



ENCIRCLE

European Cbrn Innovation for the market CLustEr

D3.11 Part b 2019 Call Topics

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1	Université Catholique de Louvain (UCL)	X
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6	Wojskowa Akademia Techniczna (WAT)	X
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9	Université de Nice-Sophia Antipolis (UNS)	X
10	Università Cattolica del Sacro Cuore (UCSC)	X
11	FALCON COMMUNICATIONS LIMITED (FALCON)	X
12	Smiths Detection Watford Limited (SMITHS)	X
13	MIKKELIN KEHITYSYHTIO MIKSEI OY (MIKSEI)	X
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Executive Summary

The Deliverable D3.11 presented herein provides the ENCIRCLE needs and gaps catalogue, which in 2019 call CBRN Cluster Part b 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 new version of the ENCIRCLE technology catalogue has been developed based on previously issued D3.9 and D3.10 and takes into considerations inputs from practitioners obtained during various events such as Horizon 2020 project eNOTICE CBRN exercise “Bio-Garden”, which took place in Peutie, Vilvorde on 19 June 2018. In addition, the catalogue includes gaps, which represent the highest priority gaps common amongst the first responders represented by the International Forum to Advance First Responder Innovation (IFAFRI) member nations.

The version of the catalogue described herein 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.

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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 have and 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 new list of needs and gaps provided in this document is the starting point for preparation of SEC-05-DRS Part b 2019 Call Topics and will become the basis for development of CBRN innovation by winning consortia in this call.

2 ENCIRCLE Catalogue – Updated list of needs and gaps

The new 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

Main Function	Gap	Phase in security cycle				Field				Need	Tool Requirements	Standards and Policy	Indicative Market Pull
		Prep	Prep	Rec	Prep	C	B	R	E				
Risks assessment, modelling and impact reduction	Lack of awareness regarding food defence in the food industry within production processes by operators, retailers and transporters. Lack of knowledge, guidelines and transportist assessment methods adapted to Food Defence (ORM, VACCIP, TACCP, CARV, FR-Stock). Lack of correlation between epidemiological information and foodborne issues.	X					X	X	X				#NA
Risks assessment, modelling and impact reduction	Lack of capabilities for real time threat assessment.									There is a lack of the capabilities for real-time threats assessment which will be able to: 1. Detect and continuously monitor threats and hazards on the incident scene in real time; 2. Assess threat and hazard data to provide appropriate guidance and decision support to responders and commanders; 3. Provide visualization capability of threat locations and proximity to responders.	<p>Potential solutions should detect, assess, and monitor active threats on the incident scene and about:</p> <ul style="list-style-type: none"> • detect and identify emerging threats and hazards; • provide information on detected CBRE agents; • allow responders to identify and designate the location (geolocate) of threats and hazards; • continuously monitor the status of identified threats and hazards on the incident scene; • display threat and hazard data in a manner that is designed to minimize distraction and cognitive failure; • generate an alert when active and passive threats and hazards are detected or evolve, based on agency-configured thresholds or parameters; • transmit threat and hazard data to authorized personnel; • be designed to minimize equipment burdens for the responder, while maintaining interoperability of components; • use a non-proprietary power source that provides sufficient power for an operational period; • be easy to operate, calibrate, and maintain throughout the service life; • integrate with existing data sets, model outputs, and emergency response software systems to remotely capture and monitor hazard-related data in multiple topographies; • operate within multiple environments; • be designed to minimize price of system, consumables, and maintenance. 	<p>Standardised methodologies and protocols for assessing the vulnerabilities along the food supply chain, and the development of standardized tools for risk assessment supported by regulations to set the standards for detection, identification and monitoring.</p> <p>Relevant standards and policy for consideration include: FSMA - Final Rule for Mitigation Strategies to Protect Food Against Intentional Adulteration - USA Regulation - 26 Maggio 2016; GFSI Benchmarking Requirements - GFSI Guidance document Version 7.1; BRC Global Standard for safety issue - V08 (August 2018); FSSC 22000 "Food Safety Systems Certification - v.4.1; July 2017; PAS 96:2017 - "Guide to protecting and defending food and drink from deliberate attack"; IFS Food - Standard for auditing quality and food safety of food products - Version 6.1 - November 2017; FSSC 22000 - Guidance on Food Defense - V1 - 10 April 2018.</p>	Automated Real Force Tracking - FAERI Study Global Market Size(2015) Global \$62.6B, Market Phase Mature and Growth
Risks assessment, modelling and impact reduction	Lack of common risk assessment processes, general knowledge regarding available methodology, processes for the sharing of results, measures and regulations for setting up minimum standards to ensure the use of adequate detection equipment, clear exceptions on privacy rights in case of extreme crisis situations in applicable legal framework at the EU level.									There is a need to prepare methodology and tools of risk assessment, residual risks of the secondary exposure process, allow able contamination levels which will be implemented in the EU Member States. Regulations according to set up standards for detection, identification, and monitoring.	#NA	#NA	

