ENCIRCLE

EuropeaN Cbrn Innovation for the maRket CLustEr

D3.10 Needs and Gaps Update

Dissemination level

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Executive Summary

The Deliverable D3.10 presented herein provides the updated version of the ENCIRCLE needs and gaps catalogue, which was source of topics for SEC-05-DRS-2016-2017: Chemical, biological, radiological and nuclear (CBRN) cluster, Part b 2017. Together with the future updates it will become basis for the preparation of the RIA aiming at research and development of novel CBRN technologies and innovations providing solutions for the gaps identified in the catalogue.

The updated version of the ENCIRCLE technology catalogue is based on the discussion carried out during 2017 ENCIRCLE Workshop, which took place on 7-8 September in Warsaw, and provides additional inputs to previously issued list of the needs and gaps in the Deliverable D3.9.

The new version of the catalogue containing Part b Call Topics will be published on the European Commission Participant Portal in the description of the SEC-05-DRS: Chemical, biological, radiological and nuclear (CBRN) cluster topic in accordance to call schedule developed by European Commission.

Table of Contents

1 Introduction

The main goal of the ENCIRCLE project is to strengthen the European industry to help create the tools and strategies needed to consolidate the EU CBRN communities of suppliers and practitioners in order to strengthen the field of CBRN safety, security and defence in the European Union.

In order to achieve this goal the innovative approach based on the five objectives aimed at prompting the innovation and business development, and filling market gaps in the project timeframe was proposed. The project objectives include:

- Create an open and neutral EU CBRN cluster,
- Provide a sustainable and flexible vision and roadmap for the development of the European CBRN market and innovations,
- Provide integration with platforms (systems, tools, services, products) by proposing standardized interfaces and future EU standards to integrate CBRN technologies and innovations developed from the Part b projects,
- Support CBRN safety, security and defence commercial and market services,
- Improve and facilitate European CBRN dissemination and exploitation.

One of the most important objectives of the project, associated with 3 of the 4 project milestones, is to provide a sustainable and flexible short to long term vision and roadmap for the development of the European CBRN market and innovations. Most of the activities associated with this objective will be covered by WP3 – Innovation Plan and Dissemination. In WP3 needs and gaps analysis and generation of the Innovation roadmap will be carried out on a yearly basis. The results of these activities will become basis for recommendations for the Part b calls in 2017, 2019 and 2020, which will be issued by the European Commission.

The proper selection of Part b Topics corresponding to the true needs of the practitioners and customers community should result in innovative CBRN solutions, which should more easily find their way to the EU market and finally to the practitioners. In order to ensure proper selection of the topics reflecting true needs and gaps ENCIRCLE consortium will:

- Collaborate closely with the Practitioner and Customer Community and Technological and Industrial Community mainly via consultations during ENCIRCLE workshops and through the portal networks;
- Conduct a continuous state of the art, market study, budgets and needs, gaps assessment and threat analysis based initially on EDEN and other EU and national projects;

- Conduct a continuous assessment of non-technological lessons learnt from EU projects (such as EDEN demonstrations) and EU national/international demonstrations and exercises allowing better defined operational procedures.

The updated list of needs and gaps provided in this document is the starting point for preparation of SEC-05-DRS Part b 2019 and 2020 Call Topics and will become the basis for development of CBRN innovation by winning consortia in these calls. The updated list was prepared based on the discussion with practitioners participating in the 2017 ENCIRCLE Workshop.

2 ENCIRCLE Catalogue – Updated list of needs and gaps

The updated version of the ENCIRCLE catalogue contains the list of technologies, which were identified as gaps in certain functions (STACCATO functions listed below) of the main phases in the CBRN Security Cycle (Prevention, Preparedness, Response, Recovery). The presented list shown in Figure 1 is the result of first efforts toward collection of the current, most relevant and most important needs and gaps, which despite many scientific studies remain unsolved. By working on the collection of the needs and gaps, the ENCIRCLE consortium will attempt to engage practitioners who are part or will soon become part of the ENCIRCLE practitioners and customers community.

