)
- ISO/IEC 19501:2005 ISO/IEC 19501:2005 Information technology – Open Distributed Processing – Unified Modeling Language (UML) Version 1.4.2 (ISO/IEC JTC 1)
- ISO/IEC 27002:2013 ISO/IEC 27002:2013 Information technology – Security techniques - Code of practice for information security controls (ISO/IEC JTC 1/SC 27)
- ISO/IEC 27035 ISO/IEC 27035 (Series of 4 documents) Information technology – Security techniques – Information security incident management (ISO/IEC JTC 1/SC 27)
- ISO/TR 22351:2015 ISO/TR 22351:2015 Societal security - Emergency management – Message structure for exchange of Information (ISO TC 292)
- NFPA 1561:2020 NFPA 1561:2020 Standard on Emergency Services Incident Management System and Command Safety
  (NFPA TC FIX-AAA)

Keywords: Standard messages, JSON

Standards needs: a standard for how and what information is sent to/by dispatching, tracking, communicating etc and open and standardised application programming interfaces (APIs) were identified as standards needs by the partners. Also, regarding interoperability between organisations, the FRs asked if the SAS messages be standardised?

Comments: in addition to the above standards, there have been three CWA efforts during the past two decades: CWA 15263:2005, which analyses the impact of data protection technologies; CWA 15931-1:2009, which provides a message structure for the transfer of information between computer-based systems so that it can be reliably decoded; and CWA 15931-2:2009, which provides the list of codes for the message structure provided by CWA 15931-1:2009. No information was found regarding the implementation of these past CWAs in CEN standards.

The STRATEGY CWA on Collaborative Emergency Response (under development) is also quite relevant for this KER, as it addresses the interoperability of messaging. RISE has joined this CWA representing the ASSISTANCE project and will continue to participate until it is complete. Any information that is useful for the further exploitation of the ASSISTANCE KERs, possibly for the PCP action after ASSISTANCE, that comes from the STRATEGY CWA will be communicated to the ASSISTANCE coordinator.

The PCP phase of technology development, after the end of ASSISTANCE, is the best time to be concerned with standards regarding data transfer formats. In the meantime, the de facto standards are the best solution because they can be adapted to conform to other data exchange standards later.

7. ASSISTANCE handbook for Pre-commercial Procurement (PCP) and Public Procurement of Innovation (PPI) preparation

ASSISTANCE project is a Research and Innovation Action where most of the technologies developed will reach TRL6-7 by the end of the project. This means that there will still be a gap in the development process before reaching the full commercial product. Bridging this gap comes with several risks as identified in section 5.2.1. Innovation procurement mechanisms such as EU-funded Pre-Commercial Procurement and Public Procurement of Innovation can **de-risk the commercialisation roadmap** described in section 5.2.2 by providing the required funding and the active involvement of EU buyers in the final steps of the development phase, therefore ensuring a product tailored to their need. In this section, a detailed handbook is provided to ASSISTANCE end-users to support the preparation and launching of an EU-funded Pre-Commercial Procurement for the ASSISTANCE SAP and a Public Procurement of Innovation for the ASSISTANCE ATN – which is already available as a final product. This way, actionable methods are provided to activate the exploitation of ASSISTANCE results after the project ends.

7.1. Introduction to PCP and PPI

This section aims at providing a non-exhaustive description and a general overview of the characteristics of a PCP and PPI from the viewpoint of a procurer. For more detailed information, several public documents are available[11,12,13].

Pre-Commercial Procurement (PCP) concerns the purchase of R&D by a body governed by public law, to bring a product into the commercialisation phase. On the other hand, **Public Procurement of Innovation (PPI)** allows contracting authorities to purchase innovative goods and services that are not yet commercially available on a large-scale basis.

Procurers' needs can be often addressed by innovative solutions that are close to market or already in small quantities, therefore not requiring R&D effort. This is when PPI can be used effectively. This would be the case for the ASSISTANCE ATN. Here the market readiness prior to full-scale deployment should be verified before the PPI through

[11] https://eafip.eu/toolkit/module-1/
[12] https://eafip.eu/toolkit/module-2/
[13] https://eafip.eu/toolkit/module-3-2/

conformance testing, certification or quality labelling of the solution. In PPI, procurers act as launch customers, also called early adopters or first buyers of the innovative solutions.[11]

When there are no near-to-market solutions, R&D effort is needed and therefore PCP can be used to compare the pros and cons of alternative competing solutions approaches. Such a process will identify the most promising innovations step-by-step via design, prototyping and product testing. The different steps involved in a PCP are presented in Figure 7, where ASSISTANCE SAP would be fitting Phase II and Phase III.

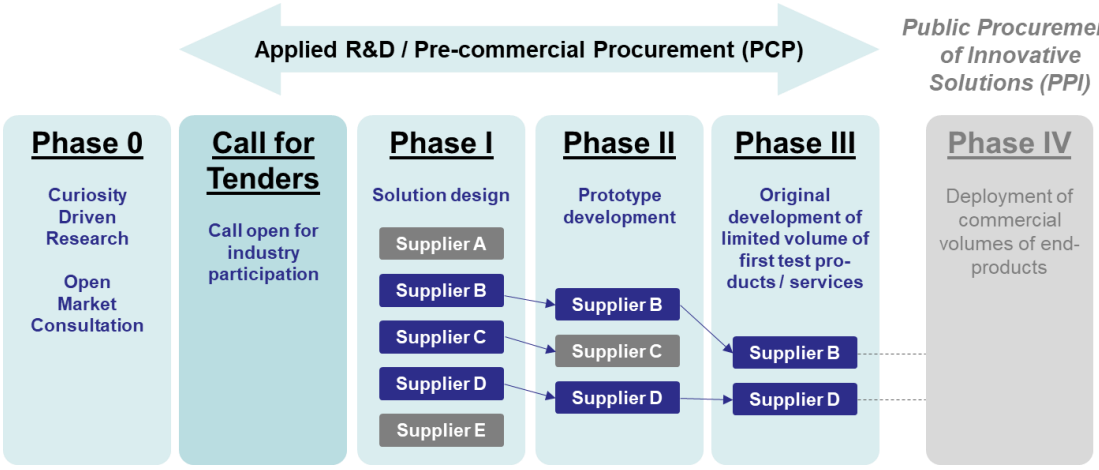


Figure 7: Public Procurement pipeline[11]

The main **differences between PCP and PPI** are presented in the following table:

	PCP	PPI
When?	**Requires R&D** to get new solutions developed. Problem clear, but pros/cons of **competing solutions** not compared/validated yet. **No commitment to deploy yet**.	Requires solution which is **almost on the market/already on the market** in small quantity, but not meeting public sector requirements for large scale deployment yet. No R&D involved.
What?	Public sector buys R&D to **steer development of solutions to its needs**, gather knowledge about **pros/cons of alternative solutions**, to avoid supplier lock-in later.	Public sector acts as **launching customer/early adopter/first buyer** for innovative products and services that are newly arriving on the market.

How?	Public sector buys R&D form **several suppliers** in parallel (comparing alternative solution approaches), in form of **competition evaluating progress after critical milestones**, risks and benefits of R&D) shared with suppliers to maximise incentives for the wide commercialisation.	Public sector acts as facilitator establishing a **buyers group with critical mass** that triggers **industry to scale up its production chain** to bring products on the market with desired quality/price ratio within a specific time. After a test and/or certification, the buyers group **purchases a significant volume of products**.

Table 16: PCP and PPI comparison[12]

In addition, PCP followed by a PPI can be contemplated when the solutions developed in the PCP still not meet the public sector requirements for large scale deployment and there is an active demand from the procurers' side.

There are **several benefits of conducting/participating in a PCP for both procurers and contractors**[14]. Some of them include improving the quality and/or efficiency of the public services, higher quality and cheaper products, reduced risk of failure in large scale subsequent PPI procurements, increased efficiency of R&D investment, increased interoperability and impact on standardisation and impact on the competitive structure on the market.

In the case of a PPI and based on the evidence from relevant case studies[11], improving the quality and/or efficiency of public services, supporting the growth of innovative companies and incentivising companies to invest in innovation, were identified as key benefits.

Moreover, it should be noted that traditional procurement methods tend to prioritise low cost and minimise the risk of deployment, instead of maximising cost/quality improvements as the PCP/PPI do. This often leads to suboptimal value for money and supplier lock-in[11].

PCP and PPI can be carried out by a single procurer who is interested in the technology. For the uptake of ASSISTANCE results by the end-users, a **joint procurement** is considered as the best mechanism to follow-up on the project. Using this mechanism means that several procurers carry out together not only the preparation but also the execution of the procurement procedure, having only one joint procurement procedure launched[11]. Thy type of action has the same benefits as the single procurement, but also

[14] "Study SMART 2014/0009 – Quantifying the impacts of PCP procurement in Europe based on evidence from the ICT sector" and other studies quoted in this study, http://ec.europa.eu/information_society/newsroom/image/document/2015-44/final_report_published_11779.pdf

adds the fact that local/regional/national bias is reduced when bringing the expertise of the various procurers involved in the process. Among the group of procurers, a lead procurer should be appointed to coordinate the action, having one joint call and one joint evaluation of offers.

In **EU-funded joint procurements**, the lead procurer will publish the call for tender on behalf of the whole buyers' group under the applicable legal framework in the country of the lead procurer following the principles described below[11]:

- **In EU-funded PCP joint procurements**, one concrete procurement that is identified as a common challenge in the innovation plans of the procurers must be addressed through the common specifications described in the tender.
- **In EU-funded PPI joint procurements,** the process focuses on one concrete unmet need that is shared by the participating procurers across countries and requires the deployment of an innovative solution. Even though the core functionality and performance characteristics should be the same, additional local functionalities may be included due to differences in the local context.

For more information, the European Assistance for Innovation Procurement (EAFIP) initiative provides a toolkit with comprehensive information, as well as assistance services.

7.2. Approach

Several roadmaps exist to exploit technologies through EU-funded innovation procurement. Procurers can apply directly to a Pre-Commercial Procurement, assuming themselves the cost of preparation of the procurement. Another option is to apply to a Coordination and Support Action (CSA) that will support the group of procurers in the preparation of the PCP action, which they should apply after completing the CSA. An alternative possibility is to bring the solutions developed in a Research and Innovation Action to the application of a PCP. The last approach is what the present deliverable proposes to the end-users in the ASSISTANCE consortium.

The methodology followed to prepare the handbook enabling the approach mentioned before consisted in the points described below:

- Detailed review of Pre-Commercial Procurement and Public Procurement of Innovation frameworks under Horizon Europe
- Creating awareness among ASSISTANCE end-users about these mechanisms through a dedicated workshop – see section 7.2.1.

- Reviewing end-users evaluation of the core ASSISTANCE solutions at deliverables D6.4 and D7.6.
- Definition of the roadmap to follow and a tentative work plan for each procurement mechanism

7.2.1. PCP&PPI Workshop with end-users

For preparing the ground and identifying the interest of the end-users in the consortium, a PCP and PPI Awareness Workshop was organised online on the 16th of July 2021. The workshop included representatives of the end-users in the consortium and the presentation of a first-hand experience from the iProcureSecurity CSA, where the ASSISTANCE end-user coordinator (AAHD) is participating. An experienced partner supporting procurers in all steps of the process, EMPIRICA, presented a step-by-step approach to implement innovation procurement.

The workshop was developed around the agenda included below:

Introduction – ETRA (10min)

- Presentation of workshop objectives
- Presentation of workshop agenda
- Guidelines for discussion – Chatham House Rule
- Tour de table: *Name, Surname, Organisation, XX*

General overview on Innovation Procurement- ETRA (15min)

- Relevant funding instruments: Pre-Commercial Procurement and Public Procurement of Innovation.
- Main benefits for your organisation
- H2020 vs. Horizon Europe
- European Assistance for Innovation Procurement (EAFIP) initiative
- Scope within ASSISTANCE

A step-by-step approach to innovation procurement – EMPIRICA (20min)

- Intellectual Property Rights and confidentiality strategies
- The link to regulation, standardisation, labelling and certification
- Open market consultation
- Drafting the tender documentation

A first-hand experience on Pre-Commercial Procurement – AAHD (10min)

- Gaps, challenges and innovation needs based on Use Cases
- Selection of final needs

Voting round with Slido (15min)

Next steps

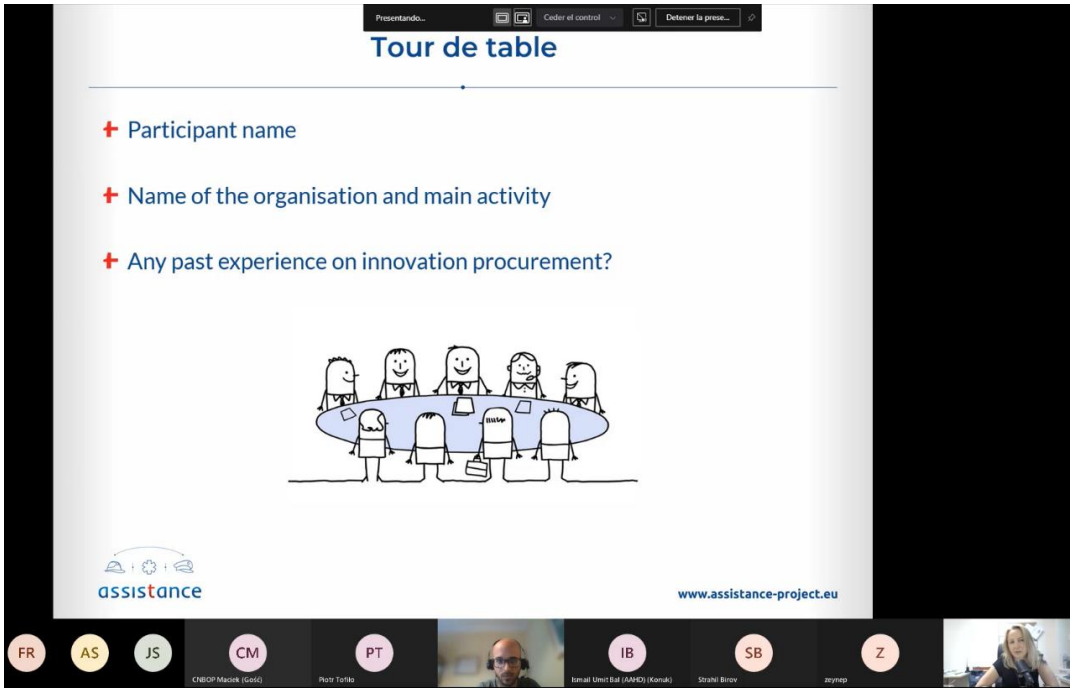


Figure 8: Tour de table at PCP and PPI Awareness Workshop

Figure 9: iProcureSecurity presentation at PCP and PPI Awareness Workshop

At the end of the workshop, all end-users expressed their interest in knowing more about how to bridge the gap and reach the commercial product through the mechanisms described, being open to potentially using them.

7.3. PCP Preparation Plan

The PCP preparation plan described in this section provides a step-by-step approach to collecting, analysing and synthesising all the information required to launch the pre-commercial procurement process. These include key information extracted from the end-user's evaluation performed in each of the project's pilots, and reported in D7.6, to transform the ASSISTANCE Situational Awareness Platform into a final product.

7.3.1. PCP Preparation Roadmap

The roadmap for the preparation of the PCP in the form of a joint procurement is described in the following, with a timeline estimated of 1 year since the finalisation of ASSISTANCE project:

1. **Establish a consortium of procurers for the Joint Procurement**

ASSISTANCE end-users moving forward with this initiative will establish a consortium of procurers, which may include end-users that didn't participate in the project. The consortium should decide the organisational strategy, including the type of procedure and the EU funding mechanism to be used, the lead procurer, who contributes to the drafting of the tender, etc…

2. **Needs identification and assessment**

ASSISTANCE foundation is based on a comprehensive set of real needs expressed by first responders' organisations. Such needs for a Situational Awareness Platform were already identified in the proposal phase and further assessed during WP2 in the project. As a result of the pilot demonstrations, some technological gaps were identified – see section 7.3.2. Such gaps will have to be reviewed in detail via workshops, focus groups, etc… after the project with the group of procurers participating in the PCP as representatives of the potential market size. The goal will be to identify the innovation needs that were not considered in the very first assessment.

3. **Prior art analysis**

A technology watch action was established in ASSISTANCE to monitor all relevant products and their characteristics in the market – see the results in section 3. This information will be used a starting point for the prior art analysis.

IPR search will be also conducted to identify any key protected intellectual property that cannot be avoided to address the needs identified before. A preliminary patent search was already performed in ASSISTANCE as part of the technology watch action, where no patent limiting the freedom-to-operate was found.

4. Regulation, standardisation, labelling and certification

Ensuring compliance regulation is a fundamental aspect of technology development. Deliverable D8.1 provided a Report on the relevant legal EU framework and assessment of the ethical impact. On the other hand, D2.2. already identified some **regulatory requirements** applicable to the technologies developed. Such reports will be a fundamental starting point to identify further regulatory requirements (if any) applicable to the technological scope of the PCP.

In general, **standards** will be looked after to ensure interoperability and replicability of the product outcome of the PCP at any first responder organisation in Europe. This will help reduce costs and improve the quality of the product. In this sense, section 6.4 of the present deliverable provided a comprehensive set of standardisation actions toward this direction. Procurers will request to the suppliers those standards relevant to comply with the needs identified in step 2.

Relevant **certification and labelling** schemes will be identified to ensure the wide deployment of the product.

5. Define the business case

This is a fundamental step to define the GO/NO-GO of the procurement process. A preliminary cost-benefit analysis is reported in D7.6. Under this report, the expected cost of procurement of the ASSISTANCE SAP (willingness to pay) and the societal cost savings (benefit) was reported. A deeper cost-benefit analysis will be performed by incorporating operational cost savings for first responders. Nevertheless, the results of the analyses performed in D7.6 already suggest that the benefits of the PCP investment will outstand the costs.

6. Open market consultation

For the needs identified with a positive business case before, an open market consultation will be organised with all potentially interested suppliers. The following principles should be followed as suggested by EAFIP[12]:

- Communicate openly and clearly the innovation needs
- Mention technologies identified as part of the prior-art analysis as examples
- The suppliers should be allowed sufficient time to ask questions and provide their views regarding the feasibility of the proposed procurement approach

In this sense, the open market consultation will provide validation on how realistic the procurement process is built.

7. Drafting the tender documentation

For drafting the tender documentation, the EAFIP already provides the main templates that should be used[12]. The following main steps will be followed:

- Define the type of procedure (e.g. competitive procedure including a selection, negotiation and award phase)
- Define the subject matter of the contract (the R&D services) and the technical specifications (including performance requirements and means of verification)
- Definition of exclusion criteria of suppliers (e.g. bankruptcy, violation of environmental criteria or social obligations, etc…)
- Definition of selection criteria (e.g. availability of qualified personnel/equipment to execute the contract)
- Definition of the award criteria (e.g. efficiency, cost, flexibility, robustness, etc…). Different award criteria can be considered for each phase of the PCP to decide which suppliers move forward in the process.
- Define criteria to assess supplier performance (e.g. carried out the work proposed in the tender, demonstrations are delivered at a minimum quality level, etc…).

8. Launching the procurement process

Once the PCP tender documents are finalised, the joint procurement consortium will take the following steps:

- Publication of the contract notice in the Tender Electronic Daily
- Selecting R&D providers and awarding the framework agreement (based on the defined criteria)

The step-by-step approach defined in this section followed the guidelines provided by EAFIP[12].

7.3.2. Gap Analysis based on End-users' Evaluation

The ASSISTANCE project was designed based on the real needs expressed by first responders' organisations. Such needs were already identified and implemented in the prototype developed of the Situational Awareness Platform. As reported in D7.6, the end-users evaluation of the pilot demonstration identified new technological gaps that should be considered by the technical partners in the next development phase, e.g., the PCP. The main gaps identified by the end-users included the following:

- User interface (UI) and user experience (UX) adapted based on usability requirements targeted to operational needs. Some key elements highlighted included needed improvements in user navigation, information insertion and message handling (sending and reception) at the Portable SAP.
- Disruptions of the network caused delays in information exchange at some time points during the demonstrations. Therefore, improvements in the stability of the hybrid communication hub would be required.

As mentioned in D7.6: *"usability is crucial for a good SA and improved usability will most certainly increase the SA as well"*. For this reason, it is critical that the procurers launching the PCP process assess in more detail the results of the project and assess any additional usability requirements.

7.3.3. High-level workplan

Due to the high technological maturity level of the ASSISTANCE SAP at the end of the project, the Pre-Commercial Procurement is estimated to have a duration of 2 years, where each year will correspond to one phase of the PCP process.

Phase 1 will be dedicated to the development, integration and testing of the features that address the innovation gaps detected in the PCP preparation phase, mainly connected to the user interface, user experience and platform capacity gaps. Such features are of paramount importance for enhanced situational awareness. A minimum of 3 suppliers are expected at this phase, which can be represented in the form of a consortium of technology providers. The tentative work plan for this phase is outlined below:

T1. Strengthening UI/UX features toward efficient situational awareness

T2. Covering innovation needs for critical platform components (e.g. network stability)

T3. Scale-up the platform capacity to a larger number of users

T4. Adaptation to applicable regulations and standards from international to the local level

T5. Platform integration with legacy systems used by FRs agencies

T6. Conformance testing, verification and validation

Based on the costs spent on ASSISTANCE SAP development in the current project, the budget for the implementation of the work plan described above is estimated at €645,840.