Figure 1a – List of Needs and Gaps

Gap		Phase in security cycle				Field			Need	Tool Requirements	Standards and Policy	Indicative Market Pull
Main Function	Description	Y19	Y20	Y21	Y22	Y23	Y24	Y25				
First responders protection	Lack of standardised or universal and multifunctional (or fit integrated sensor systems) PPE for walk-use, that is not heavy and bulky. Lack of respiratory protection, with an extended range of protection from toxic agents. Lack of standardised PPE for EOD team.								Development of standard and multifunctional, light, non-bulky, and easily removable PPE. The development needs to find the optimum balance between comfort, protection and protection of PPE (standardised, light – for longer use, usable also at high outside temperatures, and including communication, localisation devices and sensors). - For the Respiratory protection system there needs to be improved sound quality for communication and consideration for others ways to present information more easily to the operator - For the gloves they need to be able to use touch screen devices and buttons - Protective suits against general toxic threats (with no changing of air filters).	#NA	#NA	
Critical infrastructures and networks	Critical Infrastructure Protection against CBRNE threats. Lack of minimum standards for security-relevant infrastructure. Lack of sufficient security by design ventilation systems.	X							There is a need to improve protection of critical infrastructure against CBRNE threats. There is a lack of standardisation in relevant infrastructure security. There is a lack of secured and monitored system in the infrastructure (HVAC system, water system, etc.)	Development of an approach (system design) and tools (new work of tools) allow for efficient protections against CBRNE threats.	Standards for consideration: Compliance with Wireless Communications Protocols and Standards (e.g. IEEE 802.11), hardening, ruggedisation and P-design standards (e.g. MIL-STD), and safety standards (e.g. CE). Standards for consideration: Detection/Identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TIMs and in OPCW Scheduled lists of chemical agents.	#NA
Devices for detection and identification	Lack of CBRNE detectors for wash water and water used in food production processes.		X						There is a need to develop detection systems allowing to monitor wash water and water on the various stages of food production processes.	#NA	#NA	
Devices for detection and identification	DM CBRN device		X						Development of DM CBRN device that is robust and has 12 hours operation, is easy to operate, capable of self-calibration, and maintain throughout the service life. The device should allow easy integration should be compatible with existing systems. It should provide secure real time transmission to authorised personnel and present appropriate information to the user in a clear manner. These device should also fulfil forensic chain of custody requirements for data collection.	Standards for consideration: Compliance with Wireless Communications Protocols and Standards (e.g. IEEE 802.11); new PDRP (Broadway) hardening, ruggedisation and P-design standards (e.g. MIL-STD); and safety standards (e.g. CE). Standards for consideration: Detection/Identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TIMs and in OPCW Scheduled lists of chemical agents.	Remote Monitoring of Threats and Hazards – IFARRI Global Market size (2015) \$38.4B- Market Phase – Mature and Growth Improved Stand-off Detection and Identification of FARRI Global Market size (2015) \$48.4B- Market Phase Mature & Growth	
Devices for detection and identification	Real identification of hazardous agents and contaminants.								There is a lack of the capabilities for gas identification of CBRNE agents which will be able to: 1. Detects hazardous agents and contaminants on the incident scene in real time; 2. Transmits hazard data to responders and commanders; and 3. Provides pertinent information regarding the threat or hazard.	Potential solutions should detect and identify hazardous agents and threats in real time. Potential solutions should: • Detect hazardous chemicals (e.g. CVA, TICs, TIMs, VOCs); • Detect biological agents (e.g. BWA); • Detect ionizing radiation (e.g. alpha, beta, gamma); • Detect explosive compounds and precursors; • Detect levels of atmospheric gases (e.g., O ₂ , CO); • Detect airborne particulate matter; • Identify the specific agent or isotope; • Measure quantity, volume, and concentration of hazards; • Provide pertinent information, including modes of exposure and protective action information (e.g., PPE, standoff distances, immediate treatments, decontamination requirements); • Detect, analyse, and provide feedback in real time; • Detect agent in all states; • Measure hazardous agents and contaminants continuously; • Allow no false negatives; • Associate agents and contaminants within a set perimeter around the incident scene; • Generate an alert when agents and contaminants are detected, based on agency-configured thresholds or parameters; • Transmit threat and hazard data to authorized personnel; • Be designed to minimize equipment burdens for the responder, while maintaining interoperability of components; • Use a non-proprietary power source that provides sufficient power for an operational period; • Be easy to operate, calibrate, and maintain throughout the service life; • Integrate with existing data sets, model outputs, and emergency response software systems to remotely capture and monitor hazard-related data in multiple topographies; • Operate within multiple environments; • Be designed to minimize price of system, consumables, and maintenance.	Standards for consideration: Compliance with Wireless Communications Protocols and Standards (e.g. IEEE 802.11); new PDRP (Broadway) hardening, ruggedisation and P-design standards (e.g. MIL-STD); and safety standards (e.g. CE). Detection/Identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TIMs and in OPCW Scheduled lists of chemical agents.	