STACCATO Functions

- Risk assessment and impact reduction
- Protection of first responders and population
- Exercise, simulation and training
- Search and Detection
- Identification and authentication
- Situation awareness and assessment
- Intelligence, information management
- Intervention and neutralisation
- Communication
- Crisis operations management
- Search and rescue and evacuation
- Decontamination and de-pollution
- Short to long term recovery
- Psychological and Social aspects
- Control of disarmament/fight against proliferation
- Security analysis

Function			Gap		Phase in security cycle			Field					NEEDS		Tool Requirements
ID	Description		ID	Description	Prev	Prep	Resp	Rec	C	B	RN	E	Med.	No	Desc	
F1	RISK ASSESSMENT AND REDUCTION															
F1.3		Risk Reduction		Insufficient level of restriction for access (market) to CBE material or precursors.	x	x			x	x		x			There is a need for improved access control and restrictions to the market for CBE materials and precursors	
F2	PROTECTION															
F2.1		Protection Doctrine and operation		Need a more comprehensive CBRNe glossary.		x			x	x	x	x	x		There is need for more comprehensive CBRNe glossary than existing EU CBRN Glossary	More comprehensive CBRNe glossary
				Contingency plans on CBRN incident.		x			x	x	x	x			There is a need for improved contingency plans for CBRN incidents	
F2.2		People														
		F2.2.1 First responders protection		Still too short time of work in Self Contained Breathing Apparatus in level A suit.			x	x	x	x	x	x			There is a need to safely extend the operational time in SCBA in a level A suit; there is a need for better dexterity & touch screen compatibility when wearing CBRN suits	Improved PPEs
		F2.2.2 Population protection		Treatment Capacity - Crisis like Ebola 2014/15 showed that a high amount of infected casualties creates trouble even in a well developed health system			x	x	x	x	x	x	x		There is a need to be able to increase the treatment capacity when there is a high level of infected casualities	
F2.3		Critical infrastructures and networks		Critical Infrastructure Protection (against CBRNe threats)	x	x			x	x	x	x			There is a need to improve protection of critical infrastructure against CBRNE threats	
				Insufficient control of access to critical systems of the buildings (HVAC system, water supply…).	x	x			x	x	x	x			There is a need for improved access control to critical systems in buildings and critical infrastructure; Ease of Access to critical systems should be made harder at the design/planning stage (e.g. air intakes not at head height on street level).	
F2.5		Public infrastructures or areas		Need to provide goods and services to private companies and R&D centres unprotected from attacks.	x	x			x	x	x	x	x		There is an insufficient level of security at research and industrial facilities with possess or produce CBR precursors.	
				Critical infrastructure, crowded places (shopping mall centres, railways stations, airports) should be equipped with collective protection.	x	x			x	x	x				There is a need to be able to provide collective protection for the population in critical infrastructures via more capable detector and filtration suites.	More capable detectors and filtration suites.

Figure 1a – Updated List of Needs and Gaps

Function		Gap		Phase in security cycle				Field						NEEDS	Tool Requirements
ID	Description	ID	Description	Prev	Prep	Resp	Rec	C	B	RN	E	Med.	No	Desc	
F3	EXERCISE, SIMULATION and TRAINING														
F3.1	Other staff		TRAINING – adjusted to needs services (to differentiate training level depends on target audience). Training of security guards, hotel personnel		x			x	x	x	x			There is a need to have appropriate training that is targeted and role specific	
F3.2	Medical personnel		Multinational standardised training		x			x	x	x	x			Common exercises/simulations and training across organisations, at national and multinational level (ensure interoperability for incidents requiring more than one medical/paramedical player)	Exercises and trainings for medical personnel
F3.3	First responders/decision makers		Multinational standardised training		x			x	x	x	x			Common exercises/simulations and training across agencies (including food safety agencies), at national and multinational level (ensure interoperability for incidents requiring more than one player)	Exercises and trainins for first responders and decision makers
			Lack of the trained CBRNe responders – professional training. Not sufficient level of the first responders' training (raising of CBRNe awareness).		x	x	x	x	x	x	x	x		There is a need to improve the training and awarness of responders in responding to CBRNE incidents	FR CBRNe training
			Training to improve awareness of first responders in the field of forensics		x	x	x	x	x	x	x	x		There is a need to improve the awareness of all responders in the field of forensics	Forensic training
F3.4	Population		Multinational standardised training		x			x	x	x	x			Common exercises/simulations and training across agencies (including food safety agencies), at national and multinational level (ensure interoperability for incidents requiring more than one player) *realistic for the population*	
			Training of citizens, population		x			x	x	x	x			Improve/increase training and information directed at the general population	
			Training of citizens, population		x			x	x	x	x			Motivate people's actions by provding information learning material, spreading relevant information via the same media and controlling the flow of information that is available	Learning material for the population