Phase 2 will be dedicated to the validation of the features implemented in Phase 1 in an operational environment, as well as the system's complete qualification for commercial use. Only 2 out of the 3 suppliers which participated in the previous phase will be selected for Phase 2. The tentative work plan for this phase is outlined below:

T1. Pilot preparation and planning

T2. Situational Awareness Platform deployment

T3. Pilots execution

T4. Data collection, analysis and evaluation of pilot results

T5. Application to relevant certification schemes

Based on the costs spent on ASSISTANCE SAP validation in the current project, the budget for the implementation of the work plan described above is estimated at €430,560.

Considering the number of suppliers per phase and the estimated budget for the implementation of the work plan, the preliminary estimation of the pre-commercial procurement cost is €2,798,640. Such costs do not include procurement preparation and follow-up costs. Estimates should be revised by the procurers during the preparation of the PCP, also considering the in-depth characterisation of the needs.

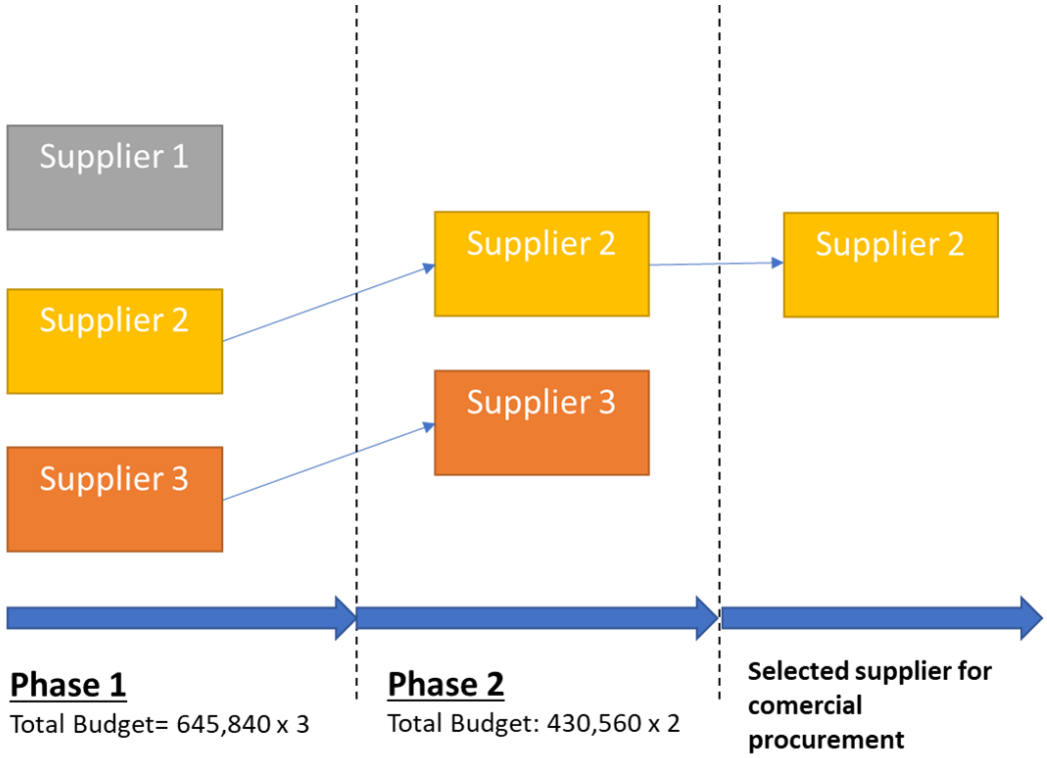


Figure 10: Tentative flowchart for ASSISTANCE PCP

7.4. PPI Preparation Plan

Similar to the plan elaborated for the PCP preparation, this section provides a step-by-step approach to collecting, analysing and synthesising all the information required to launch the Public Procurement of Innovation (PPI) process. The subject matter of the process will be the ASSISTANCE Advanced Training Network (ATN), which is technologically ready to be commercialised by the end of the project.

7.4.1. PPI Preparation Roadmap

In general, the same steps as for the preparation of the PCP – described in section 7.3.1., will be followed to prepare a PPI process in the form of joint procurement, therefore maximising the number of early adopters. The timeline estimated up to the contract signature is of 1 year since the finalisation of the ASSISTANCE project.

Compared to the process described for the PCP, particular attention will be paid to the following aspects:

- A close-to-market solution already exists (developed in ASSISTANCE) and therefore no additional R&D would be required. A few gaps were identified as

part of the end-user's evaluation in D6.4 – see section 7.4.2, however, these are not technology-related gaps and should be implemented as part of the business and organisational strategy.

- The procurement will involve only 1 phase and 1 selected supplier.
- Final developments, standardisation, certification, etc… should be covered by the suppliers.

It should be also noted that after the open market consultation (step 6) and while drafting the tender documentation (step 7), an additional step will be added:

6.5. Early announcement of the intention to buy

An early announcement of the intention to buy will be performed to give suppliers enough time to finalise the solutions and prove that they meet the functional requirements via conformance testing, certification or product labelling by the predefined date (if not already done).

The early announcement will be open to receiving feedback from the suppliers. The feedback will be analysed in order to make the decision whether to launch the tender or not.

7.4.2.Gap Analysis based on End-users' Evaluation

ASSISTANCE project was designed based on the real needs expressed by first responders' organisation. Such needs were already identified and implemented in the training curricula that is part of the Advanced Training Network. The training curricula was demonstrated during the project, where a thorough assessment was reported in deliverable D6.4. In general terms, the feedback provided by the end-users was positive. However, there were non-technical gaps identified that should be considered in the assessment of needs for the PPI preparation and in the provision of the service by the Certified Training Centres. The main gaps identified by the end-users were the following:

- A tailored assessment of the training needs of each particular first responder organization should be performed before deploying any training curricula
- For some first responders, guidance to get familiar with VR technologies was seen as a need

The gaps described before will be considered during the PPI preparation, where a more exhaustive analysis will be performed.

7.4.3. High-level workplan

The Public Procurement of Innovation of the Advanced Training Network will consist in only 1 phase that is estimated to have a duration of 2 years, where each year will comprise the following activities:

Year 1 will be dedicated to the deployment of the Advanced Training Network across all countries and procurers participating in the PPI process. The tentative workplan for this phase is outlined below:

T1. Scale-up the platform capacity to a larger number of users

T2. Preparations and planning of deployment

T3. Network deployment at Certified Training Centres

Based on the costs spent on ASSISTANCE for tailoring the VR training technology and curricula for the needs expressed by the end-users and the tasks described above, the budget for the implementation of the workplan described above is estimated at €627,900.

Year 2 will be dedicated to the evaluation of the real performance of the Training Network and the potential bug-fixing of the system deployed during the service. The tentative workplan for this phase is outlined below:

T1. Monitoring of Advanced Training Network on service in all locations

T2. Analysis and performance validation

T3. Implementation of minor adaptations on training curricula (if necessary)

T4. Implementation of minor adaptations on VR technology (if necessary)

Based on the costs spent on ASSISTANCE for tailoring the VR training technology and curricula for the needs expressed by the end-users and the tasks described above, the budget for the implementation of the workplan described above is estimated at €767,430.

Given that there is only 1 supplier selected and there is only 1 phase of the joint procurement, the preliminary estimation of the procurement cost is €1,395,000. Such costs do not include the procurement preparation and follow-up costs. Estimates should be revised by the procurers during the preparation of the PPI, also considering the in-depth characterisation of the needs.

8. Conclusions

The present deliverable has highlighted the relevant aspects for bridging the gap between the project results and full commercial deployment. Based on the results of the various analyses presented in this document, the final version of the ASSISTANCE Business Plan and Commercialisation Strategy has been proposed.

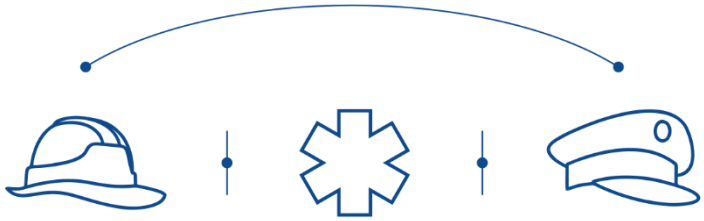
The Business Plans have been presented based on the Business Model Canvas. This is the basis for the commercial exploitation of the ASSISTANCE Situational Awareness Platform and the ASSISTANCE Advanced Training Network. The analyses have been restricted to the use foreseen as the most promising business strategy and constitute a basic pillar for future work. They illustrate and are good examples of how ASSISTANCE solutions could work in real-life scenarios. The document depicts incomes coming from the exploitation of the project up to five years after starting commercialisation, the IRR, NPV, and the expected ROI. ASSISTANCE will start transferring solutions to the market within a coherent process starting immediately after the end of the project, targeting profits in less than 5 years after the end of the project.

The individual exploitation plans of the project partners have also been updated from the previous description done in deliverable D9.2. Moreover, an in-depth analysis of the standardisation mechanisms relevant to each exploitable result was performed, including the next steps to ensure interoperability and compliance with future commercial solutions.

Finally, the deliverable has provided a handbook to ASSISTANCE end-users to activate the exploitation roadmap described above via Pre-Commercial Procurement and Public Procurement of Innovation. Further work should be performed in this direction to reach a consensus regarding the specifications required for each tender and the business case.

ANNEXES

Annex I: Technology watch setup



assistance

Grant Agreement Number 832576

DEFINITION OF TOPICS AND KEY WORDS FOR MARKET AND TECHNOLOGY SURVEILLANCE AND MONITORING

DEFINITION OF TOPICS AND KEY WORDS FOR MARKET AND TECHNOLOGY SURVEILLANCE AND MONITORING

The following tables have been prepared to collect the information needed to start the surveillance and monitoring of areas of interest for the ASSISTANCE project in terms of products, services and technologies and in general all the topics of interest for the ASSISTANCE consortium.

1. TOPICS OF SURVEILLANCE

Definition of topics is needed in order to classify the objectives for Project surveillance and interesting topics by each thematic area.

The following table must be fulfilled.

Topic of surveillance	Description	To be excluded
Video overlapping on FRs GIS (Advanced video fusion)	To know about solutions and technologies that allow first responders to overlay video from drones on the map coordinates of GIS, either real-time or not. To know about companies offering solutions related to the field. Identify patents claiming real-time video overlapping on GIS, or related (if any).	No need to consider other vehicles that are not classifies as UAV
Hostile drone neutralization	To know about solutions and technologies that allow to neutralise drones used to cause damage (e.g. as dispersal platforms for chemical or biological substances over crowds such as concerts, sport events, etc. To know about companies offering solutions related to the field. Identify patents claiming an automatic system that performs the interception of the hostile drone using a counter drone, or related (if any).	
Drones to increase network coverage	To know about solutions that allow using drones as a network access point to increase network coverage in emergency scenarios. Particular interest to advanced swarming technologies, allowing a drones' system to behave as a single entity, is looked after.	

	To know about companies offering solutions related to the field. Identify patents claiming autonomous drones' swarms, or related (if any).	
CBRN hazard evolution monitoring	To know about solutions involving the monitoring of Chemical, Biological, Radiological and Nuclear Hazards in emergency situations using robots or drones. To know about companies offering solutions related to the field. Identify patents claiming the use of robots/drones and sensor data to calculate effects zone (if any).	
Semantic orders to control the drone	To know about software solutions that allow the abstraction of the drone's capabilities in a general context and in the context of first responders, allowing to map the needs of the user to a generic flight plan. To know about companies offering solutions related to the field. Identify patents claiming methods or systems for the abstraction of the drone's capabilities, or related (if any).	
Damaged assets location and visualisation	To know about software solutions including video analytics components allowing to identify and geo-localize damaged assets in real-time. To know about companies offering solutions related to the field. Identify patents claiming methods or systems for real-time identification of damaged assets.	
Intelligent routing based on assets location	To know about software solutions allowing to automatically generate intelligent routes for rescue operations and evacuation teams. To know about companies offering solutions related to the field. Identify patents claiming intelligent routes for rescue operations, or related (if any).	

Training platforms for first responders	To know about software solutions deploying training scenarios to first responders using virtual, mixed or augmented reality. To know about any software allowing collaboration between different FR organisations and performing joint simulation exercises.	
Business models in the field of Situational Awareness platforms	To know about existing business models in the field to analyse pros and cons, and identify the most suitable ones for each exploitable solution in the project. Should be tailored to public authorities, and first responders if possible.	

2. KEY WORDS

We need to know the specific vocabulary that is related to each of the "topics of surveillance" described in the previous table. We can include words and concepts that describe the sector, the technology, standards and regulations, etc.

The following table must be fulfilled.

Topic of surveillance	Concepts/Key words
Video overlapping on FRs GIS (Advanced video fusion)	UAV, video, fusion, real-time, overlap, GIS, fire perimeter, smoke plumes, location, drone, analytics, map
Hostile drone neutralization	Chemical, biological, crowds, events, LEA, malicious drone, damage, autonomous, collision, intelligent navigation, perception, counter drone
Drones to increase network coverage	Network access, mobile network coverage, emergency, swarm of drones, communication
CBRN hazard evolution monitoring	Hazard footprint, CBRN, chemical, toxic cloud, ellipse, GIS, cloud shape, concentration, accident, hazard evolution, meteorology, effects zone, drone
Semantic orders to control the drone	Sensors, commands, capability, abstraction, drone, vocabulary, autonomy, flight plan
Damaged assets location and visualisation	Drones, cameras, zoom, thermal, GPS, asset, damage, location, video analytics, evacuation, rescue

Intelligent routing based on assets location	Automatic routing, intelligent routing, evacuation, rescue, map, operator, decision making
Training platforms for first responders	Virtual reality, mixed reality, augmented reality, emergency, scenario, training, platform, exercises, environment
Business models in the field of Situational Awareness platforms	Software-as-a-service, Situation awareness, public order, safety, emergency, police, firefighters, security, infrastructure

3. INFORMATION SOURCES

This table must list of the information sources that can be used to do the market and technology surveillance for the topics of interest. Web sites of competitors or technology, news, blogs, RTD projects to be monitored, etc.

Category	Description	Comments
General interest	https://www.cnbc.com/cybersecurity/ https://www.theguardian.com/technology/data-computer-security https://www.bbc.com/news/topics/cz4pr2gd85qt/cyber-security https://www.bbc.co.uk/safety/security	
Specilized	https://phys.org/tags/cybersecurity/ https://www.theengineer.co.uk/defence-and-security/	.
Europe	https://ec.europa.eu/ https://ec.europa.eu/jrc/en https://www.eurobserv-er.org/ https://ec.europa.eu/info/research-and-innovation_en	

General science	https://www.pnas.org/ https://www.nature.com/ https://www.sciencemag.org/ https://journals.aps.org/prl/ https://www.researchgate.net/ https://thescipub.com/ https://www.sciencedirect.com/	
Business News and markets	https://www.theguardian.com/uk/business https://www.bbc.com/news/business https://www.economist.com/ https://www.securitymagazine.com/	
Competitors and target customer group	https://www.esri.com/en-us/arcgis/arcgis-full-motion-video http://dronecatcher.nl	

Annex II: Standards and CWAs with potential relevance to ASSISTANCE partners

Many standards and CWAs were identified as being potentially relevant to the ASSISTANCE project; however, only those listed below were considered relevant specifically to the ASSISTANCE KERs.

Document/Title/TC/URL	**Description**
ASTM F 1221:89 (2014) Standard Guide for Interagency Information Exchange https://www.astm.org/Standards/F1221.htm	This guide covers the planning, operations, and evaluation phases of interagency communications as part of a comprehensive EMS system.
CWA 15263:2005 Analysis of Privacy Protection Technologies, Privacy-Enhancing Technologies (PET), Privacy Management Systems (PMS) and Identity Management systems (IMS), the Drivers thereof and the need for standardization https://ftp.cencenelec.eu/PUBLIC/CWAs/e-Europe/DPP/CWA15263-00-2005-Apr.pdf	This report analyses the impact of data protection technologies. It provides recommendations for longer term co-ordinated advice to regulators and makes recommendations to ensure that standards take account of the state of the art in this area.
CWA 15931-1:2009 Disaster and Emergency management - Shared situation awareness – Part 1: message structure https://www.oasisopen.org/committees/download.php/42411/CWA_15931-1.pdf	Provides a message structure for the transfer of information between computer-based systems so that it can be reliably decoded.
CWA 15931-2:2009 Disaster and Emergency management - Shared situation awareness – Part 2: codes for message structure https://www.oasisopen.org/committees/download.php/42412/CWA_15931-2.pdf	Provides the list of codes for the message structure for the transfer of information between computer-based systems so that it can be reliably decoded.

DIN EN 4709 Aerospace series – Unmanned Aircraft Systems (draft standards) https://www.en-standard.eu/din-en-4709-001-aerospace-series-unmanned-aircraft-systems-part-001-product-requirements-and-verification-english-version-pren-4709-001-2021/	DIN EN 4709-001 Aerospace series - Unmanned Aircraft Systems - Part 001: Product requirements and verification; English version prEN 4709-001:2021 (Draft) DIN EN 4709-002 Aerospace series - Unmanned Aircraft Systems - Part 002: Direct Remote Identification (Draft) DIN EN 4709-003 Aerospace series - Unmanned Aircraft Systems - Part 003: Geo-awareness requirements; English version prEN 4709-003:2020 (Draft) DIN EN 4709-004 Aerospace series - Unmanned Aircraft Systems - Part 004: Lighting requirements; English version prEN 4709-004:2020 (Draft)
EN ISO 9241-303:2011 Ergonomics of human-system interaction — Part 303: Requirements for electronic visual displays (ISO/TC 159/SC 4) https://www.iso.org/standard/57992.html	Establishes image-quality requirements, as well as providing guidelines, for electronic visual displays. These are given in the form of generic (independent of technology, task and environment) performance specifications and recommendations that will ensure effective and comfortable viewing conditions for users with normal or adjusted-to-normal eyesight.
EN ISO 19111:2019 Geographic information — Spatial referencing by coordinates See also Amendment 1 (2021) (ISO/TC 211) https://www.iso.org/standard/74039.html	This document defines the conceptual schema for the description of referencing by coordinates. It describes the minimum data required to define coordinate reference systems.
EN ISO 19112:2019 Geographic Information - spatial referencing by geographic identifiers (ISO/TC 211) https://www.iso.org/standard/70742.html	This document defines the conceptual schema for spatial references based on geographic identifiers. It establishes a general model for spatial referencing using geographic identifiers and defines the components of a spatial reference system. It also specifies a conceptual scheme for a gazetteer.

EN ISO 19118:2011 Geographic information – Encoding (ISO/TC 211) https://www.iso.org/standard/44212.html	Specifies requirements for creating encoding rules based on UML schemas, requirements for creating encoding services, and requirements for XML-based encoding rules for neutral interchange of data.
EN ISO 22315:2018 Societal security – Mass evacuation – Guidelines for planning (ISO/TC 292) https://www.iso.org/standard/50052.html	Provides guidelines for mass evacuation planning in terms of establishing, implementing, monitoring, evaluating, reviewing, and improving preparedness. It establishes a framework for each activity in mass evacuation planning for all identified hazards. It will help organizations to develop plans that are evidence-based and that can be evaluated for effectiveness.
ETSI Terrestrial Trunked Radio (TETRA) https://www.etsi.org/technologies/tetra	TETRA is a digital trunked mobile radio standard developed to meet the needs of traditional Professional Mobile Radio (PMR) user organizations such as: Public Safety, Transportation, Utilities, Government, Military, PAMR (?), Commercial & Industry, Oil & Gas.
FD X50-253:2011 Management des risques - Processus de management des risques – Lignes directrices pour la communication https://norminfo.afnor.org/norme/fd-x50-253/management-desrisques-processus-demanagement-des-risqueslignes-directrices-pour-lacommunication/83036	Explains why the communication is important and how to deploy it efficiently for risk management. Main guidelines are given for the case of crisis.
ISO 7731:2003 Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO/TC 159/SC 5) https://www.iso.org/standard/33590.html	Specifies the physical principles of design, ergonomic requirements and the corresponding test methods for danger signals for public and work areas in the signal reception area and gives guidelines for the design of the signals. It may also be applied to other appropriate situations. Special

	regulations such as those for a public disaster and public transport are not affected by this International Standard.
ISO 22311:2012 Societal security - Video surveillance – Export Interoperability (ISO TC 292) https://www.iso.org/standard/53467.html	Mainly for societal security purposes and specifies a common output file format that can be extracted from the video-surveillance contents collection systems (stand alone machines or large-scale systems) by an exchangeable data storage media or through a network to allow end-users to access digital video-surveillance contents and perform their necessary processing.
ISO 22316:2017 Security and resilience – Organizational resilience - Principles and attributes (ISO TC 292) https://www.iso.org/standard/50053.html	Provides guidance to enhance organizational resilience for any size or type of organization. It can be applied throughout the life of an organization.
ISO 22396:2020 Security and resilience – Community resilience – Guidelines for information exchange between organizations (ISO TC 292) https://www.iso.org/standard/50292.html	Gives guidelines for information exchange. It includes principles, a framework and a process for information exchange. It identifies mechanisms for information exchange that allow a participating organization to learn from others' experiences, mistakes and successes. It can be used to guide the maintenance of the information exchange arrangement in order to increase commitment and engagement. It provides measures that enhance the ability of participating organizations to cope with disruption risk.
ISO 22397:2018 Societal security – Guidelines for establishing partnering Arrangements (ISO TC 292) https://www.iso.org/standard/50293.html	Provides principles and a process to develop the relationship among organizations in a partnering arrangement. The process includes planning, developing, implementing and reviewing partnering arrangements.