Figure 1b – List of Needs and Gaps

Gap		Phase in security cycle			Field			Tool Requirements	Standards and Policy	Indicative Market Pull	
Main Function	Description	PPS V	PPS P	Rec	C	B	RN	E	Med		
Devices for detection and identification	There is a lack of miniature, reliable and cheap tools for sampling, detection and identification of CBRNE agents, which could be mounted on robots or drones.		X			X	X	X		Standards for consideration: Compliance with Wireless Communications Protocols and Standards (e.g. IEEE 802.11) new PPP2 (Broadway) hardening, ruggedisation and IP design standards (e.g. MIL-STD), and safety standards (e.g. CE). Detection/identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TMs and in OPCW Scheduled lists of chemical agents.	Remote Monitoring of Threats and Hazards – IFAFRI Global Market size (2015) \$8.4B- Market Phase – Mature and Growth Improved Stand-off Detection and Identification of Multiple Hazards – IFAFRI Global Market size (2015) \$48.4B- Market Phase Mature & Growth
Devices for detection and identification	Lack of stand-off detectors for CBRNE threats cheap enough to allow a spatially comprehensive deployment. Lack of working tools for point and stand-off detection of biological agents		X			X	X	X		Standards for consideration: Compliance with Wireless Communications Protocols and Standards (e.g. IEEE 802.11); hardening, ruggedisation and IP design standards (e.g. MIL-STD); and safety standards (e.g. CE). Detection/identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TMs and in OPCW Scheduled lists of chemical agents.	Standards for consideration: Compliance with Wireless Communications Protocols and Standards (e.g. IEEE 802.11); hardening, ruggedisation and IP design standards (e.g. MIL-STD); and safety standards (e.g. CE). Detection/identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TMs and in OPCW Scheduled lists of chemical agents.
Devices for detection and identification	There is lack of more generic detectors, which would allow detection of the mixtures of toxic compounds.									Standards for consideration: Compliance with hardening, ruggedisation and IP design standards (e.g. MIL-STD), and safety standards (e.g. CE). Detection/identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TMs, and OPCW Scheduled lists of chemical agents.	Standards for consideration: Compliance with hardening, ruggedisation and IP design standards (e.g. MIL-STD), and safety standards (e.g. CE). Detection/identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TMs, and OPCW Scheduled lists of chemical agents.
Devices for detection and identification	There is lack of simple, reliable, fast, robust, accurate, sensitive detection/analysis of both chemical and biological agents.					X	X			Standards for consideration: Compliance with hardening, ruggedisation and IP design standards (e.g. MIL-STD) Detection of known biological agents e.g. those listed in US Centers for Disease Control and Prevention (CDC) Category lists. Detection/identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TMs, and OPCW Scheduled lists of chemical agents.	Standards for consideration: Compliance with hardening, ruggedisation and IP design standards (e.g. MIL-STD) Detection of known biological agents e.g. those listed in US Centers for Disease Control and Prevention (CDC) Category lists. Detection/identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TMs, and OPCW Scheduled lists of chemical agents.
Devices for detection and identification	Infrastructure and buildings should be ideally equipped with the CBRNE sensors allowing i.e. for detection of dangerous agents in the ventilation systems.		X							Dedicated tools and systems, which should allow to protect infrastructure and buildings against CBRNE threats. The solution should be easy to operate, calibrate, and maintain throughout the service life.	Detection/identification of compounds listed in NATO International Task Force 25 (ITF-25) list TICs and TMs, and OPCW Scheduled lists of chemical agents.