Figure 1b – Updated List of Needs and Gaps

Function			Gap		Phase in security cycle				Field				NEEDS		Tool Requirements
ID	Description	ID	Description		Prev	Prep	Resp	Rec	C	B	RN	E	Med.	No	Desc	
F4	SEARCH AND DETECTION															
F4.2	Devices for detection and identification		Smart Materials - Better and integrated CBRNe functions. Less burden, built-in detection etc.			x	x			x	x	x			There is a need for smaller, lighter, fieldable and built-in systems for detection	integrated smaller, lighter, fieldable and built-in systems for detection
			Miniaturisation, fieldable systems for detection			x	x			x	x	x			There is a need for smaller, lighter and fieldable systems for detection	
			CW and precursors detection systems as ACAMS to control rooms and sensitive areas of labs in chemical and petrochemical plants and installations. There is a need to standardize chemical threat detection		x					x					There is a need for CW and precursor systems in control rooms and sensitive areas. There is a need to standardize chemical threat detection.	
			CBRe Stand off detection - better and more efficient situation awareness of possible CBRNe clouds and surface contaminations, detection of explosives from safe distance.							x	x	x			Improved stand-off detection of CBRe threats on the field, in urban areas...	Improved stand off detections systems on the field (for C primarily)
			Faster analytical answers to first responders (in complex matrices).		x	x	x			x	x	x			A need for better on-site detection methods/detectors for rapid decisions when there has been an incident, or if one suspect or want to detect preparations of illegal activities. Develop the ability to use detectors (such as Raman IR) for better evaluation of authentic and complex samples that contain toxic substances. Evaluate if it is possible to do forensic analysis, for instance can a pattern reveals information on who prepared it?	
			Detection of the mixtures of toxic compounds; More generic detectors – set of detectors detecting i.e. chemicals; Combining the existing technologies		x	x	x			x	x	x			There is a need for more generic multi-purpose detectors that can detect a mixture of chemicals and toxic compounds	more generic multi-purpose detectors that can detect a mixture of chemicals and toxic compounds
			Fast identification of toxins on site for rapid decisions when there has been an incident, or if one suspect or want to detect preparations of illegal activities. "simple" kits /methods for toxin-analysis. Methods needs to be developed for authentic mixed samples.		x	x	x			x	x	x			There is a need to improve the speed of identification of toxins at a site or incident to allow improved decsion making	
			Simple, reliable, fast, robust, accurate, sensitive detection/analysis of both combat chemicals and b-agents.				x			x	x				There is a need for multi-purpose detection systems that are simple, reliable, fast, robust, accurate, and are sensitive for detection/analysis of both chemicals and biological-agents.	multi-purpose detection systems that are simple, reliable, fast, robust, accurate, and are sensitive for detection/analysis of both chemicals and biological-agents.
			Tools and equipment for rapid identification of biological hazards on the scene. To improve response on CBRN actions regarding biological hazards, increase safety of rescuers and endangered people, as well as reduce costs of single biological operation.				x				x				There is a need for improved speed of (general identification? Precise identification may need a lab analysis) identification of biological hazards at a scene or incident	
			Infrastructure and buildings should be ideally equipped with the sensors - determination of CB sensors suitable for detection of such agents in the ventilation systems		x					x	x				Design buildings with CBRNe detection and security taken into account (e.g. configuration of heating/ventilation in a way that reduces or prevents dissemination of agents, installing FAE igniters as countermeasures etc.) - modified N005 to include detection. There is need to better use the existing sensors in infrastructures and networks to identify the background information and weak signals.	Building design tools and processes
			Change Detection and Detection based on the symptoms and other information		x					x	x	x			There is a need to establish detection procedures based on symptoms and to combine this symptom detection with sensors information.	establish detection procedures based on symptoms and to combine this symptom detection with sensors information.
			Standardisation of technologies, operation and T&E			x				x	x	x				
F4.3	Alarm detection (person based)		Help first responders to easily recognize contaminations, related symptoms to be able to analyze correctly the situation.				x			x	x	x			There is a need for procedures, supporting tools and training to allow fast identification of affected people (and contaminated belongings). Body worn Health Monitoring capability for First Responders.	procedures, supporting tools and training to allow fast identification of affected people