ISO/IEC 19501:2005 Information technology – Open Distributed Processing – Unified Modeling Language (UML) Version 1.4.2 (ISO/IEC JTC 1) https://www.iso.org/standard/32620.html	Describes the Unified Modeling Language (UML), a graphical language for visualizing, specifying, constructing and documenting the artifacts of a software intensive system. The UML offers a standard way to write a system's blueprints, including conceptual things such as business processes and system functions, as well as concrete things such as programming language statements, database schemas, and reusable software components.
ISO/IEC 27002:2013 Information technology – Security techniques - Code of practice for information security controls (ISO/IEC JTC 1/SC 27) https://www.iso.org/standard/54533.html	Guidelines for organizational information security standards and information security management practices including the selection, implementation and management of controls taking into consideration the organization's information security risk environment(s).
ISO/IEC 27035 (Series of 4 documents) Information technology – Security techniques – Information security incident management (ISO/IEC JTC 1/SC 27) https://www.iso.org/standard/60803.html	Provides a structured and planned approach to: a) detect, report and assess information security incidents; b) respond to and manage information security incidents; c) detect, assess and manage information security vulnerabilities; and d) continuously improve information security and incident management as a result of managing information security incidents and vulnerabilities.
ISO TC20 SC16 Unmanned aircraft systems https://www.iso.org/committee/5336224.html	Seven documents cover components, operational procedures, vocabulary, categorisation and classification, traffic management, and training.
ISO/TR 22351:2015 Societal security - Emergency management – Message structure for exchange of Information (ISO TC 292)	Describes the message structure built to facilitate interoperability between existing and new information systems. The intended audience is control room engineers,

https://www.iso.org/standard/57384.html	information systems designers and decision makers in emergency management.
NFPA 1561:2020 Standard on Emergency Services Incident Management System and Command Safety (NFPA TC FIX-AAA) https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1561	Contains the minimum requirements for an incident management system to be used by emergency services to manage all emergency incidents. Will be consolidated with NFPA 1550.
UGV IOP (also known as RAS-G IOP, or JAUS IOP), JAUS	UGV Interoperability Profile (UGV IOP), Robotics and Autonomous Systems – Ground IOP (RAS-G IOP) – Initiative from the United States (Department of Defence) to organize and maintain open architecture interoperability standards for Unmanned Ground Vehicles.

Annex III: Standardisation activities workshop invitation and agenda

online

Standardisation Activities Workshop

-for projects related to disaster resilience and societal security-

18 November 2021

General educational session 13:00 – 15:00 CET
Private break-out groups 15:00 – 16:00 CET

REGISTER HERE: https://forms.gle/p9Lo78K38bbkjSB2A
A Teams link for the workshop will be sent when you complete your registration.
Please check to make sure it doesn't go to your spam folder. Email francine.amon@ri.se if there is a problem.

In the **General Session**, learn about standards & how they can help your project:

- How the standardisation process works and benefits to research projects
  Livia MIAN, *CEN/CENELEC*
- The types of standards and related research and supporting activities
  Philippe QUEVAUVILLER, *Directorate General for Migration & Home Affairs (DG-HOME)*
- Inspiration, collaboration opportunities and resources for DRS and CIP projects
  Janne KALLI, *Sector Forum on Security (SF-SEC) & Finnish Standards Assoc (SFS)*
  Monica CARDARILLI, *European Reference Network for Critical Infrastructure Protection (DG JRC – ERNCIP project)*
  Peter FRENZ, *CEN TC 164*
  Anastasios KARAKOSTAS, *aqua3S project*
  Saskia MARESCH, *Deutsches Institut für Normung (DIN), DRIVER+ project, CURSOR project*
  Dimitris DIAGOURTAS, *STRATEGY project*
  Francine AMON, *ASSISTANCE* project

In the **Private* Session**, discuss how standards can benefit your specific project, for example:

- Which key exploitable results could benefit from standardisation?
- What are your standardisation needs?
- How shall we find relevant standards (keywords)?
- Are there existing pre-standardisation opportunities?
- What can the project do to facilitate your work?

*To protect IP, each participating project will form a break-out group. Projects can tailor this time for their own needs.

This workshop is brought to you by the ASSISTANCE and aqua3s projects, which have received funding from the European Union's Horizon 2020 research and innovation programme under Grant No. 832576 (ASSISTANCE) and Grant No. 832876 (aqua3s).

Time	Presentation/activity	Speaker	Organisation
General part of the workshop			
13:00-13:10	Welcome and introduction	Francine AMON	RISE
13:10-13:25	How the standardisation process works and benefits to research projects	Livia MIAN	CEN/CENELEC
13:25-13:40	The types of standards and related research and supporting activities	Philippe QUEVAUVILLER	DG-HOME
13:40-13:50	Sector Forum on Security	Janne KALLI	SFS
13:50-14:00	European Reference Network for Critical Infrastructure Protection	Monica CARDARILLI	DG JRC – ERNCIP
14:00-14:10	CEN TC 164 Water Supply	Peter FRENZ	DVGW
14:10-14:20	aqua3s project	Anastasios KARAKOSTAS	EGM
14:20-14:35	DRIVER+ & CURSOR projects	Saskia MARESCH	DIN
14:35-14:45	STRATEGY project	Dimitris DIAGOURTAS	SATWAYS
14:45-14:55	ASSISTANCE project	Francine AMON	RISE
14:55 – 15:10 Intermission & set-up for break-out groups			
Private part of the workshop			
15:10-15:40	Break-out sessions for projects		
15:40-15:55	Summary of break-out sessions		
15:55-16:00	Closing comments	Francine AMON	RISE

Annex IV: Standards questionnaires for ASSISTANCE consortium

These are the questions sent to the practitioner partners:

9. Name of your entity
10. Are you aware of standardization: Please rate on a rating scale of 1 – 5, where 1 is “not aware at all” and 5 is “totally aware”.
11. Do you use standards? If yes, why?
    - Quality and reliability
    - Compatibility between products and components
    - Clear communication with customers and suppliers
    - Required by customers
    - Compliance with legislation
    - Positive perception and reputation of your business
    - Others (Please describe below)
    - No, I don’t use standards

    Comments about how you use standards:
12. Which standards do you apply? Please specify if possible. You can choose more than one:
    - National
    - European (CEN, CENELEC, ETSI)
    - International (ISO, IEC, etc.)
    - Others (Please describe below)

    Comments on other standards. If you have chosen national, please specify the country.
13. Which topics are of your interest: (i.e.: ICT, Security & Defence, interoperability, etc.)
14. Does anyone at your entity participate in standardization activities? If yes, please specify what/where:
15. Are you aware of any relevant international/European standards, standards in preparation or other pre-standardization activities relevant to ASSISTANCE? If the answer is yes, please list them.
16. Please, list any areas relevant to ASSISTANCE that should be covered by a standard (identified gaps in the standardization).
17. Can you provide any keywords to search for relevant standards or pre-standardization activities?

These are the questions sent to the technology provider partners:

1. Key Exploitable Result (KER), you can list more than one KER:
2. Name of your entity:
3. Are you aware of standardization: Please rate on a rating scale of 1 – 5, where 1 is “not aware at all” and 5 is “totally aware”.
4. Do you use standards? If yes, why?
   - Quality and reliability
   - Compatibility between products and components
   - Clear communication with customers and suppliers
   - Required by customers
   - Compliance with legislation
   - Positive perception and reputation of your business
   - Others (Please describe below)
   - No, I don’t use standards

   Comments about how you use standards:
5. Which standards do you apply? Please specify if possible. You can choose more than one:
   - National
   - European (CEN, CENELEC, ETSI)
   - International (ISO, IEC, etc.)
   - Others (Please describe below)

   Comments on other standards. If you have chosen national, please specify the country.
6. Which topics are of your interest: (i.e.: ICT, Security & Defence, interoperability, etc.)
7. Does anyone at your entity participate in standardization activities? If yes, please specify what/where:
8. Will your ASSISTANCE KER be affected by standards?
   - National
   - European (CEN, CENELEC, ETSI)
   - International (ISO, IEC, etc.)
   - Others
   - I don’t know

   Please add comments in relation to question number 8:
9. Are you aware of any existing international/European standards relevant to the result?
   Please list the relevant existing standards.
10. Will your KER be compliant with the relevant standards?
11. Are you aware of any relevant international/European standards in preparation or other pre-standardization activities?

    If the answer is yes, please list the relevant standard/s in preparation.

12. Please, list any areas relevant to the result that should be covered by a standard (identified gaps in the standardization).
13. Can you provide any keywords to search for relevant standards or pre-standardization activities?

Annex V: Keywords provided by ASSISTANCE consortium

KER	KEYWORDS
Augmented video fusion module	none received
Chemical Hazards Tool	none received
Damaged Assets Location and Routing (DALR) module	Mass evacuation simulation (pedestrian and vehicular) Sheltering (resilience and response) Routing for intervention Evacuation
Robot management module	Unmanned ground vehicle UGV UGV OCU UGV HMI UGV IOP autonomous mobile robot
Drone swarms for improved network coverage	Mission interoperability Drone swarming communication Drone swarming interoperability Drone swarming standard control Standard network coverage device Communication of video streaming during an emergency
GESTOP adapted situational awareness platform	Standard messages JSON
Hybrid communication hub	none received
Hostile drone neutralisation module	none received
Mission Management Module	none received
First Responders	UAV
	First responder protection, safety and training standards
	If anything is mounted on our uniforms, it needs comply with safety regulations
	Drones
	RPAS

Annex VI: Horizon Results Booster – Exploitation Roadmap

PDES – Module C Final Report
for
«ASSISTANCE»

ADAPTED SITUATION AWARENESS TOOLS AND TAILORED TRAINING SCENARIOS FOR INCREASING CAPABILITIES AND ENHANCING THE PROTECTION OF FIRST RESPONDERS

Grant Agreement Number: 832576

Exploitation Strategy Seminar
delivered on the 22nd of April 2022

Provided by:
PAOLO DE STEFANIS

Index

1 Executive summary

This report summarises the process followed for the PDES-C service delivered to the ASSISTANCE project and the main outcomes of the exploitation strategy seminars (ESS) held on the 22nd of April 2022. The seminar was conducted from remote (online).

It presents the seminar, the agenda of the day, the participants. It then introduces the terminology used, and the three main tools presented and exercised:

- the characterisation table
- the exploitation roadmap and
- the risk matrix.

The Expert was appointed on the 19th of May 2021 and the Project Coordinator was contacted on the 19th of May 2021. The Coordinator informed the Expert that the ESS would have taken place at the beginning of 2022.

On the 28th of May a conference call with the Project Coordinator was organised to discuss expectations, get a first insight on the state of the art, present the service and introduce preparatory activities, it was agreed to have 2 half day ESS at the end of a thorough work together. On the same day the Expert sent to the Project Coordinator all the info and the Exploitation Summary Table to be shared with Project Partners and filled.

Preliminary Reports were exchanged with the team, with the Expert strongly suggesting sharing the document with all the Partners before the ESS to have a common starting point at the ESS.

The ESS were then attended by Eduardo Villamor Medina, Federico Carvajal and Fidel Gonzalez. The agenda presented in this report is the one actually run.

During the seminar, the discussions included a focus on how exploitation needs to aim at sustainability of the activities, after the end of the project. Besides, particular attention was devoted to the activities to be possibly carried out during the Business Plan Development phase.

Sessions were held remotely, with the partners actively contributing, according to their role.

On the same days of the ESS, the Expert sent to the Project Coordinator, to be shared with Project Partners, all the materials used, and slides presented.

After the ESS the Expert requested to follow up the analysis of the possible risks to be tackled, to be sure that it includes all the main hurdles and the contingency plan to be enforced.

Anonymous feedbacks will be gathered from participants through the HRB platform project's dedicated workspace.

From the Expert's perspective, some quick preliminary remarks that will be better detailed in the Recommendations section are provided below. Project Partners need to carefully consider the following remarks:

a. The project is working in the direction of exploiting what is technically achieved during the project's life. Project Partners have been very clear that it's crucial to finalise exploitation related decisions asap. The economic feasibility and viability of KERs should be revised according to updated information which will come out in the next months, linked to the further technical development of the KERs. Clear quantification of costs and revenue streams/additional sources to cover costs to be incurred is crucial to prioritise actions and understand sustainability.
b. Ownership of results, Background brought by several partners annexed to the Consortium Agreement and the consequent rights to exploit, should be further clarified and, if relevant,

bilateral/multilateral Memorandum of Understanding (MoU) agreements should be signed among relevant partners. A template for the MoU is provided enclosed to this report.

c. The project is delivering several Exploitable Results, even if two have been the direct subject of this analysis. The business case is still to be fully validated, which should be done through a BPD service.

d. Most of the efforts now should be on assessing the most valuable business model to deliver these KERs to the market, both through standard commercialization routes and PPI/PCP approaches. It's crucial that the Consortium devotes adequate resources to ensure that the key project outcomes are made available to the relevant stakeholders, mixing a baseline exploitation strategy based on publicly available data and results with a "premium" service delivered against payment.

2 List of Abbreviations

Abbreviation	Definition
BPD	Business Plan Development
BP	Business Plan
DALR	Damaged Assets Location and Routing
ESS	Exploitation Strategy Seminar
KER	Key Exploitable Result
H2020	Horizon 2020
HRB	Horizon Results Booster
PPI	Public Procurement of Innovation
PCP	Pre-commercial Procurement
PDR	Plan for Dissemination of Results
MVP	Minimum Viable Product
WP	Work Package

3 Introducing the PDES-C

3.1 The PDES-C

The aim of this service is to strengthen the capacity of projects in using their research results enhancing partners' capacity to improve their exploitation strategy.

Project activities and the research work done or to be done are considered in terms of Key Exploitable Results (KERs). KERs are results which have commercial and/or societal significance. The results selected for the discussion during the service are analysed from a viewpoint which is exploitation only and considering how they will be used to generate, after the end of the project, impact. This is the market/customer demand or societal needs/user point of view.

The service and the virtual Exploitation Strategy Seminar (ESS) provided the participants with the opportunity to work on:

1) the identification/grouping of key exploitable results;
2) the first definition of the related use mode;
3) the identification and mapping of risks related to the exploitation;
4) follow-up actions.

The ESS for ASSISTANCE was conducted remotely, online, due to the COVID-19 restrictions enforced throughout Europe.

3.2 Agenda of the day

22nd of April 2022

12,00 – 12,15, Ice breaking (Expert, all project partners)

Welcome, virtual tour de table, presenting the Exploitation Strategy Seminar agenda.

12,15 – 13,00, Achieving Project Goals – Characterisation Table and Exploitaiton Roadmap (Expert)

Introducing the main elements connected to the Characterisation of Key Exploitable Results.

13,00 – 13,30 – Next Steps (Expert).

3.3 List of Participants

No. Partner	Organisation	Name and Surname
4	ETRA INVESTIGACION Y DESARROLLO SA	Eduardo Villamor Medina
7	UNIVERSITAT POLITECNICA DE VALENCIA	Federico Carvajal
8	FUNDACION ANDALUZA PARA EL DESARROLLO AEROESPACIAL	Fidel Gonzalez

3 partners out of 19 attended the meetings. They were those involved with the project coordination, generation of the KER and project exploitation activities.

4 Exploitation and Key Exploitable Results

4.1 Next future - Exploitation in Horizon Europe

Activities to disseminate and exploit results from research and innovation are an integral part of Horizon Europe. Enhanced dissemination and exploitation are strategic matters for the success of Horizon Europe, synergies with other programmes and for the achievement of impact on society at large. One of the most efficient ways of furthering dissemination and exploitation of research results is through education and training. When new discoveries and knowledge are integrated in education activities, students at all levels are able to bring state-of-the-art knowledge with them to workplaces across society.

In addition to the initiatives towards open science mentioned above, Horizon Europe introduces novelties in the way research and innovation results are disseminated and exploited, giving more **emphasis to third party uptake** with **private investments** and to the knowledge and **impact these results create after the end of research and innovation projects**.

Against this background, and in line with Horizon Europe's overarching objective of enhanced communication and engagement with the public, dedicated activities for the visibility, use and valorisation of research and innovation results, including mission outputs are introduced. Horizon Europe ensures support to beneficiaries for their dissemination and exploitation activities during and after their project lifetime. Furthermore, a framework for feeding consolidated outcome based on research and innovation results, into policy and decision making will be proposed.

The availability of top-quality talent and the effective circulation of knowledge between research, industry, education and training is a pre-requisite for maximizing the impact of European research and innovation investments. Integrating research and innovation activities with education and training and supporting activities for knowledge exchange and transfer across sectors, for instance via Marie Skłodowska-Curie Actions and Knowledge and Innovation Communities, is a powerful method to ensure research and innovation activities are informed by and directed towards citizens' and society's needs and the results are widely disseminated, for instance through a well-educated workforce. A balanced approach between research and innovation is a central part of Horizon Europe, built in the design which spans the full range of Technology Readiness Levels (TRLs) from curiosity-driven research to commercially driven innovation and support to market deployment, and within innovation, technological, non-technological and social innovation.

4.2 Definitions

Results: Any tangible or intangible output of the action, such as device, data, knowledge and information whatever their form or nature, whether they can be protected.

Communication: the **promotion of the project and its results** to a multitude audience (including the media and the public/society) in a strategic and effective manner.

Dissemination: the **public disclosure of the results** by any appropriate means (other than resulting from protecting or exploiting the results), including by scientific publications in any medium.

Exploitation: the **utilisation of results** – up to four years after the action:

- in further research activities other than those covered by the action concerned, or
- in developing, creating and marketing a product or process, or
- in creating and providing a service, or in standardisation activities.

4.3 Characterisation Table

The characterisation table is the tool used in the ESS to summarises the main features of a KER and to provide information on the selected exploitation route. Information summarised in the characterisation table is to be further integrated and finalised after the ESS becoming the base for the PEDR/business plan for the result. It does not focus on the scientific dimension of the KER but offers a snapshot of the most important elements to be considered when dealing with the use of a result, following a problem oriented (demand driven) approach.

During the ESS project partners discuss the characterisation table in an interactive manner and further finalised it.

In the table, each element is described in a simple way highlighting the most important features that distinguish the result from current solutions. The table contains information on:

- **The novel solution:** Description of the Result, problem solved, Unique Selling Point (competitive advantages or innovativeness introduced compared to already existing Products/Services);
- **Market:** Product/Service Market Size, Market Trends/Public Acceptance, Product/Service Positioning; Competitors/Incumbents, Prospects/Customers;
- **External factors:** Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.);
- **Go to market aspects:** Cost of Implementation (before Exploitation), Time to market, Estimated Product/Service Price, Adequateness of Consortium Staff, External Experts/Partners to be involved;
- **IPR Status***:* Background (type and partner owner), Foreground (type and **partner owner)**;
- **Exploitation Strategy:** Exploitation Forms (direct industrial use, technology transfer, license agreement, publications, standards, etc.), Which partner contributes to what (main contributions in terms of know-how, patents, etc.) Partner/s' expectations, Sources of financing foreseen after the end of the project (venture capital, loans, other grants, etc.).

4.4 Priority map and risk matrix

The Priority Map provides at a glance a snapshot on the main risks identified by the partners. It is based on risks selected in the Risk Matrix assessment tool (Risk Matrix) and the proposed remedy actions. The Risk Matrix helps the partnership identifying for each KER, the type of risk, its level of importance related to the use of the concerned KER, the probability for such a risk to happen, remedy actions and their probability to succeed.

The Risk Matrix analyses the following six different categories of risks:

- **1. Partnership Risks:** internal risk factors related to the composition of the partnership or specific behaviours of the partners, conflict of interests, etc.
- **2. Technological Risks:** external factors related to the feasibility of the technology, its level of development, presence of other emerging technologies, etc.
- **3. Market Risks:** external risk factors related to fulfilment of marked needs, presence of competitors or alternative products, etc.
- **4. IPR Risks:** factors related to the presence of similar previous patents, the possibility to protect the developed technology/product, patent counterfeit, etc.
- **5. Environmental risk factors:** are external factors related to the presence or changing in legislations, standards, etc. Special attention will be given to regulatory environment and standardisation issues.
- **6. Financial risk factors:** factors related to the availability of funds for bringing the research stage to prototyping industrialisation/commercialisation.

The severity grade is scored for each risk (1 = low; 10 = high). The grade shows the importance of the risk with respect to successful exploitation. For example:

- a previous patent, on the same technology, is a severe risk (10 points) if our exploitation route is fully relying on patenting;
- the sudden change of market conditions can be a severe risk if we want to introduce a product into the market.

After scoring the severity grade, the second step is to evaluate the probability for the risk to happen (1 = low; 10 = high). In the examples above:

- in the case of the patent, if we realize (after a quick search) that there is a patent preventing us to patent as well, then the probability of happening is 100% and the related mark is 10;
- in the case of market change: the apple market will not change so dramatically in the next future (grade 1) while apps market is changing every day (grade10).

The product of the severity and the probability grade will give the risk grade of the concerned risk factor (value on the x axis).