Figure 1c – List of Needs and Gaps

Main Function	Gap	Phase in security cycle					Field					Tool Requirements	Standards and Policy	Indicative Market Pull	
		Pre v	Prep	Resp	Rec	Med	B	RN	E	Med					
CBRN Identification	Detection and Identification of concealed dangerous materials (CBE agents) such as white powders in envelopes.				X		X			X			Standards for consideration: Compliance with hardening, ruggedisation and IP design standards (e.g. MIL-STD) Detection of known biological agents e.g. those listed in US Centers for Disease Control and Prevention (CDC) Category lists. Detection/Identification of compounds listed in NATO International Task Force 25 (ITF-25) list TCs and TMs, and OPCW Scheduled lists of chemical agents. Standards for consideration: Compliance with Wireless Communications Protocols and Standards (e.g. IEEE 802.11); hardening, ruggedisation and IP design standards (e.g. MIL-STD); and safety standards (e.g. CE). Detection/Identification of compounds listed in NATO International Task Force 25 (ITF-25) list TCs and TMs	Remote Monitoring of Threats and Hazards – IFA FFI Global Market size (2015) \$8.4B- Market Phase – Mature and Growth Improved Stand-off Detection and Identification of Multiple Hazards – IFA FFI Global Market size (2015) \$48.4B- Market Phase Mature & Growth	
CBRN Identification	Tools and procedures supporting first responders in easier recognition of contaminations related symptoms and allowing them to analyse correctly the situation.		X						X				Develop improved detection and identification solutions for protection against concealed dangerous materials e.g. such as white powders in envelopes. The solution should be easy to operate, calibrate, and maintain throughout the service life. The solution should not be bespoke for one agent.	Develop improved detection and monitoring at the crisis incident to quickly identify affected people and contaminated items. Solutions should ideally involve stand-off detection and monitoring systems and should present the information to the incident commander or medical personnel in a clear and informative manner. The solution should be easy to operate, calibrate, and maintain throughout the service life.	
CBRN Identification	Forensic CBRN teams only in a few countries in Europe. Lack of procedures for forensic activities in the hot zone. Forensic laboratories are not equipped for safe investigation of CBRN materials and vice versa. Sampling focuses on identification for health and safety purposes, not on forensic purposes. Current decontamination methods destructive towards forensic trace materials. Lack of methods for first analysis on the field. Sufficient on-site forensic capability is lacking.												CBRN Forensic: There is need to create EU level SOP, standardisation documents, how to share information between EU countries in area CBRN Forensics. Especially in the area of sampling, decontamination methods, equipment. Forensic national labs equipped to perform CBRN materials analysis. Lack of methods for sufficient on-site forensic - field analysis. Product to be laid or sprayed on a CBRN device, or a pool or powder to fix them without modification of their nature (forensic). Possible implementation of STANAG 4359 (AEP-10) - NATO Handbook for Sampling of Chemical Warfare Agents Possible parallels with crime scene standards and practices (e.g. ISO/IEC 17020:2012 Requirements for the operation of various types of bodies performing inspection)	CBRN Forensic: There is need to create EU level SOP, standardisation documents, how to share information between EU countries in area CBRN Forensics. Especially in the area of sampling, decontamination methods, equipment. Forensic national labs equipped to perform CBRN materials analysis. Lack of methods for sufficient on-site forensic - field analysis. Product to be laid or sprayed on a CBRN device, or a pool or powder to fix them without modification of their nature (forensic). Possible implementation of STANAG 4359 (AEP-10) - NATO Handbook for Sampling of Chemical Warfare Agents Possible parallels with crime scene standards and practices (e.g. ISO/IEC 17020:2012 Requirements for the operation of various types of bodies performing inspection)	

Figure 1d – List of Needs and Gaps

Main Function	Gap	Phase in security cycle				Field				Need	Tool Requirements	Standards and Policy	Indicative Market Pull
		Pre v	Res p	Rec	C	B	RN	E	Med				
Situation Assessment	The Command truck is equipped with limited number of sensors, such as wind direction and speed, providing information on the situational awareness. All the information on situational awareness is usually obtained from radio voice communication.	X											Combined Effects Assessment – PA/RI study Market Size (2015) \$64B- Market Phase – Mature and Growth Risk Assessment, Decision support to Command – IPAPQ Global Market size (2015) \$17B, Market Phase Mature and Growth All source collection and integration Market Phase Mature and Growth Global Market size (2018) \$64B- Market Phase Growth
Situation Assessment	Joint Operational Picture and tactical command toolkit												#NA
Situation Assessment		X											#NA
Decontamination and Depollution	Decontamination of CBRN contaminated forensic evidence			X	X	X							#NA
Decontamination and Depollution	Lack of knowledge and generally accepted decision mechanisms (including standardisation) for technologies that enable capability for "how clean is clean" and to keep the balance between decontamination and rebuilding or replacement. Lack of guideline or standards which consist procedures about sampling and how to accomplish a mission of resiliency after contamination.												#NA
Decontamination and Depollution	There is a lack of efficient and effective CBR decontamination systems that are environmentally friendly.			X	X	X							#NA

Figure 1e – List of Needs and Gaps

3 Way forward

The delivery of the Deliverable D3.12 is a next step after providing D3.9, D3.10 and D3.11 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 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 projects 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 further 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.