Figure 1c – Updated List of Needs and Gaps

Function			Gap		Phase in security cycle				Field					NEEDS		Tool Requirements	
ID		Description	ID	Description	Prev	Prep	Resp	Rec	C	B	RN	E	Med.	No	Desc		
F5	IDENTIFICATION and AUTHENTICATION																
F5.2		CBRNe identification		Help first responders to easily recognize contaminations, related symptoms to be able to analyze correctly the situation.		x	x		x	x	x				Fast identification of affected people (and contaminated belongings)	Symptom based detection procedures and tools	
				SOP – what to check first. Lack of procedures for sampling – where to sample?			x		x	x	x				There is a need for inproved standard operating procedures for sampling	Sampling procedures	
F6	SITUATION ASSESSMENT																
F6.1		Determine scale of event, propagation in time, appropriate security zones and level of response		Improved Rapid Scene assessment to identify the threat accurately and quickly			x					x	x		There is a need for rapid and accurate scene assessment of the incident	Robust, cheap, intuitive, reliable and suitable for the operating environment outputs need to be approriate for the user need, family based, categorised. Lateral Flow Devices need to be more widespread (e.g. IMASS for bio) and better development/roll-out of SALIANT outputs for CB&E.	
				Identification of the threat – from whatever sources are available			x		x	x	x	x			There is a need to be able to identify the threat from what ever resources are	Robust, cheap, intuitive, reliable and suitable for the operating environment	
				Compatible standard operating procedures and terminology			x		x	x	x	x			There is a need for compatible standard operating procedures and terminology to improve situation awareness and interoperability		
				Training and self help for non specialised responders who are normally first at the scene			x		x	x	x	x			There is a need for Improved training and self help for the initial first response attendees	Improved training for non specialized FR, for instance built upon/roll-out ERASMUS+ CBRN-POL Programme	
				Knowing where all the responders and assets are at the incident in any environment			x		x	x	x	x			Need to improve the ability to know where all the responders and the assets	Robust, cheap, intuitive, reliable and suitable for the operating environment	
				Automatic integration and interoperability of sensors and unmanned platforms											Automatic sensor and Unmanned integration with the command system using the avaible communication	Robust, cheap, intuitive, reliable sensors, and suitable for the operating environment	
F6.2		Situation Assessment		Who is affected and where they are			x		x	x	x	x			Need to improve information to the 'commanders' on scene on who is injured and where they are, in any environment	Robust, cheap, intuitive, reliable systems and suitable for the operating environment	
				Joint Operational Picture and tactical command toolkit			x		x	x	x	x			There is a need for improved information gathering in real time for all forces that is managed, secure, prioritised and tailored to the role and force, supported by improved on scene command decision support	Robust, intuitive, reliable and suitable for the operating environment Adaptive flexible, and intelligent tactical command toolkit Adaptive, flexible information management system for Joint Operational Picture Needs to be able to be easily iupdated	
F6.5		Environmental Monitoring Systems															
				Background and weak signal detection											There is a need to gather information from the environment and safety sensor systems to analyze the background and detect weak signals	Better use of the existing sensors and sysems in the infrastructures and networks	
F7	INTELLIGENCE																
				EU regulation in information about CBRN agents and precursors losses. Insufficient level of restriction for access (market) to CBE material or precursors.	x				x	x	x	x			A system for reported losses/suspicious acquisitions being made more widely and automatically reported to LEAs/regulatory authorities		