The risk grade coupled with the probability of success will position the risk in the Priority Map.

- A high-risk grade and a low probability of success of the intervention, identifies a situation where we may consider discussing to stop the project (Warning). Examples:
  - There is a patent interfering with the one we would like to file. As a remedy, there is the plan to ask the owner for an agreement but, it is evident, chances of succeeding are very low. The selected exploitation path is blocked and there is not any possibility to go on;
  - The market is changing regulations and the product is not compliant anymore. As a remedy, there is the re-design of the product but with a very low probability of having something that will match the customers' needs. This may lead to the decision to stop the project.

- A high-risk grade with a high probability of success for the remedy action defines a situation where there is the need for an immediate action to ensure exploitation (action). Examples:

  - There is a previous patent interfering with the one we are about to file in. An agreement with the previous patent is feasible. In this case, the exploitation of that technology, if the agreement is reached, it is still possible, but action should be taken as soon as possible;
  - The market is changing regulations and the product is not respecting the new one. The re-design of some components will fulfil both compliance to new regulations and customers' needs. Partnership should re-think our project as soon as possible.

- A low-risk grade coupled with a high probability of success of the planned remedy defines a situation where it would be preferable to keep an eye on what is happening (Control) to be ready to act. Example:
  - Regulations in the market have not changed since the last 20 years and our product is valid only with such regulations. As a remedy, we should re-design some components to continue to be on the market. We have to monitor the situation (regulatory framework) and in case it will change, we have to immediately re-design our product.

- A low-risk grade and a low probability of success for the remedy, it is a situation does not call for immediate action (no action). Examples:
  - Regulations in the market have not changed since the last 20 years and our product is valid only with such regulations. We could think to re-design our product but there are low possibilities to get good results. Under these conditions it is better not consider any intervention;
  - Regulations in the market have not changed since the last 30 years and our product is fully compliant. There is no need at the current stage to modify our product nor to be worried about any change in regulations.

4.5 Towards the exploitation plan

The ESS is just one of the first step of a structured path towards exploitation. Working with KERs calls for understanding what the actual results are (will be) and what needs to be until the end of a project (and beyond) to have a clear and actionable exploitation plan ready and agreed among partners.

In the following pages, we provide a table that illustrates how what it is discussed during the ESS is to be integrated and developed to prepare the exploitation plan. Using these tables will help project partners in better prepare and structuring the Plan for Exploitation and Dissemination of the Results (PEDR) by focusing on relevant information planning actions and ensuring resources needed for a sustainable use of the results.

Support in finalising is part of the Business Plan Development (BPD) service provided under the Horizon Results Booster [1].

Characterisation Table

Add KER name	
Problem	*Describe the problem you are addressing (the problem your potential users have).* *Potential users are the people, companies, organisations, etc. that you expect will use the result (and generate an impact). They are your "Customers".*
Alternative solution	*Describe how your "customer" has solved the problem so far.*
Unique Selling Point USP - Unique Value Proposition UVP	*Describe the competitive advantages, the innovative aspects. What does your solution do better, what are the benefits considering what your user/customer wants, how does your solution solve his/her problem better than alternative solutions, what distinguishes the KER from the competition/current solutions?*
Description	*Describe in a few lines your result and/or solution (i.e., product, service, process, standard, course, policy recommendation, publication, etc.). Use simple wording, avoid acronyms, make sure you explain how your UVP is delivered.*
"Market" – *Target market*	*Describe the market in which your product/service will be used/can "compete", answering the following questions:* *- What is the target market?* *- Who are the customer segments?*
"Market" – *Early Adopters*	*Early adopters are the "customers" you are willing to address first. They are usually the ones that feel the problem harder than all the others (they are not the project partners).*

[1] https://www.horizonresultsbooster.eu/

"Market" - Competitors	*Who are your "competitors" (note: they are the ones offering "alternative solutions")?* *What are their strengths and weaknesses comparing to you?*
Go to Market – Use model	*Explain what is your "use model", how the KER will be put in use (made available to "customers" to generate an impact). Examples of use models: manufacturing of a new product, provision of a service, direct industrial use, technology transfer, license agreement, contract research, publications, standards, etc.* *Note training is a service.*
Go to Market - Timing	*What is the time to market?*
Go to Market – IPR Background	*What is the Background (type/ partner)?*
Go to Market – IPR Foreground	*What is the Foreground (type/ partner)?*

Exploitation Roadmap

The roadmap is a tool designed to help the consortium to identify and plan activities to be performed after the end of the project. The highest risk a consortium faces is not being able to implement the exploitation and dissemination plan and increase the TRL level or go to market, due to lack of resources. The exploitation roadmap is designed to address this risk, mitigate it and pave to way toward use and a stronger impact.

Exploitation roadmap	
Actions	*Briefly describe actions planned to be executed 3-6 months after the end of the project.*
Roles	*Roles of partners involved in the actions defined above.*
Milestones	*List the milestones and KPIs to be used for monitoring the implementation of the actions listed above. Add timeline.*
Financials **Costs**	*Cost estimation to implement planned activities (1 year, 3 years).*
Revenues	*Projected revenues and eventual profits once the KER will be used (1 and 3 years after use).*
Other sources of coverage	*Resources needed to bridge the investment needed to increase TRL and ensure the result is used.*
Impact in 3-year time	*Describe impact in terms of growth/benefits for the society.*

Use options

KER's Exploitation route (how the KER will be further exploited)			
Selected route		**Implementing actor**	**Yes**
DIRECT USE	Commercialisation: *deployment of a novel product/service (offered to the target markets)*	One partner[2]	
		A group of partners[3]	
	Contract research (*new contracts signed by the research group with external clients*)	A partner	
		A group of partners	
	A new research project (*application to public funded research programmes*)	A partner	
		A group of partners	
	Implementation of a new university – course (*Note that a training course is a service*)	A partner	
		A group of partners	
		A new partnership	
INDIRECT USE	Assignment of the IPR	A partner	
		A group of partners	
	Licensing of the IPR	A partner	
		A group of partners	
	Development of a new legislation/standard	A partner	
		A group of partners	
	Spin- off	A partner	
		A group of partners	
		By assignment	
		By licensing	
	Other (*please describe*)		

[2] Partners identifies the partners of the project receiving the ESS, not third parties that may be partner in the future.

[3] Provide the names of the partners.

5 ASSISTANCE – Adapted Situation Awareness Tools And Tailored Training Scenarios For Increasing Capabilities And Enhancing The Protection Of First Responders

5.1 Project Main Data

TITLE	ADAPTED SITUATION AWARENESS TOOLS AND TAILORED TRAINING SCENARIOS FOR INCREASING CAPABILITIES AND ENHANCING THE PROTECTION OF FIRST RESPONDERS
ACRONYM	ASSISTANCE
CONTRACT NUMBER	832576
BUDGET	€ 6.393.691,25
COORDINATOR	UNIVERSITAT POLITECNICA DE VALENCIA
STARTING DATE	01-05-2019
ENDING DATE	31-07-2022

5.2 Project Abstract

The main purpose of the ASSISTANCE project is twofold: On the one hand to help and protect different kind of first responders' (FR) organizations that work together taking into account the type of disaster/crisis they are mitigating in each moment and on the other hand, to enhance their capabilities for facing complex situations providing them advanced training based on Virtual Reality (VR), Mixed Reality (MR) and Augmented Reality (AR), tailored to their real needs depending on the type of incident. ASSISTANCE project will use novel technologies such as; UAV, Robots, drones' swarms and advanced training based on VR, MR and AR for increasing the FR's situation awareness (SA) taking into account their need in terms of data (e.g. real time video, persons and objects location, evacuation routes status, ad-hoc network coverage and so on). Different types of adapted SA modules will be developed inside a common SA framework capable of offering the sensor outcome needed by each FR organization (e.g., real time video and resources' location for firemen, evacuation routes status for emergency health services and so on). Regarding training, an advanced training network based on VR, MR, AR and other novel technologies and methodologies (e.g., tailored curricula, immersive interfaces, adapted training methodology definition, etc.) will be established in order to share different VR platforms and scenarios for enhancing the current training capabilities and skills of different FRs organization. All the ASSISTANCE results will be tested under controlled conditions in three different demonstration pilots. Solutions will be developed in compliance with EU societal values, fundamental

rights and applicable legislation, including in the area of privacy and personal data protection. Societal aspects (e.g., perception of security, possible effects of technological solutions on societal resilience, gender diversity) have to be taken into account in a comprehensive and thorough manner.

5.3 KERs considered at the ESS

Starting from the ASSISTANCE PDR, we have identified the main KERs per WP and we discussed the potential KERs with the WP Leaders.

The initial list of KER is reported in the table below:

ASSISTANCE Result	Brief description of functionalities	Topic 1 rating (1-5)	Topic 2 rating (1-5)
		Please rate your interest regarding topic 1	*Please rate your interest regarding topic 2*
Augmented Video Fusion Module	Software allowing for real-time video flows from UAVs to be overlapped in a GIS map, projecting the field of view on a 3D terrain.	4,24	4,22
Chemical Hazards Module	Software platform allowing for current and predicted gas distribution, calculation and communication of danger zones, human-system interaction, etc.	4,14	3,84
Damaged Assets Location and Routing (DALR) Module	This module includes 2 components: - Damaged Assets Location and Routing: Software platform to manage video streaming from drones, locate damaged assets and provide a routing service. - Evacuation Management: Evacuation and intervention times and rotes will be provided based on appropriate optimization and decision algorithms and real-time computer simulation models.	4,04	4,29
Robots Management Module	Software system that operates on mobile robots and specific payloads (CCTV camera, thermal camera, gas, radioactivity, EMF, …) for disaster response scenarios that is interoperable with modules and toolkits developed in Assistance	3,90	4,02
Drones' swarms for improved network coverage	Software allowing cooperative drones' flights to provide ad-hoc network coverage in hostile environments.	3,84	3,98
Adapted Situational Awareness Platform (GESTOP)	Platform allowing for the integration of several sensors data and offering advanced SA and Command and Control (C2) capabilities. It also includes the Portable SA Platform.	3,64	3,58
Hybrid communication hub	Communication system (hardware) for land mobile and nomadic applications, providing reliable and secure connectivity between the field units, field commanders and the C2 centres. It provides high availability in areas outside of coverage area of traditional communication networks.	3,61	3,73
Hostile drone neutralisation Module	Software allowing autonomous UAV to neutralize in a fast and efficient way malicious drones while minimizing collateral damages.	3,53	3,57
Mission Management Module	Software platform allowing for UAV and UGV Mission Plan building and computation.	3,41	3,82

In order to filter those KERs that have highest exploitation potential, we have run a survey with the potential end users of the various services proposed, resulting in the selection of the following KERs:

No.	Name of the KER
1	Augmented Video Fusion Module
2	Chemical Hazard Module
3	Robot Management Module
4	DALR Module
5	Drones Swarms for improved network coverage

For each KER, we have set up dedicated meetings to start filling the KERs' tables, with the main goal to prioritise those KERs that have stronger exploitation potential.

The main outcome of such meetings was that the most relevant KERs to be further analysed are **KER1 "Augmented Video Fusion Module"** and **KER5 "Drones Swarms for improved network coverage".**

That's why only KER1 and KER5 will be analysed in depth, including the Roadmap and the Risk Assessment, while the others will be described in terms of KER Table only.

6 Improved Exploitation Strategies for Key Exploitable Results in ASSISTANCE

The Characterisation Table and the Exploitation Roadmap were drafted by the beneficiaries with feedback and suggestions from the Expert. The final version is the result of several iterations, brainstorms and discussions during the webinars and coaching sessions. Some final feedback and pointers from the Expert have been included in *italic*.

6.1 KER No.1 – Augmented Video Fusion Module (KER leading beneficiary: UPV)

6.1.1 Characterization of the result

AUGMENTED VIDEO FUSION MODULE	Input from the beneficiary	Output and comments/suggestions for improvement by the Expert
Problem	Currently according to the 7 ASSISTANCE end users (7 Different FRs organizations) none of them are aware of the possibility of overlay real time video from UAV on the GIS of a SA application. There is a commercial solution from ESRI (Full Motion Video) 15 which not really overlap the video window on the same map coordinates. It shows the video window and marks in the map the perimeter of the video window. This hinders the capability of First Responders for having a clear picture of the video context.	*Analyse whether the video overlay feature is a "must have" for first responders or a "nice to have". In other words, what would be the benefits for them to have a better picture of the video context? Or what consequence can they report about poor or sub-optimal visibility of the context?* *Identification of problems is the first step for the finalisation of a clear go-to-market strategy. Clearly show that problems have been identified and validated together with "customers". Involving customers will make sure that results are used and that the envisaged impact is achieved.*

Alternative solution	As far as we know there is not any commercial product that provide this capability. Related solutions in the filed include: GINA Software s.r.o.; Skyward and Pix4D; ANAFI platform.	*Since alternative solutions are important to benchmark the proposed innovation and to get a better insight on competition, it is recommended to focus on them. Make sure you are able to collect the information needed to compare and to quantify the added value of your solution and to have insight on how the alternative solutions are delivered.* *Focus on the use case, understanding the added value for users in a real operating scenario and with real procedures.*
Unique Selling Point USP - Unique Value Proposition UVP	This module offers a very innovative feature not available in the market yet. This new feature helps the end users to see what is happening in a certain point of the map locating the video window in the exact location. This fact allows to locate in real time events, persons or objects which could not be located easily with just a normal video window. The main customer of this module would be different types of FRs organizations.	*You are supposed to describe and **quantify**, considering the problems highlighted and the identified alternative solutions, what do you do better and how better is your solution in solving those specific problems.*
Description	This new module will re-scale the video window to the GIS scale and will fit the video window exactly in the GIS area which is recorded. The effect produced is like a real time window is opened in the GIS to be able to see what is happening in this area in this moment. In addition, the advanced video fusion module will analyse the video flow extracting useful information for the FRs according to their expressed needs (e.g., fire perimeters, smoke plumes, persons' location, etc.) This way once the drone	*Pinpoint the additional information that would be available with Assistance that are not available today to users and analyse their perceived added value.* *Make sure that you provide a clear and compelling description of your solution explaining how the UVP is delivered to early adopters and customers.*

	has passed the area the acquired information from the real time video will remain in the FRs HMI to increase their SA with the synthetic real time information gathered.	
"Market" – *Target market*	The target market for this feature would be different types of FRs organizations for using it for prevention or during real emergencies.	*A clear identification of the target market is needed, with its segmentation both at European and at global level. It should include both a qualitative and quantitative description in terms of size and features.*
"Market" – *Early Adopters*	At this stage we have not identify any early adopter.	*Early adopters are crucial for the implementation of your exploitation plan. Being the early adopters the first ones that will be reached out with the innovative solution, it will be important to make sure to connect with them.*
"Market" - Competitors	As far as we know there is not any commercial product that provide this capability. Related solutions in the filed include: GINA Software s.r.o.; Skyward and Pix4D; ANAFI platform.	*Focus on competitors who are providing alternative solutions.*
Go to Market – Use model	We plan to use the dissemination materiel taken from the project pilots for presenting the module to potential customers in related events (e.g., CERIS workshops, or cluster projects workshops scheduled for the final part of 2021). Technology transfer, possibly to spin-off.	*Please be aware that use model and target market, customers need to be consistent.*

Go to Market - Timing	At the end of the project, we estimate that the module TRL will be 6. We foresee one year after the project for increasing the TRL to 7-8. The potential PCP promoted by the project could be a good mean for achieving this.	*Considering the evolution in terms of time to market, when do you plan to reach the market?*
Go to Market – IPR Background	*GESTOP System*	*Provide background information (knowledge/IP that is relevant to the project that is supplied by the partners at the start of the project) considering also what already agreed in the Consortium Agreement.*
Go to Market – IPR Foreground	*For the moment we have not consulted this issue with the university administrative personnel.*	*Provide foreground information (knowledge/IP produced within the project duration) considering also what already agreed in the Consortium Agreement and what has been generated during the project lifetime.*

Overall comments: the approach is certainly smart and has relevant application opportunities.

Expert's suggestions for the exploitation strategy are:

- Carry out an in-depth market analysis, identifying:
  - Providers of software solutions that could integrate your KER
  - If possible, analyse how such software work and if/how your solution could be integrated.
- If the competitive positioning shows that the technology provides an added value:
  - Create connections with system integrators who can help you further develop and integrate the technology in their solutions.
- Run a profitability analysis to understand the revenue and profit potential of such agreement.

6.1.2 Exploitation Roadmap

KER name	Input from the Beneficiary	Output and comments/suggestions for improvement by the Expert
Actions	The foreseen actions in short-term period after the end of the project are: • Action 1 (A1): Management of Intellectual Property Rights (definition of licensing approach); • Action 2 (A2): Further tests and validation with end users; • Action 3 (A3): Integration of the solution in existing tools used by first responders. • Action 4 (A4): Dissemination of the availability of the solution at international level. A tentative timeline for the action defined above is (considering the end of the Project as T_0): • A1: T_0 + 2 months; • A2: T_0 + 12 months; • A3: T_0 + 24 months; • A4: T_0 + 24 months.	*Attention should be paid to make the result available and usable to the intended audience, and make their availability known through targeted communication actions.* *Key to the exploitation will be the interaction with a system integrator that has a consolidated presence in this market and that can deliver the result to the intended customers.*
Roles	• UPV will take care of all the afore-mentioned activities	*Please ensure that adequate IP exploitation agreements are in place between the KER main exploitation partner and the possible contributors. This is important both for the non-commercial dissemination of the result (e.g., for scientific use) and for its possible industrial exploitation.*

Milestones	The following milestones are defined: • Milestone 1 (M1): definition of NdA and license agreement draft: T_0 + 3 months; • Milestone 2 (M2): final tests and validation: T_0 + 12 months; • Milestone 3 (M3): Redesign of the software to fit the system integrator's product: T_0 + 24 months. • Milestone 4 (M4): publication of the result on scientific and industrial journals A3: T_0 + 12 months.	*Milestone M2 should be achieved through an in-depth involvement of the system integrator, which should start immediately.*
Financials Costs	The following cost breakdown is foreseen for each Action: • A1: about 20 k€ • A2: about 200 k€ • A3: about 500 k€ • A4: about 40 k€	*Provide more information on the above identified costs and investments needed to bridge the end of the project to the next steps planned and increase TRL or go to market.*
Revenues	Depending on the licensing approach, revenues can derive both from upfront payments, royalties on installations, and after sales-services as training and support.	*The analysis of the revenue model should be the basis of the BPD work, as it will largely determine the direct and indirect economic impact for the main exploitation partner.*
Other sources of coverage	No external sources of coverage are foreseen. The costs related to the present exploitation roadmap are expected to be covered by own budget.	*Resources should also include "marketing" expenses, which are those needed to "attract" end users (also possibly paying customers). Besides, resources should be devoted to data maintenance and users' support.*
Impact in 3-year time	In 3 years' time it is expected that the results will significantly support first responders by streamlining their operation in a crisis scenario.	*The work to be done in the BPD shall focus on the quantification of this impact, both in terms of economic and societal potential.*

6.1.3 Risks Assessment and Priority Map

KER Risk Assessment Map							
	Description of Risks	**Degree of criticality of the risk related to the final achievement of this KER. (1 low- 10 high)**	**Probability of risk happening (1 low - 10 high)**	**Risk Grade**	**Potential intervention**	**Estimated Feasibility/ Success of Intervention (1 low- 10 high)**	**Conclusion**
	Partnership Risk Factors						
1	Partner does not follow the exploitation schedule due to lack of business competencies	*6*	*4*	**24**	Regular meetings with the University's TTO will be held to support researchers dealing with potential customers.	*7*	**Control.**
2	Partners carry out low quality exploitation activity	*6*	*4*	**24**	Regular meetings to improve performance and update partners on new developments, exchange on experiences etc	*7*	**Control.**
3	The partner quits executing the exploitation plan	*9*	*2*	**18**	The partner is committed and is already seeking additional opportunities to follow-up with the product development	*5*	**Between Control & No Action**
	Technological Risk Factors						
4	Clients do not like solution, and thus there is low interest	*7*	*7*	**49**	Adapt the functionalities and user experience according to the end-users' and customers' needs.	*9*	**Control.**
5	Integration in third parties' software is problematic	*7*	*4*	**28**	Redesign of the software or launch of a proprietary full-fledged solution.	*5*	**Between Control & No Action**
	Market Risk Factors						

6	Nobody buys the exploitable result: too expensive costs	*7*	*4*	**28**	Review of licence strategy	*5*	**Between Control & No Action**
7	Unsuitable marketing force	*8*	*6*	**48**	Increase the advertising and hire an account manager to approach system integrators and nurture the relationship with them.	*6*	**Control.**
	IPR/Legal Risk Factors						
8	Legal problems - violation of IPR	*7*	*5*	**35**	Find proper legal/commercial agreement.	*7*	**Control.**
	Financial/Management Risk Factors						
9	Marketing and distribution fail due to a weak strategy	*7*	*9*	**63**	Revise the strategy	*6*	**Action!**
10	Marketing and distribution fail due to a lack of resources	*8*	*10*	**80**	a.) Adapt strategy to low-cost activities b.) Dedicate staff more specifically	*8*	**Action!**
	Environmental/Regulation/Safety						
11	Failure to comply with standard procedures in place for first responders	*8*	*2*	**16**	Most of the procedures are already known by the development team. In case of non-compliance, get involved in review activities on actual standards and procedures.	*5*	**Between Control & No Action**

The main risks relate to the integration of the solution with existing tools and procedures, which might require early interaction with system integrators with a strong presence in the field.

Besides, the lack of business focus of certain follow-up activities should be mitigated by directly involving the University's Liaison and TTO Offices, as well as possibly leveraging on the BPD service of the Horizon Results Booster.

6.1.4 Use options

KER's Exploitation route (how the KER will be further exploited)			
Selected route		**Implementing actor**	**Yes**
DIRECT USE	Commercialisation: *deployment of a novel product/service (offered to the target markets)*	One partner[4]	X
		A group of partners[5]	
	Contract research (*new contracts signed by the research group with external clients*)	A partner	
		A group of partners	X
	A new research project (*application to public funded research programmes*)	A partner	
		A group of partners	X
	Implementation of a new university – course (*Note that a training course is a service*)	A partner	X
		A group of partners	
		A new partnership	
INDIRECT USE	Assignment of the IPR	A partner	X
		A group of partners	
	Licensing of the IPR	A partner	X
		A group of partners	
	Development of a new legislation/standard	A partner	
		A group of partners	
	Spin- off	A partner	X
		A group of partners	
		By assignment	
		By licensing	
	Other (*please describe*)		

[4] Partners identifies the partners of the project receiving the ESS, not third parties that may be partner in the future.

[5] Provide the names of the partners.

6.2 KER No.2 – Chemical Hazard Module (KER leading beneficiary: TNO)

6.2.1 Characterization of the result

CHEMICAL HAZARDS MODULE	Input from the beneficiary	Output and comments/suggestions for improvement by the Expert
Problem	Currently, fire brigades and emergency response organisations use very simple methods to predict possible hazard footprints of CBRN events. The basic tool is a set of cloud templates, each representing a typical set of chemicals, which are positioned on a map according to the currently occurring wind-direction. The ellipse shaped templates illustrate the size and shape of alarming and evacuation zones around a toxic cloud. Although plastic templates applied on a paper map are still in use, the computerised version uses digitised cloud templates in a GIS tool (GasMal) and selection of the appropriate cloud shape is supported by a set of questions.	Currently the chemical hazard risk is assessed "conservatively", namely that a larger area is restricted than what would be really needed. In other words, even if a more accurate risk prediction model would be available, this would turn into more informed decisions by authorities and consequently more limited restrictions (or even broader restrictions, in case the model suggests so). *Identification of problems is the first step for the finalisation of a clear go-to-market strategy. Clearly show that problems have been identified and validated together with "customers". Involving customers will make sure that results are used and that the envisaged impact is achieved.*
Alternative solution	-	*Since alternative solutions are important to benchmark the proposed innovation and to get a better insight on competition, make sure you are able to collect the information needed to compare and to*

		quantify the added value of your solution and to have insight on how the alternative solutions are delivered.
Unique Selling Point USP - Unique Value Proposition UVP	- Dynamically taking real-time data into account and integrating this into the model (e.g., weather data and sensor data); - Making uncertainty explicit and reducing uncertainty by integrating real-time data - Using a web interface, which makes the system easier to deploy to users/customers and easier to roll out improvements	*You are supposed to describe and **quantify**, considering the problems highlighted and the identified alternative solutions, what do you do better and how better is your solution in solving those specific problems.*
Description	CBRN hazard evolution module is based on the update of RESPONSE system. Because EFFECTS is a typical preparation tool, requiring a lot of input, predefined accident scenarios are available within RESPONSE, which is a dedicated webserver version of EFFECTS. In emergency situations the CBRN hazard evolution module user just needs to select the appropriate scenario, adjust main inputs (like type and amount of material released) and the tool will collect actual and local meteorological conditions, leading to a reliable hazard footprint. Sensor information from chemical sensors (attached to robots or drones) can be used as feedback and will adjust concentrations calculations according to measured values. This way, a lot of uncertainty in the calculated effects zones can be	*Make sure that you provide a clear and compelling description of your solution explaining how the UVP is delivered to early adopters and customers.*

	eliminated, avoiding unnecessary panic when alarming or even evacuation areas around the accident location.	
"Market" – *Target market*	First response organisations (fire brigades; crisis response).	*A clear identification of the target market is needed, with its segmentation both at European and at global level. It should include both a qualitative and quantitative description in terms of size and features.*
"Market" – *Early Adopters*	Experts for hazardous substances.	*Early adopters are crucial for the implementation of your exploitation plan. Try to be as much precise as you can. Being the early adopters the first ones that will be reached out with the innovative solution, it will be important to make sure to connect with them.*
"Market" - Competitors	EFFECTS (from the company Gexcon): -Strengths: Uses more accurate and validated models -Weaknesses: Does not use real time weather; does not take uncertainty into account; does not integrate sensor measurements SAFER One (by SAFER systems): https://www.safersystem.com/products/safer-one/ -Strengths: Tailored with a lot of functionality for use by first responders - Weaknesses: Does not take uncertainty into account	
Go to Market – Use model	Technology transfer, publications.	*Who should be the target for technology transfer? Is there any company that you believe would be interested in integrating this solution into their offer?*

	But companies like SAFER systems, or Gexcon, could possibly be interested to incorporate the new technology into their products.	*Publications are dissemination means not exploitation ones.*
Go to Market - Timing	TRL5	Is this the current TRL or the target TRL? How will you validate the solution in a real environment? Are you planning to carry out comparative tests with currently used approaches? Depending on availability of funding, we want to let one or more Dutch Fire Brigade departments carry out evaluations of the system. Further product or market development depends on the outcome of such evaluations. TRL 5 is the current level. Perhaps TRL 6 after the demonstration in Turkey.
Go to Market – IPR Background	RESPONSE webserver, SA model and SA display developed under FP7 project TRADR, Work Load Model, Work Agreement model, Socio-cognitive engineering method and tool	
Go to Market – IPR Foreground	Know-how	*Provide foreground information (knowledge/IP produced within the project duration) considering also what already agreed in the Consortium Agreement and what has been generated during the project lifetime.*

Overall comments: This seems to be a nice add-on to existing emergency preparedness and response software used in the field. The most important aspect to validate is how to integrate this feature into existing software, to increase the adoption rate.

To this scope, Expert's advice are:

- **Use Case**: if possible, try to collect information on the consequences of inaccurate hazard footprint determination. What happens when larger (or smaller) areas are restricted? How often does it happen that areas are evacuated that should not be (and areas are kept open instead of being closed down)? What is the impact in terms of economic and societal losses?
- **Business Case**: You mentioned a couple of software that could integrate your solution. If technology transfer is the most likely solution for the commercialization, try to understand how to perform software integration with such solutions. This can be done following this approach:
    - Make a list of the most popular software for preparedness and response (I've done a quick search, and this is the list I've found):
        - https://www.noggin.io/products/emergency-management-software
        - https://veoci.com/solution/emergency-management?gclid=Cj0KCQiAubmPBhCyARIsAJWNpiPBjCMvZ0dO0q3PeJw3cb7H_-1NdgpWKIyAAcLfYnqSfuxcWLpBIlQaAoJhEALw_wcB
        - https://www.intelex.com/landing/emergency-response-software?source=h%2B1cla%2ByaKEG51SvIUSSmNagVb4dH9DnTME7s%2BStFX1s6fSw2rYzL7kxqo63kI3lKAvsO%2FghLVlgVMI6lvg2ZA%3D%3D&gclid=Cj0KCQiAubmPBhCyARIsAJWNpiNiTqU1AbPJJR6PKgfYY09bQxsn92OnTD_95cCcrqItPBbRpGOD-84aAj9eEALw_wcB&gclsrc=aw.ds
        - https://d4h.com/
    - If possible, analyse how such software work and if/how your solution could be integrated.
    - Get in touch with the most interesting software providers to identify in advance if some adjustments are needed in order to integrate your solution in third-party's software.
    - Run a profitability analysis to understand the revenue and profit potential of such agreement.

6.3 KER No.3 – Robot Management Module (KER leading beneficiary: PIAP)

6.3.1 Characterization of the result

ROBOT MANAGEMENT MODULE	Input from the beneficiary	Output and comments/suggestions for improvement by the Expert
Problem	In the crisis management landscape, there is a lack of data integration when it comes to robot management. Robots can only be operated alone, and the data collected cannot be shared and combined with other inputs. Currently, robots are commonly used in scenarios with hazardous environment, in which human presence is undesirable – explosive ordinance disposal (EOD), inspection of partially collapsed structures or mitigation of disasters in highly contaminated environments. Usually a single robot is used, however multiple robots can be used when crisis response scenario requires so (large size of the disaster area, complex environment, various types of events encompassed etc.) - for example, when multiple types of tools and sensors must be used concurrently, or the required operation is too complex to be executed by one robot.	*Elaborate more the use case for the adoption of robots in a crisis scenario. When are they adopted? Explosive management? Other situations?* *How many robots are normally adopted? When do you believe that several robots simultaneously should be used?* *Clearly show that problems have been identified and validated together with "customers". Involving customers will make sure that results are used and that the envisaged impact is achieved.*

	Issues with lack of data sharing are mostly related to situations of robot cooperating with other types of entities. In current setup it is impossible to provide any parameters, such as UGV position, to anyone except operator and personnel right next to operator, such as commanding officer, UAV operators or anyone else actively engaged in any task.	
Alternative solution	-	*Since alternative solutions are important to benchmark the proposed innovation and to get a better insight on competition, make sure you are able to collect the information needed to compare and to quantify the added value of your solution and to have insight on how the alternative solutions are delivered.*
Unique Selling Point USP - Unique Value Proposition UVP	Software system that operates on mobile robots and specific payloads for disaster response scenarios that is interoperable with modules and toolkits developed in ASSISTANCE. This is a step beyond the current State of Play of mobile security robots that are operated as a standalone device and the data from robots is available only to the operator that is operating the platform. Robots can be used in extremely hazardous environments in which human presence is undesirable or limited. They can gather measurements and provide insight to the places that would be inaccessible in other ways, which can be crucial for selection of used measures, planning and execution of crisis mitigation operations.	*Elaborate the value delivered in a specific use case? What are the concrete benefits in terms of usability, crisis management, better operational outcome that you think you can achieve?*

	Use of robots interoperable with other systems allows them to be used in complex crisis management scenarios, in which cooperation between multiple entities involved in mitigation is crucial. Currently, their use in these types of scenarios is limited, since robots are used as the standalone devices, from which data is available only to the operator. Introduction of data sharing and management capabilities would enable to repurpose current generation of EOD and other types of robots to be inserted into more general crisis scenarios. Currently use of such robots has very high deployment costs – in logistics, time, human resources and process interruption. These deployment costs are only viable in situations where otherwise human life would be put at risk. When a given robot can be used more extensively, the deployment costs become more reasonable – if no EOD is required the robot can monitor e.g., the presence/concentration of dangerous gases, provide remote moveable cameras or perform minor scouting tasks in dangerous areas which are not directly life threatening, but pose some injuries risks for humans.	
Description	Software system that operates on mobile robots and specific payloads (CCTV camera, thermal camera, gas, radioactivity, EMF, …) for disaster response scenarios that is interoperable with modules and toolkits developed in ASSISTANCE.	

"Market" – *Target market*	The robot's management module will be offered as an upgraded system on top of the regular security inspection robots. The targeted markets stay the same as the current: governmental and non-governmental agencies that deal with security risks. The primary end-users will be Fire Fighters brigades. Solution is targeted at a single robot use case. However, additional care is taken to make sure all features translate well into multirobot environment. Additional features for dual operation, multirobot coordination and cross-organization cooperation are planned.	
"Market" – *Early Adopters*	The early adopters of our system are Fire Fighters, especially the ones that currently operate mobile platforms manufactured by Łukasiewicz – PIAP and can request an upgrade of their systems.	*A clear identification of the target market is needed, with its segmentation both at European and at global level. It should include both a qualitative and quantitative description in terms of size and features.*
"Market" - Competitors	There are some mobile robots' manufacturers in EU and worldwide that offer competitive solutions. Most of them offer closed solutions in a finalized form. Our Institute provides UGV with an option to prepare customized system for each client. This is achievable due to having full stack production in-house including all mechanical, electronic and software components.	*Focus on competitors who are providing alternative solutions.*
Go to Market – Use model	Our model is to offer the software as additional option that will be marketed together with our portfolio of robotic products.	*Please be aware that use model and target market, customers need to be consistent.*

	We will also provide a service for our customers to upgrade existing solutions.	
Go to Market - Timing	The robot's management module will be at TRL 6 and planned time to market is between 2 years for early adopter to 4 years for general availability of market proven solutions.	
Go to Market – IPR Background	No specific background.	
Go to Market – IPR Foreground	The technology will be directly linked to our design of robots. It is protected by know-how. Several solutions inside our robots are already protected by patents.	

Overall comments: the approach is certainly smart and has relevant application opportunities.

There are many players who are moving in this arena and the competitive advantage of the proposed solution should be validated through an in-depth market analysis.

Expert's suggestions for the exploitation strategy are:

- **Use Case**: Approach first responders and validate their in-field operations. It's particularly important to assess how often they need to deploy more than 1 robot and the information that should be exchanged between robots and with the users.
- Carry out an in-depth market analysis, identifying:
  - Providers of similar solutions based on cooperative robots, even in other industries
  - Their specifications and performance
  - Their status of development
- Define a competitive positioning for the technology under development:

- Based on the collected information and on the estimation of the target performance of the system under development, identify the competitive advantage of the solution

- If the competitive positioning shows that the technology provides an added value:
  - Take a “make or buy” decision: do you want to enter the market with a complete solution (robot + software) or you rather want to provide your software to robot manufacturers?
  - Make an analysis on the other application scenarios where intra-robots communication would create added value for the users (for instance: subsea operations?)

6.4 KER No.4 – Damage Assets Location and Routing (KER leading beneficiary: ETRA&UC)

6.4.1 Characterization of the result

DAMAGED ASSETS LOCATION AND ROUTING (DALR) MODULE	Input from the beneficiary	Output and comments/suggestions for improvement by the Expert
Problem	Drones help improve rescue operations by providing an aerial view of a particular area to first responders. Existing systems using cameras mounted on drones are based on zoom cameras or thermal cameras. Zoom cameras provide functionalities like easy location reference or GPS coordinates of image shown, while thermal cameras main use it is to view in dark conditions, usually at night. The operators usually are provided with an HMI where he/she can explore the area in real-time to get an overview of any damage asset location. There are no existing systems which takes benefit of the operator feedback to provide an automatic rerouting for rescue operations or evacuation teams, or to locate affected areas in a map in real time, so any operator can have an enhanced situational awareness view.	*Identification of problems is the first step for the finalisation of a clear go-to-market strategy. Clearly show that problems have been identified and validated together with "customers". Involving customers will make sure that results are used and that the envisaged impact is achieved.*

Alternative solution	-	*Since alternative solutions are important to benchmark the proposed innovation and to get a better insight on competition, make sure you are able to collect the information needed to compare and to quantify the added value of your solution and to have insight on how the alternative solutions are delivered.*
Unique Selling Point USP - Unique Value Proposition UVP	The two innovative solutions proposed to first responders are on the one hand to easily locate damage assets or unavailable infrastructure in a map and mark them so this information can then later be used in any decision-making process, and on the other hand to automatically calculate (re-)routing alternatives based on the information introduced in the system by the operator.	*Explain how the software classify an asset as unusable/damaged.*
Description	2 software components	*A clear identification of the target market is needed, with its segmentation both at European and at global level. It should include both a qualitative and quantitative description in terms of size and features.*
"Market" – *Target market*	Target market: Global Crisis Management Market Customer Segment: First Responders	*A clear identification of the target market is needed, with its segmentation both at European and at global level. It should include both a qualitative and quantitative description in terms of size and features.*
"Market" – *Early Adopters*	Fire brigades, local police authorities, medical services, civil protection	*Early adopters are crucial for the implementation of your exploitation plan.. Try to be as much precise as you can. Being the early adopters the first ones that will be reached out with the*

		innovative solution, it will be important to make sure to connect with them.
"Market" - Competitors	There are no similar solutions available in the market up to date.	*Why there is no similar solution available? Why a solution to the identified problem has not been introduced so far? Too difficult, too expensive, too small market, etc?? This is very important to be clarified.*
Go to Market – Use model	Given that the KER is composed by 2 software components, it could be exploited through 2 routes: - Publications, further R&D and technology transfer (Evacuation Module) - Further R&D and software as a service (Damaged assets Location)	*Please consider that publications are a dissemination mean not an exploitation one.*
Go to Market - Timing	TRL 6 by the end of the project. The integrated solution is expected to reach the market in 2 years.	
Go to Market – IPR Background	RTE Tool allows to know the evacuation times of a mass gathering event (e.g., fan-zone, stadium, venue of the celebration) within a few seconds by taking into account changing conditions of the emergency (escape routes availability, applied evacuation strategy) – Know-how	
Go to Market – IPR Foreground	Damaged Assets Location and Routing Module (DALR), composed by the Damaged Assets component (owner is	

	ETRA) and the Evacuation Management component (Owner is UC)	

Overall comments: This seems to be a nice add-on to existing emergency preparedness and response software used in the field. The most important aspect to validate is how to integrate this feature into existing software, to increase the adoption rate. To this scope, Expert's advice is:

- (If not done yet): explore the scenario of the most adopted software for emergency preparedness and response. Some of the most famous include:
  - https://www.noggin.io/products/emergency-management-software
  - https://veoci.com/solution/emergency-management?gclid=Cj0KCQiAubmPBhCyARIsAJWNpiPBjCMvZ0dO0q3PeJw3cb7H_-1NdgpWKIyAAcLfYnqSfuxcWLpBIlQaAoJhEALw_wcB
  - https://www.intelex.com/landing/emergency-response-software?source=h%2B1cla%2ByaKEG51SvIUSSmNagVb4dH9DnTME7s%2BStFX1s6fSw2rYzL7kxqo63kI3lKAvsO%2FghLVlgVMI6lvg2ZA%3D%3D&gclid=Cj0KCQiAubmPBhCyARIsAJWNpiNiTqU1AbPJJR6PKgfYY09bQxsn92OnTD_95cCcrqItPBbRpGOD-84aAj9eEALw_wcB&gclsrc=aw.ds
  - https://d4h.com/
- Ideally have a demo of such products and understand if your technology would fit such framework
- Realize a simple mock-up (even with a video or some slides) of your proposed solution and show it to first responders, to get immediate feedback on its usefulness and to collect info on possible new functionalities to add

6.5 KER No.5 – Drone's Swarms for improved network coverage (KER leading beneficiary: CATEC)

6.5.1 Characterization of the result

DRONES' SWARMS FOR IMPROVED NETWORK COVERAGE	Input from the beneficiary	Output and comments/suggestions for improvement by the Expert
Problem	When a large disaster within an area of limited network coverage, or the network is cut off, first responders need to deploy mobile ground antennas to be able to manage the crisis and coordinate with the Command-and-Control Centre. Such antennas have the following limitations: - Hard to adapt to different coverage areas - Ground transport needed for deployment - Time-consuming and setup	*Collect information about the procedures used by first responders when entering a crisis area. In particular, analyse what they exactly do to ensure adequate communication and what are their requirements and how often are they not fulfilled.*
Alternative solution	To the best of our knowledge, there is no commercial solution of this type in the market. There are some existing proofs of concepts in universities and research centres, but there is no service provided up to date. The only alternative commercial solution is based on mobile antennas that are normally carried on ground	*Collect information on the costs of such antennas. In this way we might compare the cost of the swarm of drones with that of antennas.*

	vehicles. These antennas can be temporarily installed to provide network coverage.	
Unique Selling Point USP - Unique Value Proposition UVP	One of the advantages of our solution is that drones can be fast and easily deployed in different areas requiring network coverage. This means that the coverage area can be adapted through minor changes at a software level, which requires a negligible amount of time. On the other hand, fixed ground antennas are inconvenient and considerably less flexible when changing the coverage area. Moreover, in emergency scenarios where ground access is limited (roads and highway are cut off) due to a fire or natural disaster, drones can be easily deployed through the air to cover such areas, while mobile ground antennas could be blocked.	*You are supposed to describe and **quantify**, considering the problems highlighted and the identified alternative solutions, what do you do better and how better is your solution in solving those specific problems.*
Description	Drones as communication relays. A market-based cooperation system will be implemented for ensuring a distributed and efficient way of collaboration between the swarm of drones. This combination of advanced robotics technologies that allows having autonomous drones' swarms, for ensuring communications in emergency scenarios is very novel.	
"Market" – *Target market*	The target market would be first responder services: firemen, sanitary emergencies, law enforcement agencies, etc.	*A clear identification of the target market is needed, with its segmentation both at European and at global level. It should include*

		both a qualitative and quantitative description in terms of size and features.
"Market" – *Early Adopters*	Early adopters would be training services of these first responders.	*Early adopters are crucial for the implementation of your exploitation plan.. Try to be as much precise as you can. Being the early adopters the first ones that will be reached out with the innovative solution, it will be important to make sure to connect with them.*
"Market" - Competitors	There is no similar marketed solution at this stage. Telecommunication entities (Telefonica, Orange, etc…) would be the most relevant competitors.	*Focus on competitors who are providing the closest alternative solutions.*
Go to Market – Use model	Our idea of perfect technology transfer would be to share with one or multiple interested companies the developments and let them mature the technology to an even higher TRL and providing the service to interested agencies as law enforcement agencies. This technology could be interesting for many people as the coverage provided by the swarming could easily be switched to another type of coverage, as visual coverage, or any type of sensing, just by replacing the network coverage device a few developments. Regarding the license, we are not planning to license the software.	