Figure 1d – Updated List of Needs and Gaps

Function			Gap		Phase in security cycle				Field						NEEDS		Tool Requirements	
ID	Description		ID	Description	Prev	Prep	Resp	Rec	C	B	RN	E	Med.	No	Desc			
F8	INTERVENTION AND NEUTRALIZATION																	
F8.1	Medical countermeasures			On the field medical countermeasures, adequate quantities					x	x	x		x					
				Improved Triage(based on individual personal detection) and use of Telemedicine			x		x	x	x	x	x		There is a need for a faster and more efficient CBRNe triage, using also symptoms and telemedecine		Improved CBRNe triage tools and procedures, including remote diagnosis	
				Antidotes for CW and precursors poisoning - Provide assistance and therapies in case of CW events. Needed in the control rooms of chemical and petrochemical plants and installations, lab and medical facilities.					x				x					
				Patient Isolation Units to be more widely available and deployable at incident points.			x		x	x			x		More widely available and deployable Patient Isolation Units at incident points, User configurable for positive and negative pressure operating modes and allowing paramedic access to patient for IV, fluids, wound dressing etc.		Patient isolation units suitable for CB contamination and FR protection	
F9	COMMUNICATION (contents)																	
F9.1		Interoperable secured communications (Security systems architecture)		Secure high bandwidth reliable and robust communications that are operable in a short time and operational despite standard communication denial.			x	x							There is a need for secure high bandwidth reliable and robust communications that are fully operational in a short time and operational despite standard		Reliable and secure communications on the field	
F9.2		Communication means and procedures		Applications supporting actions of the first responders			x	x	x	x	x	x			Simple applications		Apps on smartphones or tablets	
F10	CRISIS OPERATIONS/MANAGEMENT																	
F10.2		Optimisation, Planning & Decision Support systems		The lack of good understanding of the decision process by first responders			x	x	x	x	x	x			There is a need to improve the trainig of first responders and provide them support on the decision process		FR training	
F12	DECONTAMINATION AND DEPOLLUTION																	
				Need multi-national standards to define the acceptable level of recovery for a public place. Generally validation by national experts.				x	x	x	x							
				CBR Decontamination - Better and more efficient systems. Enviromental friendly decontamination solution.				x	x	x	x					There is a need for efficient and effective CBR decontamination systems that are environmentally friendly; 'Dry' decon to be better understood and more widely practised; A capability for remediated/re-cycling at site any liquid decontaminate created from decon process/any mass decon showering.		Environmentally friendly CBR decon methods and systems	
F12.2		Persons		Fast, on site, decontamination of casualty personal effects (keys, spectacles, prosthetic limbs, credit cards etc), so casualties can recover their essential personal items and 'self help' to recover at the earliest opportunity and also reduce the burden on the state for immediate care. Emergency Services or Hospitals with responsibility for providing decontamination.				x	x	x	x					Light decontamination system for belongings (keys, credit cards, etc.)		Light decontamination system for belongings (keys, credit cards, etc.)	

Figure 1e – Updated List of Needs and Gaps

Function		Gap		Phase in security cycle				Field					NEEDS		Tool Requirements
ID	Description	ID	Description	Prev	Prep	Resp	Rec	C	B	RN	E	Med.	No	Desc	
F13	SUPPORT														
F13.2	Air and space systems technology		UAV (carrying detection and sampling systems)		x	x		x	x	x	x			There is a need to improve stand-off detection and sampling	Unmanned vehicles for detection and safe sampling whilst preserving the forensic scene
F14	PSYCHOLOGICAL AND SOCIAL ASPECTS														
			Human Factors Interpretation of data	x	x	x	x	x	x	x		x			
F17	LOCALISATION														
F17.1	Positioning and localisation		Knowing where all the responders and assets are at the incident in any environment			x		x	x	x	x			Need to improve the ability to know where all the responders and the assets are in real time in whatever environment they are working (indoor, outdoor, underground…)	Robust, cheap, intuitive, reliable and suitable for the operating environment
Other than STACCATO Functions															
	Procurement policy		Procurement departments of companies dealing with explosive, toxic or flammable chemicals in significant quantities should establish stringent procedures, procurement policy. This will improve safety and health of staff, population and environment. Affected stakeholders: trade and producers' associations, R&D centers, governments of member states, and more												
	Procurement policy		Need to inform and advise procurement agencies to adapt their procurement rules and calls to obtain what they really need in terms of performances etc for CBRNe												

Figure 1f – Updated List of Needs and Gaps

3 Way forward

The delivery of the Deliverable D3.10 is a next step after D3.9 for the future ENCIRCLE consortium activities, which will result in the recommendations for the SEC-05-DRS: Chemical, biological, radiological and nuclear (CBRN) cluster Part b calls in 2019 and 2020. The main activities relate to the preparation of the recommendations for future calls which will be carried out within WP3 in collaboration with WP4.

The overall approach and methodology will be based on collaborative innovation built on regular exchanges and inputs through the ENCIRCLE portal capabilities and networks (gathering the partners and the two communities' requests, questions, recommendations and inputs), including the progress achieved in different WPs and around a series of collaborative workshops that will be held yearly during the project to meet the requested project deadlines. An important tool for getting input from practitioners and customers involved in the ENCIRCLE Community will be the set of ENCIRCLE Questionnaires, which will be used to gather their view on the needs and gaps in the field of CBRN capability development. The ENCIRCLE consortium will attempt to reach practitioners from the whole of Europe to get a broad view on the needs and gaps of all EU countries.

In the upcoming months the activities of WP3 (Task 3.1 Needs and roadmap monitoring) will be dedicated to the review of:

- needs from previous projects such as EDEN and other CBRN related projects, workshops and interviews with the Practitioner and Customer community, threat analysis,
- gaps from projects, state of the art from the innovation watch and the competition analysis.

The recommendations for the future calls will be discussed during the future ENCIRCLE Workshops.