Go to Market - Timing	Expected TRL at the end of the project TRL7 Time expected to market: 5 years	
Go to Market – IPR Background	Algorithms for cooperation and coordination among UAS – Know-how	
Go to Market – IPR Foreground	Network coverage through the use of swarms of drones – Know-how	

Overall comments: the approach is certainly smart and has relevant application opportunities.

There are many players who are moving in this arena and the competitive advantage of the proposed solution should be validated through an in-depth market analysis.

Expert's suggestions for the exploitation strategy are:

- Approach first responders and validate their in-field operations. It's particularly important to assess how often they need to ensure better network coverage and how "happy" they are with the current approach they are adopting.
- Carry out an in-depth market analysis, identifying:
  - Providers of similar solutions based on drones
  - Their specifications and performance
  - Their status of development
- Define a competitive positioning for the technology under development:
  - Based on the collected information and on the estimation of the target performance of the system under development, identify the competitive advantage of the solution (e.g., better network coverage, faster setup time, higher connection speed, etc.)
- If the competitive positioning shows that the technology provides an added value:
  - Create connection with system integrators who can help you further develop and integrate the technology in their solutions. Some interesting players are:

- https://www.telit.com/blog/how-cellular-connected-drones-improve-disaster-response/ (an apparently good partner for co-development)
- https://www.ericsson.com/en/news/2020/12/ericsson-drone-mounted-network-could-support-emergency-response (another large enterprise for co-development)
- https://eena.org/our-community/emergency-services-drones-network/ (important for having access to a community of users and developers)
- https://www.leonardo.com/it/home?utm_medium=paidsearch&utm_source=google_search&utm_campaign=7zIK0N&gclid=Cj0KCQiAubmPBhCyARIsAJWNpiOwt-exWty-wiAc_XGwbVK6Aak8wDg1ML4KMVXPwcfIaQnkaxN4AE4aAoDlEALw_wcB (this is a large Italian company for co-development of drones-based solutions)
- https://itgdronesolutions.com/dronesafebox/?gclid=Cj0KCQiAubmPBhCyARIsAJWNpiN59_FTP-rcWuN0MIPilvQIBE4Iz3rYXw9zvKPI9AOoMlpyePzdvooaAq04EALw_wcB
- https://www.soarizon.io/news/six-ways-drones-are-helping-in-emergency-response (owned by the multinational company Thales)
- https://www.iai.co.il/news-media/features/drones-assisting-emergency-response
- https://dronesaferegister.org.uk/blog/drones-for-emergency-services (this for Public Procurement)

6.5.1 Exploitation Roadmap

KER name	Input from the Beneficiary	Output and comments/suggestions for improvement by the Expert
Actions	The foreseen actions in short-term period after the end of the project are: • Action 1 (A1): Management of Intellectual Property Rights (definition of licensing approach); • Action 2 (A2): Further tests and validation with end users; • Action 3 (A3): Integration of the solution in the operating scenario; • Action 4 (A4): Dissemination of the availability of the solution at international level. A tentative timeline for the action defined above is (considering the end of the Project as T_0): • A1: T_0 + 2 months; • A2: T_0 + 12 months; • A3: T_0 + 24 months; • A4: T_0 + 24 months.	*Attention should be paid to make the result available and usable to the intended audience, and make their availability known through targeted communication actions.* *Key to the exploitation will be the interaction with end users to understand the logistics and economic constraints to adopt the solution.*
Roles	• CATEC will take care of all the afore-mentioned activities	*Please ensure that adequate IP exploitation agreements are in place between the KER main exploitation partner and the possible contributors. This is important both for the non-commercial dissemination of the result (e.g., for scientific use) and for its possible industrial exploitation.*

Milestones	The following milestones are defined: • Milestone 1 (M1): definition of NdA and license agreement draft: T_0 + 3 months; • Milestone 2 (M2): final tests and validation: T_0 + 12 months; • Milestone 3 (M3): Redesign of the solution to fit the real operating environment's conditions: T_0 + 24 months. • Milestone 4 (M4): publication of the result on scientific and industrial journals A3: T_0 + 12 months.	*Milestone M2 and M3 should be achieved through an in-depth involvement of the end users, which should start immediately.*
Financials Costs	The following cost breakdown is foreseen for each Action: • A1: about 20 k€ • A2: about 200 k€ • A3: about 500 k€ • A4: about 40 k€	*Provide more information on the above identified costs and investments needed to bridge the end of the project to the next steps planned and increase TRL or go to market.*
Revenues	Revenues can derive from sales of the drones or alternatively from licenses from drones manufacturers that integrate the software in their systems.	*The analysis of the revenue model should be the basis of the BPD work, as it will largely determine the direct and indirect economic impact for the main exploitation partner.*
Other sources of coverage	No external sources of coverage are foreseen. The costs related to the present exploitation roadmap are expected to be covered by own budget.	*Resources should also include "marketing" expenses, which are those needed to "attract" end users (also possibly paying customers). Besides, resources should be devoted to data maintenance and users' support.*
Impact in 3-year time	In 3 years' time it is expected that the results will significantly support first responders by streamlining their operation in a crisis scenario.	*The work to be done in the BPD shall focus on the quantification of this impact, both in terms of economic and societal potential.*

6.5.1 Risks Assessment and Priority Map

KER Risk Assessment Map							
	Description of Risks	**Degree of criticality of the risk related to the final achievement of this KER. (1 low- 10 high)**	**Probability of risk happening (1 low - 10 high)**	**Risk Grade**	**Potential intervention**	**Estimated Feasibility/ Success of Intervention (1 low- 10 high)**	**Conclusion**
	Partnership Risk Factors						
1	The partner does not follow the exploitation plan	*6*	*4*	**24**	The company is motivated to follow-up the technology development, but it might happen that they lose focus on the business strategy. Support through the BPD service of the Horizon Results Booster might be helpful to provide additional strategic guidance.	*7*	**Control.**
2	Partners carry out low quality exploitation activity	*6*	*4*	**24**	The team plans to organize regular meetings to check the status of the work and plan contingency actions in case of need.	*7*	**Control.**
3	The partner does not pursue the exploitation plan and quits the exploitation of the result	*9*	*2*	**18**	Try to license the results so far achieved to players operating in drones manufacturing and related services.	*5*	**Between Control & No Action**
	Technological Risk Factors						
4	The system is not scalable and fails to provide reliable results with a large network of drones	*7*	*7*	**49**	Redesign the solution or limit the application scenario to situation where the solution fits the requirements of the end-users.	*9*	**Control.**
	Market Risk Factors						

5	We fail to find a drone manufacturer interested to integrate our software	*9*	*7*	**63**	We can develop our own drones and enter the market with a full-fledged solution.	*8*	**Action!**
6	Nobody buys the exploitable result: too expensive costs	*7*	*4*	**28**	Review the pricing strategy.	*5*	**Between Control & No Action**
7	Unsuitable marketing force	*8*	*6*	**48**	Increase the marketing budget.	*6*	**Control.**
	IPR/Legal Risk Factors						
8	Legal problems – failure to find an agreement with the system integrator	*7*	*5*	**35**	Review the framework of the agreement and find alternative economic or legal provisions for addressing possible deal-breaker issues.	*7*	**Control.**
	Financial/Management Risk Factors						
9	Marketing and distribution fails due to a weak strategy	*7*	*9*	**63**	Revise the strategy	*6*	**Action!**
10	Marketing and distribution fails due to a lack of resources	*8*	*10*	**80**	a.) Adapt strategy to low cost activities b.) Dedicate staff more specifically	*8*	**Action!**
11	Lack of endorsement from top management	*6*	*4*	**24**	The management team has always been supportive to the initiative. The investment needed to exploit the research results after the end of the project is manageable.	*9*	**Control**
	Environmental/Regulation/Safety						
12	Failure to comply with standard procedures in place for first responders	*8*	*2*	**16**	Most of the procedures are already known by the development team. In case of non compliance, get involved in review activities on actual standards and procedures.	*5*	**Between Control & No Action**

Risks are mostly relating to testing and operating the solution in a real environment, understanding the whole set of operational constraints to be addressed.

Besides, a detailed business plan should be carried out to decide whether to go to the market with a full-fledged solution (with drones and software commercialized by the partner) or to license the software to third-parties who take care of business development, sales, and after-sales services.

6.5.2 Use options

KER's Exploitation route (how the KER will be further exploited)			
Selected route		**Implementing actor**	**Yes**
DIRECT USE	Commercialisation: *deployment of a novel product/service (offered to the target markets)*	One partner[6]	X
		A group of partners[7]	
	Contract research (*new contracts signed by the research group with external clients*)	A partner	X
		A group of partners	
	A new research project (*application to public funded research programmes*)	A partner	X
		A group of partners	
	Implementation of a new university – course (*Note that a training course is a service*)	A partner	
		A group of partners	
		A new partnership	
INDIRECT USE	Assignment of the IPR	A partner	X
		A group of partners	
	Licensing of the IPR	A partner	X
		A group of partners	
	Development of a new legislation/standard	A partner	X
		A group of partners	
	Spin- off	A partner	
		A group of partners	
		By assignment	
		By licensing	
	Other (*please describe*)		

[6] Partners identifies the partners of the project receiving the ESS, not third parties that may be partner in the future.

[7] Provide the names of the partners.

7 Recommendations

Issues	Recommendations
Characterisation of KERs	The discussion allowed the team to focus on the most promising KER for further development, which turned out to be KER 1 and KER 4 because of the highest innovation potential. Now the activity should focus on validating the use cases and business cases to commercially and non-commercially exploit the technology.
New KER Policy Recommendation	The adoption of KER in operating scenarios might support the definition of new standard procedures in emergency situations.
Discussing Exploitation at Consortium Meetings	Exploitation is an important component of the project. The team should now focus the practical and strategical aspects of exploitation as it was exercised during the ESS. This will allow to update KERs characterisation and risks analysis and contribute to the further development of the technologies and approaches to be showcased at the demo plants. The project should consider the Exploitation Plan as a living document and: ▪ Update the plan according to the progress and emerging results of the project; ▪ Consider reviewing the UVP and the use model during the project lifetime; ▪ Involve colleagues from marketing and business development departments in the finalisation of the plan. ▪ Discuss and finalise, at consortium meetings, exploitation roadmap.
Internal use of KERs	The internal use is foreseen for further research purposes.
Exploitation Plan-Planning	When addressing Exploitation (and Dissemination) Plans, it is suggested to: ▪ Keep it flexible enough and in line with the economic, environmental, societal and legal context in which the project has been set up; ▪ Use the lean canvas to better define early adopters, current solutions, unique value proposition and commercialisation channels (see **Error! Not a valid result for table.** for further information); ▪ Identify KPIs and milestones to define a roadmap, with all the activities needed to pave the way for use of the selected KERS; ▪ Take into consideration the time and resources needed for implementing the next steps after the end of the project, considering that most of the partners have guidelines and procedures for spin-offs, joint ventures, licencing that require time. ▪ Consider consistency among the selected route to market, competition, early adopters, proposed exploitation actions and the expected impact of the project;

	▪ Highlight the value chain dimension of the project and make sure this is considered to find the best set up in terms of future collaboration as partnership and as individual entities;
Monitoring Risk Analysis	It is recommended to continue to address the identified risks and to improve the impact of mitigation actions.
IP ownership and partnerships for exploitation	The lead exploitation partners (UPV and CATEC) will take care of finalizing license agreements for the use and exploitation of the KER.
Horizon Results Platform	It is strongly suggested for Dissemination purposes to upload each key Exploitable result on the EC Horizon Results Platform https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/horizon-results-platform Detailed step-by-step instructions here: https://webgate.ec.europa.eu/funding-tenders-opportunities/display/IT/Managing+Project+Results+in+the+Horizon+Results+Platform Please note that to be authorised to upload you should have granted one of the following roles for the project: PCoCo (Primary Coordinator Contact), CoCo (Coordinator Contact) or PaCo (Participant Contact) roles in the project. This is all explained in the instructions in the link above.
Further exploitation related support service	It would be good to follow up the fruitful work done with the PDES C, with a BPD or with Go-to-Market services. The aim of Go-to-Market services is to address one or more specific aspects for the implementation of the business/action plan: • Pitching (capacity to present in front of interested stakeholders) • IPR support (orientation in the IPR landscape) • Innovation Management (specialised training) • Exploitation options (exploration and in-depth analysis of the different options) • Business services (one among commercialisation plan, evaluation of business plan potential, creation of start-up) • Access to non-EU funding (analysis of funding options for follow-on financing) Additional HRB services can be requested at https://www.horizonresultsbooster.eu/

8 Annex 1: Related information

This chapter reports the results of specific project related to specified key words on the Internet, also a list of projects (found on Cordis) of similar interest with a brief description and related patents.

8.1 Related Links

Some interesting players are:

- https://www.telit.com/blog/how-cellular-connected-drones-improve-disaster-response/ (an apparently good partner for co-development)
- https://www.ericsson.com/en/news/2020/12/ericsson-drone-mounted-network-could-support-emergency-response (another large enterprise for co-development)
- https://eena.org/our-community/emergency-services-drones-network/ (important for having access to a community of users and developers)
- https://www.leonardo.com/it/home?utm_medium=paidsearch&utm_source=google_search&utm_campaign=7zIK0N&gclid=Cj0KCQiAubmPBhCyARIsAJWNpiOwt-exWty-wiAc_XGwbVK6Aak8wDg1ML4KMVXPwcfIaQnkaxN4AE4aAoDlEALw_wcB (this is a large Italian company for co-development of drones-based solutions)
- https://itgdronesolutions.com/dronesafebox/?gclid=Cj0KCQiAubmPBhCyARIsAJWNpiN59_FTP-rcWuN0MIPilvQIBE4Iz3rYXw9zvKPI9AOoMlpyePzdvooaAq04EALw_wcB
- https://www.soarizon.io/news/six-ways-drones-are-helping-in-emergency-response (owned by the multinational company Thales)
- https://www.iai.co.il/news-media/features/drones-assisting-emergency-response
- https://dronesaferegister.org.uk/blog/drones-for-emergency-services (this for Public Procurement)

(If not done yet): explore the scenario of the most adopted software for emergency preparedness and response. Some of the most famous include:

- https://www.noggin.io/products/emergency-management-software
- https://veoci.com/solution/emergency-management?gclid=Cj0KCQiAubmPBhCyARIsAJWNpiPBjCMvZ0dO0q3PeJw3cb7H_-1NdgpWKIyAAcLfYnqSfuxcWLpBIlQaAoJhEALw_wcB
- https://www.intelex.com/landing/emergency-response-software?source=h%2B1cla%2ByaKEG51SvIUSSmNagVb4dH9DnTME7s%2BStFX1s6fSw2rYzL7kxqo63kI3lKAvsO%2FghLVlgVMI6lvg2ZA%3D%3D&gclid=Cj0KCQiAubmPBhCyARIsAJWNpiNiTqU1AbPJJR6PKgfYY09bQxsn92OnTD_95cCcrqItPBbRpGOD-84aAj9eEALw_wcB&gclsrc=aw.ds
- https://d4h.com/

8.2 Related projects

Project Airsense: https://cordis.europa.eu/project/id/793581

In recent years, the need to enable location- and map-aware services in GPS-deprived environments has become increasingly important, especially after natural disasters events. At the same time, the possibility to form swarms of mini-robots is a very attractive solution for users' mobiles positioning and for mapping of position-related physical quantities, not only for outdoor but also for indoor scenarios, e.g. assessing the status of buildings immediately after an earthquake. In this context, unmanned aerial vehicles (UAVs) represent a good choice thanks to their flexibility, reconfigurability and advantageous line-of-sight propagation conditions. Despite UAVs' potentials for indoor positioning, scholars and professionals have mostly considered and used them only for enabling outdoor applications.

In this perspective, AirSens aims at analyzing the potentialities of swarms of UAVs for high-accuracy tracking and sensing in indoor contexts, by addressing three novel objectives: (1) the assessment of the swarms' localization performance, even in infrastructure-less scenarios, by deriving the fundamental limits and considering energy-efficient solutions; (2) the investigation of swarms' mapping capabilities, enhanced by crowd-sensing mechanisms; (3) the design of an information-seeking control for navigation (i.e. where the swarm should navigate to provide reliable position estimates) and formation (i.e. which specific swarm geometry can maximize the positioning performance).

These objectives will be pursued through an innovative combination of theoretical and experimental analyses, possible thanks to the synergy between the researcher and her supervisors, experts in the fields of advanced signal processing (USA) and radio-localization (Italy), which perfectly matches the project vision. AirSens will also enhance the researcher technical and managerial skills thanks to multidisciplinary and ad-hoc training activities.

Project 1-SWARM: https://cordis.europa.eu/project/id/871743

Cyber-physical systems-of-systems (CPSoS) are networks that interconnect cyber-physical systems and people. The focus is on increasing the intelligence of cyber-physical systems at the edge of the networks, so that they show cognitive behaviour and have a high degree of autonomy. The EU-funded 1-SWARM project aims to develop a modular framework for designing robust CPSoS networks characterised by swarm intelligence that meet industrially accepted open standards. Dubbed the 'Swarm Intelligence DevOps Framework', it will aid researchers to engineer CPSoS for diverse scenarios: food packaging and material handling operations, automated guided vehicles in dynamic environments, and flocks of aerial drones used to monitor retail shops.

Project Hoppersup: https://cordis.europa.eu/project/id/101000154

The role of unmanned aircraft systems is expanding to include emergency fire services. Firefighting drone technology can reduce the risk to human life and support firefighting efforts when manned aircraft are grounded at night-time and in daytime periods of reduced visibility. Currently, the use of

drones is limited to monitoring and data collection tasks mainly due to the lack of the necessary power to lift heavy loads. In this context, the EU-funded HOPPERSUP project will focus on the development, implementation and testing of an enhanced stabilisation control system for a new platform for heavy duty drones. The aim is to increase the drones' payload capacity from 150 litres to 600 litres.

Project Gamodrone: https://cordis.europa.eu/project/id/751062

The use of civilian unmanned aerial vehicles (UAV) that allow capturing and streaming video in real-time is steadily increasing. One of the reasons for such interest is that the use of drones, either single units or in swarms, is currently being considered for reconnaissance missions in emergency situations such as earthquakes, radiation leakage in nuclear power plants or in case of a terrorist attack. More challenging applications such as package delivery services are also being considered, in which data speed, reliability and video quality are of paramount importance. Another promising application for civil UAV's is to help providing flexibility to beyond-5G networks. The main goal of the project (highest priority) is to study efficient adaptive video compression and streaming solutions for interactive and non-interactive omnidirectional video that allow making an efficient use of the available bandwidth while satisfying target delay and video quality requirements. In order to deal with the limited knowledge of the interference environment at the receiver side (which is a likely scenario for airborne terminals) I will study efficient interference management and multi-user detection techniques. In order to further optimize the bandwidth usage, the correlation between the information of different terminals (e.g. when two or more drones within a swarm are capturing partly overlapping panoramas) will be exploited, so that redundant information is kept at the minimum necessary. The secondary goal (lower priority) of the project is the study of how to efficiently exploit the unique UAV's mobility characteristics to provide additional coverage in congested network areas. This will be carried out by capitalizing on the results of the main goal. In particular, the channel characterization and the interference management techniques studied in the context of video streaming will be adapted to the use of drones as 3D-mobile gap-fillers.

8.3 Related patents

There are several patents relating to drones' technology and techniques for image overlay, but none of them is conflicting with the main KERs analysed.

9 Annex 2: Memorandum of Understanding (MoU)

1. Valorisation and exploitation of … (please refer to the specific KER)

1.1 Agreement between partner, partner, partner ……

1.2 The following Memorandum of Understanding is made on the dd/mm/yyyy by and between

- **Partner a**, VAT …, registered in …, hereinafter referred to as …
- **Partner b**, VAT …, registered in …, hereinafter referred to as …
- **Partner c**, VAT …, registered in …, hereinafter referred to as …
- **……**

Individually referred to as a "Party" or collectively as the "Parties".

1.3 Background of the Agreement

During the CLEANKER project's life the KER was developed… *(clearly describe the KER)*

As per consortium agreement of the Project signed by the Parties, [number of Section]: Results, … Results are owned by the Party that generates them.

Partner a, b, c, x, y and z contributed to the generation of the KER. Each one contributed in the following way:

- **Partner a, …**
- **Partner b, …**
- **Partner c, …**
- **Partners x, …**
- **Partner y, …**
- **Partner z, …**

Upon successful conclusion of the project activities, Parties agreed to jointly define the best way to exploit and valorise the KER.

Partners a, b, c, … expressed the willingness to further valorise and exploit the above-mentioned KER, securing the needed resources, while partners x, y, and z agreed to give to partners a, b, c, … the full right to exploit declaring to have nothing to claim.

Given the uniqueness and further impact potential of KER/s above mentioned, all Parties through this agreement aim to define clear roles and modalities to exploit the programme beyond the grant received from the European Commission.

1.4 Purpose of the Agreement

The agreement is therefore aimed at clarifying and regulating

A. Scope and objectives of KER
B. Use of the brand *(example)*
C. Use of the data collected via the platform *(example)*
D. Use of the DB (software) *(example)*
E. Procedures and Roles of the Parties *(example)*

2. Scope and objectives of KER ……

The Parties agree that KER is …(KER description)

The KER is built around… and it is implemented through:

A. A network(s)-based outreach approach; *(example)*
B. …;
C. …;
D. ….

3. Use of the brand

….

…

4. Use of the data collected

…The registered data are the property of each of the Parties, who can use them for other activities in respect of GDPR and only for non-competing purposes with the current agreement (to be finetuned by partners legal offices).

5. Use of the ….

5.1 Procedures and Roles of the Parties

All Parties shall appoint 1 person within their respective organisation as the first and foremost contact point for ensuring swift and clear communication between the Parties and for implementation of the exploitation plan for this KER as approved by CLENKER and annexed to this MoU.

The initial persons responsible for being the contact point are:

- Partner a: Name, email address, telephone number
- Partner b: Name, email address, telephone number
- Partner c: Name, email address, telephone number
- Partner ……

All partners will be informed of changes in the contact points in a timely fashion, not exceeding 5 working days from the moment the appointment from the organisation.

Partners a, b, c, … who expressed the willingness to further valorise and exploit the KER will proactively look for potential business development opportunities. Each time one of the Parties is clearly informed by a potential customer, the Party must inform the other Parties' relevant contact points and receive organisational approval (X out of X) to proceed.

It is the responsibility of each Party to ensure the contact points of the other Parties are informed using, if necessary, more than one communication channel (*e.g., email, WhatsApp, phone, etc*). It is the responsibility of the other Parties to ensure the approval to proceed (or denial thereof) is communicated back to the Party in a timely fashion, not exceeding 1 working week (5 working days) from the moment the latter's communication has reached them.

5.2 Dedicated KER management (in the case of a horizontal governance set-up – to be finetuned according to the governance set up chosen by the concerned partners, before the end of the project))

The Party in charge of any new contract will inform all partners about the client, the scope of the contract and foreseen role for each partner (if possible and to different degrees). In order to progress with a new programme, partners must agree on its relevance and viability. Parties have 5 working days to register non-agreement, otherwise the proposal will be considered suitable.

When the contract is finalised, agreed by all Parties and service sold to the client, the Party in charge will act as main contract manager and coordinator, responsible and liable for the smooth implementation of the envisaged activities throughout all phases.

The partner who secures the contract should also perform a "client financial check" and all Parties will be paid promptly upon payment from the client according to the payment schedules agreed upon.

The Party will be the interface between the client and the Parties and will also be responsible for proposing the allocation of resources among partners.

5.3 Promotion and marketing

Parties a, b, c, … who expressed the willingness to further valorise and exploit the KER will ensure the proper outreach, using their networks and contacts (social media, newsletters, websites) to promote the KER toward the target markets and early adopters initially identified in the exploitation plan annexed to this MoU.

The most suitable party to deliver the communication activities will be decided on the basis of the scope of the contract and the main target audience.

Cost of marketing and sales activities will be split among partners according to the provisions of the exploitation plan for the current KER.

5.4 To summarise:

Activity	*Party responsible*	*Cost split between parties (%)*
Programme management and coordination	*Party who secured a contract*	
KER and methodology management	*…*	
Innovation and IPR management		
KER update		
Outreach and communication	*…*	
…	*…*	

6. Intellectual Property Rights and NDA

The Parties acknowledge that nothing in this Agreement shall affect any pre-existing (background) and future (foreground) ownership of any intellectual property rights.

Dedicated NDA will be developed and signed between Parties and customers every time needed.

7. Miscellaneous

In the event of further participation in call for proposals covering actions that fall in the scope of this Agreement, the parties mutually recognize a first right of information and best effort to bid together

This Agreement is at-will and may be modified by mutual consent of all the Parties. This Agreement shall become effective upon signature by the authorised officials and will remain in effect until modified or terminated by any one of the Party by mutual consent. In the absence of mutual agreement by the Parties this Agreement shall remain in force for twenty-four months.

Any dispute that might arise concerning this Agreement shall be settled amicably.

8. Date & Signatures

FOR [please insert name of participant or potential or current partner]

Partner a: Name, Position

Partner b: Name, Position

Partner c: Name, Position

Partner x: Name, Position

Partner y: Name, Position

Partner z: Name, Position

10 Annex 3: The Lean Canvas

10.1 How to approach the business model

The Business Model is the plan for the successful operation of any "business", identifying, the intended "customer" base, products/services, sources of revenue and details of financing. It describes the way in which "value" can be extracted from an exploitable R&D result.

When working on the "business" model it is important to focus on the following elements:

<table>
<tr><td colspan="2">Your ultimate goal
• Why am I doing this thing?
• Which are my goals? (Best and worst scenario)
• Am I really better?</td></tr>
<tr><td>Global market
• Competitors
• Incumbents
• Investors (geography matters)
• Level of investment</td><td>Local market
• Competitors
• Incumbents
• Investors
• Peculiarities</td></tr>
<tr><td colspan="2">6-12-18 months plan
• KPI
• Product roadmap
• Cashflow
• Valuation target
• Next step</td></tr>
</table>

Every customer has a problem, every problem has a solution

When working on the business model, it is crucial to start from the problem not from the solution. New initiatives, including spin-off, fail because their offer (a product, a service, a license) is not designed for the customers. Every customer has a problem; every problem has a solution. Vice versa, not every solution has a problem, not every problem has a customer. Brainstorm and identify the problem (forget the solution) focus on the problem, identify a common definition.

Early Adopters

To develop the exploitation model, it is important to look at early adopters and how to go from early adopters to "early majority". Innovators are the ones that "use" the "alfa" version (2,5%, often the industrial partner in an R&D project); early adopters are the customers ready to "use" the "beta" version (13,5%). Next step is to reach the "early majority" (34%). New initiatives fail before reaching out the early majority and this is connected with the capability to reach early adopters.

Identify the "customers", who will pay, focus on the riskier ones and describe them in the most specific way. Why that customer has that problem is the way to select the assumptions (how they deal with the

problem, what are they looking for). Focus on the most important one, the one that, if not validated, will make everything fall down.

UVP

The Unique Value Proposition, or Unique Selling Proposition (USP), is a clear statement describing the benefits of the novel offer, how you solve your customer's needs and what distinguishes you from the competition. It is clearly related to the customers' needs and how their problems are solved so far.

In defining the UVP you do not want a "point of parity" when your features are similar to the ones of the competitors". What counts are the points of difference, what you do, that the others do not and that matters to the customers. You do not want to be better than your competitors, you want to be better for your customers. Do not imitate/mirror competitors. Keep in mind customers, not competitors.

10.2 How to approach the Lean Canvas

For preparing the Exploitation Plan (your business plan) of a R&D result it is useful to use the Lean Canvas. The Lean Canvas is an adaptation of Business Model Canvas by Alexander Osterwalder which Ash Maurya8 created in the Lean Startup spirit (Fast, Concise and Effective startup). Lean focuses on problems, solutions, key metrics and competitive advantages.

The canvas is a good tool to focus on the exploitation model and start collecting information for the exploitation plan. Among the different type of canvas, the lean business model canvas, by Ash Maurya, is the most suited for R&D projects. It is a powerful tool to be used by the partners to further develop the characterization of their KERs, prepare the materials to be discussed at consortium meetings and draft the exploitation/business plan for a KER.

The lean canvas helps to fine-tune and develop the exploitation strategy for a KER having in mind four questions:

1) Who is "my customer"?
2) What is "her/his" problem?
3) How does "She/he" solve the problem now?
4) Is our solution more efficient than the current one?

10.3 How to fill out a Lean Canvas for a KER

The end goal of the lean canvas is that an unknowing third-party will be able to review it from start to end and, and through this revision, understand what your KER is about. They will understand the problem in focus, the customer groups that you target, the solution you provide, how it differentiates from competitors, how you intend to create value, etc. Due to this, it is very important to avoid the use of highly technical language, abbreviations etc. They can result in third parties not understanding the nature of your KER.

Below a description of the main steps to draft the canvas.

1) **PROBLEM** - find 3 main problems you are addressing.

Explain: ***What*** is the problem and ***why*** is it a problem.

[8] For more information about this canvas, please refer to the blogpost explaining Lean Canvas and the ideas behind it on his website: http://www.ashmaurya.com/2012/02/why-lean-canvas/

Additionally, attempt to add numbers or quantifiable measures that will clearly highlight the scale of the problem.

Describe EXISTING ALTERNATIVES - Find out how they are solving the problem now (today's alternatives)

2) **CUSTOMER SEGMENT** - identify who has the problem, define target customers (do not confuse with users).

Be clear on explaining the geographic location of your customers, the industry in which they are operating in, as well as connecting them to the problem in question.

EARLY ADOPTERS - find a small niche that is having the biggest problem, the ones that suffer the most (early adopters).

These will be the first customers of your solution; Be sure to find as much information about these as possible. Explain the geographic location, connect them to the problem, explain exactly why these will be the first adopters, clarify your current connection to them etc.

3) **UNIQUE VALUE PROPOSITION**

Define your UVP based on the today's alternative, what makes your product/service more efficient for your customers, a single and compelling sentence that makes everybody understand why you are far better (your features need to be compelling to the customers' needs, otherwise are irrelevant to clients).

Ensure that you clearly define how you differentiate from alternative solutions, and why the customer will come to you; Explain the ***uniqueness*** of your solution.

Provide facts and data, explaining the performance of your product compared to alternative solutions (efficiency increase of 20%, decreased energy consumption of 10%, 30% fewer development costs etc.).

4) **SOLUTION** – outline the main features of your solution.

When your features are similar of the ones of the competitors, this is an equality. What matters are the points of difference! What you do, that the others do not do and are what matters to the clients.

Be sure to explain the format of your solution (is it a machine, an equipment, a software, a service, a process, etc.), what it does, and how it does it.

5) **UNFAIR ADVANTAGE** – what is it that gives you an advantage in front of the competition? Something that can't be easily copied or bought.

This could be IPR, being first movers on new technology that takes years to develop etc. Be sure to explain, *why* the listed points provide you with an advantage. It can be difficult for third parties to understand if they do not have a wide array of knowledge regarding your industry.

6) **CHANNELS** – How will you reach your customers?
Be sure to investigate whether the chosen channels are suitable for your choice of customers and consider whether they will be enough to establish the needed reputation on the market.

7) REVENUE STREAMS
Which will be the main revenue streams when the solution is ready for the market. Explain how each of them will generate revenue and how much you expect to generate from each stream.
Estimate revenues for seed stage after 6 months and after 3 years. Quantify amounts and prices by detailing, for example, the expected number of services provided and paid, number of licenses sold at which prices etc.

8) **KEY METRICS** – key activities you will measure to track the success (e.g. units sold, users registered, retaining users, paying customers, number of complaints …)

9) **COST STRUCTURE** – which will be the main costs when the solution is ready for the market (e.g. customer acquisition costs, distribution costs, hosting, people etc). As with revenues, estimate the total costs issued after 6 months and 3 years along with the estimated cost of each "cost-entity". This will connect your revenues to your costs.

After you finish the exercise, test your hypothesis “out the lab”, with at least 2 to 3 real potential customers. Validate the following assumptions:

- Are the problems you assume really the ones? Is your solution to solving their problem?
- Are the features your solution is offering the ones the market needs and looks for?
- Are the explanations provided in the canvas enough to provide the customer with an understanding of your project?

Write down the feedbacks and update, revise, iterate the Canvas accordingly.

Lean Canvas by Ash Maurya

<table>
<tr>
<td rowspan="2">Problem
1)
Top 3 problems

His main problem
Which job has to accomplish

What and why?

4)
Existing alternatives to address the same problems</td>
<td>Solutions
6)
Top 3 features
Based on the VP
(why it is better than others)
Use MVP to test assumptions

Remember: the first sentence should clarify what it does, how it does it.</td>
<td rowspan="2">Unique Value proposition
5)
Why you are different and worth buying
(How you help customer doing his job, accomplish his mission
Improve his position
…. better than others.
Provide

Explain how you differentiate from alternative solutions and thus the uniqueness of your solution.
Provide numbers to the performance of your solutions (see earlier explanation).</td>
<td>Unfair Advantage
7)
Can it be easily copied or brought?
What is the customer retaining costs?
Acquisition costs
Switching costs

See the earlier explanation for clarification.
….</td>
<td rowspan="2">Customer segment
2)
Who are they?

Distinguish between users and customers (customers buy, users “use”)
Split into vertical segments
Pick the strongest customer segment

Remember geographic location, Industry and
connection to the problem.

3)
Early adopters

Remember geographic location, Industry and
connection to problem.
+ why are they early adopters?
What is your relation to these etc.</td>
</tr>
<tr>
<td>Key Metrics
9)
Key aspects/activities you need to measure for a feedback</td>
<td>Channels
8)
How you contact your customers/early adopters,
How you deliver value
How you promote value</td>
</tr>
<tr>
<td colspan="3">Cost structure
11)
Prototyping
HR costs, Eng. costs, MFG costs, marketing costs etc.
Estimate costs for each “cost-entity”
Estimate costs after seed stage 6 months and 3 years.</td>
<td colspan="3">Revenue Streams
10)
The different revenue streams How each stream generates revenue Estimation of how much each stream will generate Estimation of revenue at seed stage 6 months and 3 years.</td>
</tr>
</table>

11 Annex 4: Commercialisation options and examples of contracts

11.1 Licensing

Exclusive:

Only the licensee can use the licensed IP or technology (the licensor cannot use or license it);

Sole:

The licensor agrees not to grant any additional licenses but retains the right to make use of the licensed IP.

Non-Exclusive License:

The licensee and the licensor can both use the licensed intellectual property or technology. The licensor is also allowed to negotiate further non-exclusive licenses with other companies.

11.2 Franchising

While on the one hand, franchising helps franchisors to expand their business with the need for less investment, on the other hand, it enables franchisees to enter into a market more easily since the business is based on an established brand and/or on a proven business model. Franchising means less risk and low costs for both parties with higher chances of surviving within the first years of business.

In Europe, the regulation of franchising is not harmonized. Also, in most EU Member States there are no independent codes establishing all the rules for this particular partnership. However, this sector has the particularity of being self-regulated in the EU through the European Code of Ethics for Franchising establishing a set of guidelines and principles for both franchisors and franchisees. Therefore, it is important for potential franchisors and franchisees to get to know the requirements that they must meet under their national law and become familiar with the European Code of Ethics for Franchising.

Due diligence: potential franchisees should carry out a due diligence to detect potential risks, which may arise during the franchise. Such an audit may include verification of the related IP, financial and business information about the franchisor, sufficiency of the goods/services, training and assistance to be provided by the franchisor, etc.

11.3 Joint ventures (JVs)

JVs are business alliances of two or more independent organisations (ventures) to undertake a specific project or achieve a certain goal by sharing risks. IP has an important role in the creation of such collaborations, since venture bring their own intellectual assets for the success of a JV and they should agree on their initial contributions, responsibilities and obligations within the alliance as set out in JV agreements.

Advantages

- Gives opportunity to exploit and share IP assets with reduced financial investment.
- Allows companies to access new markets by sharing risks.
- Creates possibilities to leverage existing technologies and patents developed by each venture.
- Provides companies with the chances to develop new IP with less investment.
- Allows utilization of unused IP assets.

Disadvantages

- There may be an imbalance in expertise, intellectual assets and investment brought into the JV by the ventures.
- Coping with different management cultures in IP management may be difficult.

Key terms in the JV agreements: Background, foreground and access rights

In JVs, the ventures bring into the project their previously owned IP assets - which are known as background - and they should decide on the access rights to their background for other ventures. Furthermore, the project implementation will also generate IP, which is referred to as IP foreground or results. The ownership of foreground/results and determination of access rights should be clarified before entering a JV partnership together with compensation of IP registration and/or maintenance costs.

11.4 Spin-off (newco)

A Spin-off (or newco) is a separate legal entity created by a parent organisation (PO) to bring its IP assets into the market. It is generally an efficient solution for the parent organisations, who may not be fully capable of commercialization of their own IP assets, such as for universities and research institutions. Spin-offs are an important means of technology transfer since they are acting as an intermediary between the research environment and industries while putting research results into the commercial market with a marketable product. Moreover, through spin-offs, research organisations can focus on their main task of “research” instead of “marketing”, which is the main task of commercial companies (spin-off).

A spin-off company can be formed by a person external to the PO for the exploitation of the IP asset created by the parent organisation. In this type of spin-off, as the new company is owned by an external professional, the IP assets to be exploited by the new company (spin-off) are generally transferred by licensing, to allow the PO to keep control over them. The external professionals can also be venture capitalists, who foresee a market potential in commercialisation of IP.

Conducting due diligence

A due diligence study allows the investors to ascertain the ownership of the IP to be transferred and any obligations affecting the transfer.

11.5 Material Transfer Agreements (MTAs)

MTAs are used when exchanging tangible materials between parties to secure the IP rights of the material provider against possible disclosure by the recipient party. The material exchanged can take many forms, such as product samples, prototypes, software, chemical compounds or biological materials etc. Generally, such a transfer occurs during:

- feasibility studies to check whether the material is compatible with the recipient facilities,
- research activities on the material in R&D partnerships,
- provision of samples or prototypes to future clients for trials, etc.

12 Annex 5: Follow-up funding opportunities

12.1 European Investment Project Portal (EIPP)

The European Investment Project Portal (EIPP) is the EU matchmaking portal, enabling EU-based project promoters – public or private – to reach potential investors worldwide. The Portal is a free service offered by the European Commission and is part of the Investment Plan for Europe, which aims to mobilise investment, boost economic growth and create jobs across the EU.

For more information check here: https://ec.europa.eu/investeuportal/desktop/en/index.html

12.2 The InvestEU Programme

The InvestEU Programme builds on the successful model of the Investment Plan for Europe, the Juncker Plan. It will bring together, under one roof, the European Fund for Strategic Investments and 13 other EU financial instruments. Triggering more than €372 billion in additional investment over the period 2021-27, the InvestEU Programme aims to give an additional boost to sustainable investment, innovation and job creation in Europe.

The Programme consists of:

- The InvestEU Fund which aims to mobilise more than €372 billion of public and private investment through an EU budget guarantee of €26.2 billion that backs the investment of implementing partners such as the European Investment Bank (EIB) Group and other financial institutions.
- The InvestEU Advisory Hub which provides technical support and assistance to help with the preparation, development, structuring and implementation of investment projects, including capacity building.
- The InvestEU Portal which brings together investors and project promoters on a single EU-wide platform, by providing an easily accessible and user-friendly database of investment opportunities available within the EU.

https://europa.eu/investeu/home_en

12.3 CASCADING GRANTS

Cascade Funding, also known as Financial Support for Third Parties (FSTP), is a European Commission mechanism to distribute public funding in order to assist beneficiaries, such as start-ups, scale-ups, SME and/or mid-caps, in the uptake or development of digital innovation.

This funding method aims at simplifying the administrative procedures, creating a light, SME-friendly application scheme, by allowing that some EU-funded projects may issue, in turn, open calls for further funding.

This scheme is based on the model of Erasmus students and was first introduced by the European Commission in Horizon 2020, the Framework Programme for Research and Innovation (2014-2020). It will be used also in the new Horizon Europe Framework Programme for Research and Innovation (2021-2027).

More information and open calls available here: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/competitive-calls

12.4 COSME

COSME is the EU programme for the Competitiveness of Enterprises and SMEs, running from 2014 to 2020, with a budget of €2.3billion. COSME will support SMEs in the following areas:

- Facilitating access to finance
- Supporting internationalisation and access to markets
- Creating an environment favourable to competitiveness
- Encouraging an entrepreneurial culture

COSME is a programme implementing the Small Business Act (SBA) which reflects the Commission's political will to recognise the central role of SMEs in the EU economy. http://ec.europa.eu/growth/smes/cosme/

12.5 Access to finance in Europe

University technology transfer offices (UTTOs) often perform the function of transferring technology and commercialising innovations emerging from the University sector to the market place.

For more information check here:

http://europa.eu/youreurope/business/funding-grants/access-to-finance/index_en.htm

This site can help to apply for loans and venture capital supported by the European Union.

Click on your country to locate banks or venture capital funds that provide finance supported by the EU.

12.6 Ad hoc grants for EIC Pathfinder and EIC Transition grant holders

The grant holders of EIC Pathfinder projects (including grants resulting from certain EIC pilot Pathfinder, FET-Open and FET-Proactive calls) and of EIC Transition projects are eligible to receive ad hoc grants with fixed amounts of up to EUR 50 000, as specified in the relevant call sections of the EIC work programme.

In line with Article 47(3)(b) of the Horizon Europe Regulation, the ad hoc grants are not subject to any call. They reflect the necessity and hence the possibility for the EIC to proactively support, at any stage of a project implementation, the assessment of any potentially innovative lead stemming from a EIC Pathfinder project, or reinforce the coordination and management of a Portfolio where needed.

These ad hoc grants fund either complementary activities to explore potential pathways to commercialisation (for EIC Pathfinder grant holders) or portfolio activities (for EIC Pathfinder and EIC Transition grant holders).

These ad hoc grants do not fund research or activities that were already foreseen in the original project. A maximum of three ad hoc grants can be awarded for each EIC Pathfinder project and more than three may be awarded in exceptional and duly justified cases. A maximum of one ad hoc grant can be awarded for each EIC Transition project. Any such ad hoc grant can be awarded to an individual grant holder or a group of grant holders.

EIC grant holders, after discussion with a EIC Programme Manager or following a project review, can apply for such an ad hoc grant.

12.7 Fast Track scheme to apply for the EIC Accelerator

The 'Fast Track' scheme is a novelty under Horizon Europe and a specific process applicable to the EIC Accelerator. It provides for a specific treatment of applications that result from existing Horizon Europe or Horizon 2020 projects.

Under the Fast Track scheme, applicants do not apply directly to the EIC Accelerator call. Instead, a project review is carried out by the responsible funding body to assess the innovation or market deployment potential of an existing project, to decide whether the project is suitable for support under the EIC Accelerator.

The responsible funding body can submit the outcome of the projects review to the EIC Accelerator, if the project review concludes that the following conditions are met:

- the proposal meets the two first criteria of the EIC Accelerator (excellence and impact),
- there is no duplication of funding of activities to be supported under the EIC Accelerator with the existing grant, and
- the applicant meets the eligibility criteria for the EIC Accelerator.

The applicant will then be invited to prepare a full application for the EIC Accelerator to one of the cut-off dates within the next 12 months following initial review. They will receive support through the EIC artificial intelligence-based IT platform and coaching.

12.8 EIC Transition

The EIC Transition funding scheme builds on promising research results to demonstrate and mature the technology and develop business plans.

EIC Transition funds innovation activities that go beyond the experimental proof of principle in laboratory to supports both:

- the maturation and validation of your novel technology in the lab and in relevant application environments
- the development of a business case and (business) model towards the innovation's future commercialisation.

Grants of up to €2.5million and more are available to validate and demonstrate technology in application-relevant environment and develop market readiness.

EIC Transition has open funding for projects in any field of science or technology as well as challenge driven funding on specific strategic fields.

Single applicants (SMEs, spin-offs, start-ups, research organisations, universities) or small consortia (max 5 partners) may apply.

https://eic.ec.europa.eu/eic-funding-opportunities/eic-transition_en

12.9 EIC Accelerator

The EIC Accelerator supports individual Small and Medium Enterprises (SMEs), in particular Startups and spinout companies to develop and scaleup game-changing innovations. In some cases, small mid-caps (up to 500 employees) are supported.

The EIC Accelerator provides substantial financial support with:

- grant funding (non-dilutive) of up to €2.5 million for innovation development costs,
- investments (direct equity investments) of up to €15 million managed by the EIC Fund for scale up and other relevant costs.

In addition, EIC selected companies receive coaching, mentoring, access to investors and corporates, and many other opportunities as part of the EIC community.

Applications can be submitted at any time through the EIC platform. Applicants have to submit a video pitch, a slide deck and respond to a short set of questions about their innovation and their team.

Applications that meet all the criteria at the remote evaluation stage and are assessed positively by the EIC jury but not recommended for funding, will be awarded a Seal of Excellence to help them secure funding from other sources. Companies with a Seal of Excellence can also get support from EIC Business Acceleration Services.

https://eic.ec.europa.eu/eic-funding-opportunities/eic-accelerator_en

12.10 EIC Prizes

The EIC Prizes are awarded to whoever can most effectively meet a pre-defined challenge, without prescribing how that challenge should be solved. These will boost breakthrough innovation across sectors by fostering cutting-edge solutions which bring major benefits to citizens and society.

In 2021 the following challenges are defined:

- EU Prize for Women Innovators (3 prizes of €100k, 1 prize for 'Women Innovators' main category, 1 prize of €50k for 'Rising Innovator' category)
- The European Capital of Innovation Awards (iCapital) (total budget €1,8 million, European Capital of Innovation winner €1 million)
- The European Innovation Procurement Awards (total budget €300k)
- The European Social Innovation Competition (total budget €200k)

12.11 EUREKA and Eurostars funding

Eurostars supports international innovative projects led by research and development- performing small- and medium-sized enterprises (R&D-performing SMEs). With its bottom-up approach, Eurostars supports the development of rapidly marketable innovative products, processes and services that help improve the daily lives of people around the world. Eurostars has been carefully developed to meet the specific needs of SMEs. It is an ideal first step in international cooperation, enabling small businesses to combine and share expertise and benefit from working beyond national borders.

Eurostars applies a decentralized funding procedure; participants do not receive funding directly from the EUREKA Secretariat or the EU. All funding to participants in approved projects is managed by their respective funding body and according to their national funding rules and procedures. These rules and procedures are dependent on the member countries involved in the project. Project partners are strongly advised to contact their National Project Coordinators (NPCs) and browse on the Eurostars in each country. https://www.eurostars-eureka.eu/

12.12 Entrepreneurship and Small and medium-sized enterprises (SMEs)

The dedicated section on EU portal offers a wide focus dedicated to information on possible EU funding opportunities for SMEs and in general on what EU does for SMEs: https://ec.europa.eu/growth/smes

Furthermore, to know if a programme is relevant to your particular case, we strongly suggest that you contact your local Enterprise Europe Network partner, who can give you one-to-one advice and support in applying for EU funding.

Contact details of the Enterprise Europe Network members: http://een.ec.europa.eu/about/branches/

12.13 Seal of Excellence – EuroQuity Initiative

This initiative is dedicated to those companies who have received the Seal of Excellence from the EU Horizon 2020 SME Instrument Programme. Matchmaking activities and support services will be provided in order to facilitate their access to risk finance and enhance their visibility, through a specific on-line community based on the EuroQuity platform.

Each "Seal of Excellence" SME will gain in this way instant visibility among different actors: the main EU business angels' networks, VCs, corporate investors, and new business partners, at the same time investors will be guarantee on the quality of SMEs' projects and their innovation potential. Free services will also be offered to these companies allowing them to grow on a European level:

- Visibility and access to European investors
- Possibility to pitch online in front of investors during e-pitch sessions
- Connections with National Contact Points of your Country

More information available here https://www.euroquity.com/fr/community/Access4SMEs--Seal-of-Excellence-5bb56459-4f88-4d3c-a2eb-8e4b6e865ea5/

12.14 Contracts and grants - access to business opportunities

Several different contracts and grants are regularly made available for companies or organisations who want to work with Directorate General (DG) for Internal Market, Industry, Entrepreneurship, and SMEs or apply for funding.

In the framework of public procurement contracts, DG Internal Market, Industry, Entrepreneurship, and SMEs regularly organizes calls for tenders. Calls for tenders are special procedures to generate competing offers from different businesses looking to obtain works, supply, or service contracts.

Those tenders/calls also give an insight in competitors' activities as well as ideas for partnerships and stakeholders. Furthermore, there are possibilities for winning contracts.

12.15 Tenders Electronic Daily

TED provides free access to business opportunities from the European Union, the European Economic Area and beyond.

Every day, from Tuesday to Saturday, a further 2,000 public procurement notices are published on TED.

You can browse, search and sort procurement notices by country, region, business sector and more.

Information about every procurement document is published in the 24 official EU languages. All notices from the EU's institutions are published in full in these languages. For more information check here:

http://ted.europa.eu/TED/search/search.do

12.16 Innovaccess - Intellectual Property Portal

Innovaccess aims to enhance Intellectual Property (IP) support services to Small and Medium-sized Enterprises (SMEs) to turn their Intellectual capital into commercial values and competitiveness.

The portal helps to protect IP rights and to understand IP security rules. For more information check here: http://www.innovaccess.eu/.

12.17 European Green Deal

Background

On 11 December 2019, the Commission presented the European Green Deal, with the ambition of becoming the first climate-neutral bloc in the world by 2050. Europe's transition to a sustainable economy means significant investment efforts across all sectors: reaching the current 2030 climate and energy targets will require additional investments of €260 billion a year by 2030.

The success of the European Green Deal Investment Plan will depend on the engagement of all actors involved. It is vital that Member States and the European Parliament maintain the high ambition of the Commission proposal during the negotiations on the upcoming financial framework.

A swift adoption of the proposal for a Just Transition Fund Regulation will be crucial.

The Commission will closely monitor and evaluate the progress on this transition path. As part of these efforts, every year the Commission will hold a Sustainable Investment Summit, involving all relevant stakeholders, and it will continue to work for promoting and financing the transition. The Commission invites the investment community to make full use of the enabling regulatory conditions and ever-growing needs for sustainable investments, and authorities to take an active role in identifying and promoting such investments.

The Just Transition Mechanism

The Just Transition Mechanism (JTM) is a key tool to ensure that the transition towards a climate-neutral economy happens in a fair way, leaving no one behind. While all regions will require funding and the European Green Deal Investment Plan caters for that, the Mechanism provides targeted support to help mobilise at least €100 billion over the period 2021-2027 in the most affected regions, to alleviate the socio-economic impact of the transition. The Mechanism will create the necessary investment to help workers and communities which rely on the fossil fuel value chain. It will come in addition to the substantial contribution of the EU's budget through all instruments directly relevant to the transition.

The Just Transition Mechanism will consist of three main sources of financing:

1) **A Just Transition Fund**, which will receive €7.5 billion of fresh EU funds, coming on top of the Commission's proposal for the next long-term EU budget. In order to tap into their share of the Fund, Member States will, in dialogue with the Commission, have to identify the eligible territories through dedicated territorial just transition plans. They will also have to commit to match each euro from the Just Transition Fund with money from the European Regional Development Fund and the European Social Fund Plus and provide additional national resources. Taken together, this will provide between €30 and €50 billion of funding, which will mobilise even more investments. **The Fund will primarily provide grants to regions. It will, for example, support workers to develop skills and competences for the job market of the future and help SMEs, start-ups and incubators to create new economic opportunities in these regions. It will also support investments in the clean energy transition, for example in energy efficiency.**
2) A dedicated **just transition scheme under InvestEU** to mobilise up to €45 billion of investments. It will seek to attract private investments, including in sustainable energy and transport that benefit those regions and help their economies find new sources of growth.
3) **A public sector loan facility with the European Investment Bank** backed by the EU budget to mobilise between €25 and €30 billion of investments. It will be used for loans to the public sector, for instance for investments in district heating networks and renovation of buildings.

   The Commission will come with a legislative proposal to set this up in March 2020.**The Just Transition Mechanism is about more than funding: relying on a Just Transition Platform, the Commission will be providing technical assistance to Member States and investors** and make sure the affected communities, local authorities, social partners and non-governmental organisations are involved. **The Just Transition Mechanism will include a strong governance framework centred on territorial just transition plans.**

More information available here https://ec.europa.eu/info/research-and-innovation/strategy/european-green-deal/call_en

12.18 European Institute of Technology and Innovation

Under EIT's Knowledge and Innovation Communities (KICs) are partnerships that bring together businesses, research centers and universities. Through the KICs, EIT strengthen cooperation among businesses (including SMEs), higher education institutions and research organisations, form dynamic pan-European partnerships, and create favourable environments for creative thought processes and innovations to flourish. These partnerships are called Innovation Communities and each is dedicated to finding solutions to a specific global challenge, from climate change and sustainable energy to healthy living and food.

There are 8 Innovation Communities and each focuses on a different societal challenge:

- EIT Climate-KIC
- EIT Food
- EIT Health
- EIT Digital
- EIT Manufacturing
- EIT Innoenergy

- EIT Urban Mobility
- EIT Raw Materials

12.19 LIFE Programme

LIFE programme is the EU's funding instrument for the environment and climate action. The programme is divided into two sub-programmes, one for environment (representing 75% of the overall financial envelope) and one for climate action (representing 25% of the envelope).

- The programme includes large scale demos/pilots with focus on Environment and Climate Action; with clear impact aims during the project; and clear environmental/climate problem baseline (de-risk).
- Projects start at TRL 6-7 aiming up to 9 to bridge valley of death (income allowed – end-user important).
- The funding programme uses bottom-up approach (call-topics are broad) allowing proposers to define their solutions needed for their environmental context/problem.
- Focus is on making Environmental impacts in the EU.
- Even proposals from single EU beneficiaries are allowed.
- Proposers can apply in their own language.
- There is no set proposal budget limit.

12.20 Dealflow

Dealflow is sponsored by the European Commission to support EU-funded innovations with fundraising, venture building and networking. It supports EU-funded projects from H2020.

Three typologies of support are foreseen:

- Venture-building: giving tailored support on challenging business topics (e.g. sales strategy, market sizing & research, organizational structure, and pitching);
- Fundraising (preparation): preparing investor materials and providing access to investor networks;
- Networking: introductions to industry experts, potential clients and new partners through their matchmaking platform, community & events.

https://dealflow.eu/

12.21 Accelerators and Incubators

If you have the intention to create a startup/spinoff, you are suggested to check Accelerators/Incubators in your area.

Here below there is a non-exhaustive list of international and pan-European Accelerators/Incubators networks:

- Startup Bootcamp: founded in 2010, Startup Bootcamp is a well-known global network of startup accelerators that offer an intense 3-month program. After Selection Days, 10 startups join diverse accelerator programs (Amsterdam, Istanbul, London, Barcelona, Copenhagen, Berlin, Eindhoven and Haifa) where they receive mentoring, free workspace, great networking opportunities, and pitching opportunities to over 400 investors on Investor Demo Day.

- Startup Weekend: Startup Weekend brings together developers, designers, product managers, aspiring entrepreneurs, marketers and tech enthusiasts to launch a startup in 54 hours. These weekend-long events are focused on learning through creating, building professional relations and networking.
- StartupBus Europe: is a unique project founded in 2010. It is a hackathon for European tech entrepreneurs ("buspreneurs") where they compete over the course of a 3-day bus ride on the way to Vienna.
- IMPACT Accelerator: (Internet Mobile Projects Accelerator) offers premium acceleration services for European mobile start-ups and small and medium-sized business for a period of six months. It operates in several locations in Spain and Italy and given it is one of the 16 consortia selected by the European Commission within the framework of the Seventh Framework Programme, the selected start-ups in the extended phase can count on the Buongiorno Headquarters in 14 countries.
- Wayra: launched in 2011, Wayra is a startup accelerator financially backed by Telefonica, one of the biggest telecommunication companies in the world.

Here below a non-exhaustive list of Accelerators/Incubators in Member States:

- Austria: i5invest, INiTS, Up to Eleven, Kubator
- Belgium: Telenet Idealabs, NEST'Up
- Bulgaria: 3Challenge, Eleven, LAUNCHub
- Croatia: Zip
- Czech Republic: StarCube, Startup Yard
- Denmark: Accelerace
- Estonia: GameFounders,Garage48, Startup Wise Guys
- Finland: Startup Sauna
- France: TheFamily, Numa (Le Camping)
- Greece: OpenFund
- Germany: Axel Springer Plug & Play, hub:raum
- Hungary: iCatapult
- Italy: H-Farm, LuissEnLabs
- The Netherlands: Rockstart
- Norway: betaFACTORY
- Lithuania: StartupHighway
- Portugal: The Lisbon Challenge
- Poland: Gamma Rebels
- Romania: SeedForTech, Innovations,
- Spain: SeedRocket, Tetuan Valley

12.22 Innovfin

InnovFin – EU Finance for Innovators is a joint initiative launched by the European Investment Bank Group (EIB and EIF) in cooperation with the European Commission under Horizon 2020. InnovFin aims to facilitate and accelerate access to finance for innovative businesses and other innovative entities in Europe.

Innovfin makes available specific instruments for different typologies of financing.

Start-up and SME financing

- InnovFin Equity provides equity investments and co-investments to or alongside funds focusing on early-stage financing of enterprises operating in innovative sectors covered by Horizon 2020, located or active in the EU or Horizon 2020 Associated Countries. InnovFin Equity is available via four products: InnovFin Technology Transfer, InnovFin Business Angels, InnovFin Venture Capital, InnovFin Fund-of-Funds.
- InnovFin Guarantee SME guarantee provides guarantees and counter-guarantees on debt financing between EUR 25 000 and EUR 7.5 million, in order to improve access to loan finance for innovative small and medium-sized enterprises (SMEs) and small mid-caps (up to 499 employees).

Corporate finance

- InnovFin Emerging Innovators offers a range of tailored products which provide financing in support of R&I by small, medium-sized and large companies and the promoters of research infrastructure. It provides loans or guarantees directly or indirectly via financial intermediaries.
- InnovFin MidCap Guarantee provides guarantees and counter-guarantees on debt financing of up to EUR 50 million, in order to improve access to finance for innovative midcaps (up to 3 000 employees) which are not eligible under the InnovFin SME Guarantee.
- InnovFin Corporate Research Equity (in collaboration with EFSI) increases the supply of equity-type financing under the European Fund for Strategic Investments (EFSI) to large research and innovation (R&I) programmes and to innovative large mid-caps and small or medium-sized enterprises (SME). It addresses the market gap for large equity-type investment in the form of contingent loans, in particular with mid- to long-term repayments profile that are directly linked to product development cycles.

Science

- InnovFin Science (for research institutions and universities) aims at supporting research and innovation (R&I) investments by public or private research institutes/organisations and universities, including the financing of buildings and other infrastructure directly related to R&I activity. It provide different forms of debt or equity-type financing.

Thematic financing

- InnovFin Energy Demo Projects provides loans, loan guarantees or equity-type financing to innovative demonstration projects in the fields of energy system transformation, including but not limited to renewable energy technologies, smart energy systems, energy storage, carbon capture and storage or carbon capture and use, helping them to bridge the gap from demonstration to commercialisation. The product is deployed directly by the EIB.
- InnovFin Infectious Diseases provides financial products ranging from standard debt to equity-type financing for amounts typically between EUR 7.5 million and EUR 75 million, to innovative players active in developing innovative vaccines, drugs, medical and diagnostic devices or novel research infrastructures for combatting infectious diseases. The product is being made available directly through the European Investment Bank.

12.23 Startup Europe

STARTUP Europe is an initiative of the European Commission to connect high tech startups, scale-ups, investors, accelerators, corporate networks, universities and the media. The 4 main objectives of Startup Europe are to:

- Connect people

- Connect local start up ecosystems
- Help start-ups soft land in other market
- Celebrate entrepreneurs' success

In order to help build a strong European ecosystem where startups can thrive, Startup Europe is empowering 7 projects, funded under Horizon 2020, that are connecting local ecosystems across Europe. These projects will connect deep tech startup ecosystems and support cross-border activities for startups and scale-ups. The cross-border activities include the following: connecting tech entrepreneurs with potential investors, business partners, accessing skills, and services helping startups soft land in new international markets.

- Scaleup4Europe: The Scaleup Labs will provide deep tech start-ups with a structured open innovation approach in which they can achieve cross-border market success, through first successful collaborations with corporate customers, investors and/or public institutions.
- B-HUB FOR EUROPE: Will target deep tech vertical startups in the blockchain domain. The initiative is aimed at: discovering high-potential innovations, shaping suited proof of concepts and business models, providing specialised acceleration services to overcome current market barriers and assist the go-to-market process, unlocking new market channels with potential private/public customers, scaling up innovative businesses across five startups ecosystems in Europe: IT (Rome), FR (Paris), DE (Berlin), LT (Vilnius) and RO (Cluj-Napoca).
- The Scale-up Champions: Project builds on the premise of equalising opportunities of scaling up for startups across five countries represented through the partners of the consortium: Estonia, Lithuania, Poland, Denmark and Spain. Main activities targeting: corporate-startup collaboration, investment readiness and internationalization
- STARTUP 3: Will scout for top founding teams to identify (uptake) breakthrough innovations from deep tech verticals (i.e., built on tangible scientific discoveries or engineering/ technical advances). Then STARTUP3 will help them fine tune (upgrade) their technologies/ business models and align their value proposition to the actual market demand (the so-called Key Performance Areas – KPAs). Finally, STARTUP3 will bring together top deep tech startups/ SMEs and the most prominent corporate innovators – CVC arms, incubators and accelerators, and innovation labs (facilitated by clusters and digital innovations hubs – DIHs) with the aim of catalysing productive interaction (upscale).
- X-Europe: Brings together leading training, acceleration, events, and media companies from across Europe. Through the delivery of training, matchmaking & promotional services X-Europe will support 150 deeptech startups and help them to internationalize, grow across borders, and into developing frontiers.
- INNODEC - (Innovation Radar Data-based Identification & Commercialisation): Aims to close the gap between investors and research projects from both sides. On the one hand, this is achieved through placing investors/partners in contact with the research projects with the highest potential, and then on the other, to coach the projects on raising capital, identifying a business model and developing a sound go-to-market strategy. This approach will ensure scalability while simultaneously catering to the large diversity between projects and their needs.
- MediaMotorEurope: Will boost solutions that can address challenges. Its goal is to nurture high-potential European deep tech innovators, solving today's most prominent media industry challenges and support them in building the media solutions of tomorrow such as misinformation, accessibility, user interfaces and use of data. A large focus will be on deep tech solutions, such as AI and machine learning, and their potential application in the domain of media and creative industries.

12.24 INTERREG EUROPE

Interreg Europe can help in the following ways:

- **Financial support** – funding is available for interregional cooperation projects, which have the potential to lead to longer-term collaborations and partnerships
- **Expand your network** – meet new like-minded partners, stakeholders, and business colleagues across Europe.

The DG also gives the opportunity to organisations to get some grants through calls for proposals. These are invitations for suppliers to submit a proposal on a specific commodity or service. A grant or a subvention is a direct financial contribution from the European Commission to support a specific action or project of a non-commercial nature, to cover eligible costs directly incurred by the beneficiaries.

For more information check here: http://www.interregeurope.eu/

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HORIZON RESULTS BOOSTER

An initiative of the European Commission