



ENCIRCLE

European Cbrn Innovation for the market CLustEr

D5.3 ENCIRCLE Cluster Impact Y3

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Executive Summary

The Deliverable D5-3 presented herein provides a summary of Impact of the developments conducted by the ENCIRCLE consortium throughout the year three of the ENCIRCLE project.

Table of Contents

Executive Summary	3
1 Introduction	5
2 ENCIRCLE Impact	6
2.1 Innovation Plan and Dissemination.....	6
2.1.1 Part B Call Topics.....	6
2.1.2 ENCIRCLE Dynamic Catalogue	7
2.1.3 ENCIRCLE Dissemination activities.....	8
2.1.4 Innovation Watch.....	10
2.2 ENCIRCLE Communities	12
2.2.1 ENCIRCLE practitioner and technological communities	12
2.3 Market and Business Support.....	14
2.3.1 Market analysis.....	14
2.3.2 Business Models and Plans and Financial Instruments	14
2.3.3 Sustainability of the cluster	15
2.4 Integration and Technical support	15
2.4.1 Standards and Interfaces.....	15
2.4.2 Integration Platforms and Human Factors	16
2.4.3 Impact Policy and Exploitation	17
2.4.4 Human Factors.....	17
2.5 Feedback on Part B research and development activities	18
2.5.1 TERRIFIC.....	18
2.5.2 EU-SENSE	20
2.5.3 COSMIC.....	23
2.5.4 Other Projects and Initiatives.....	24
2.5.5 List of ENCIRCLE Resources.....	25
2.6 Planned activities in 2020.....	26

5-3 ENCIRCLE Impact

4

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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, an innovative approach was proposed. Based on five objectives, it aims at prompting the innovation and business development, and filling market gaps within the project timeframe. 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

The purpose of this document is to summarise the ‘impact’ of the ENCIRCLE Project to date, covering the period from March 2019 to March 2020.

2 ENCIRCLE Impact

The ENCIRCLE project has been running since the 10th March 2017 and the following sections summarise the impact to date over the period March 2019 to March 2020.

2.1 INNOVATION PLAN AND DISSEMINATION

2.1.1 Part B Call Topics

The starting point for ENCIRCLE catalogues was list of the technologies which were originally identified as gaps in certain functions (based on the STACCATO functions) of the main phases in the CBRN Security Cycle (Prevention, Preparedness, Response, Recovery) at the end of the EDEN project. This catalogue was updated based on the careful evaluation of its content as well as other contributions including workshops in 2017. In the second year of project realisation we have continued work on evaluation of the gaps in the catalogue and focused on their prioritisation. During our work we were supported by practitioners who, during events such as Biogarden exercise organised by eNOTICE project, have reviewed full list of needs and gaps. Our efforts have led to development of the draft of the topics catalogue. This catalogue thanks to support from BAE was further extended by addition of comments regarding market pull, standardization and links to EU CBRN Action Plan. The catalogue of needs and gaps has been refined and updated since the project has commenced as follows:

- D3.9 Part B 2017 Call Topics – recommended for the 2017 call, issued in May 2017,
- D3.10 Refined future Part B Call Topics - as a result of the ENCIRCLE workshop in Nov 2018.
- D3.11 Part b 2019 Call Topics - before publishing call the list of the topic was additionally reviewed by the EC and suggested changes and additions have been made.

In February 2020 we have finalised list of the 9 topics for the last CBRN Cluster call in the H2020 Framework programme, SU-DRS04-2020 CBRN Cluster, which will be open on March 12, 2020. At the beginning of March 2020, this list was under the final review by the European Commission. In our work on preparation of the list of the topics we have again reviewed carefully list of the needs and gaps and analysed it taking into consideration potential needs fulfilment and gaps closure by the developments of the CBRN-related projects carried out within H2020 Programme. The list of preselected 68 topics was then evaluated and prioritised during consultation process and survey with practitioners.

The survey was conducted using the online survey tool SLIDO, via contact with practitioners networks, via on-line communications, and presentations at the 21st International CBRN Symposium 2019 CBRN Internal symposium at in Farnborough and NO-FEAR demonstrations in Rome in May 2019. The survey included responses from the practitioner and technological community from Law enforcement, Fire service, Medical service, Military, Government/public

institution, Industry and Academia. The survey was conducted as a multiple choice asking for the participants to respond to what they considered to be the two most important needs that need to be addressed by research and development for implementation in the next five years (the survey received 55 responses). The results of the survey were described in the report “ENCIRCLE 2020 Topic Prioritisation Summary of Survey Results” prepared by BAE. Based on the results of survey 11 topics with high priority have been identified.

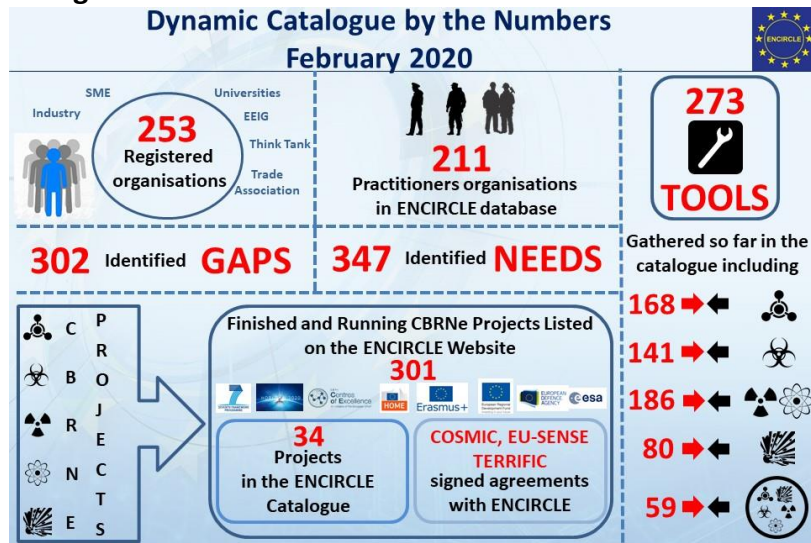
Taking into consideration results of the survey and after a few rounds of the corrections and modifications based on the comments obtained from DG HOME, DG ECHO and REA we have finally reduced list of the topics to 9. The topics have been clearly linked to EU CBRN Action Plan and we assigned them to certain phases in security cycle as well as the threat (CBRNe) they are responding to.

2.1.2 ENCIRCLE Dynamic Catalogue

The work on further development of the catalogue has continued. Work carried out during third year of project realisation included:

- Improvements being made to the catalogue based on user feedbacks.
- Process of addition of a new tools, projects and organisations continues - active approach have been implemented (mailing campaigns, phones, skype, webex call) to encourage technology providers to register and advertise their technologies in the catalogue and to encourage project coordinators to provide information about their projects.
- Improvements in the description of the organisations registered in the catalogue have been implemented, which will provide easier identification of the fields of activities.
- Opening of a space for Innovation watch. In this space, continuous assessment of new capabilities and threats is carried out through the uploading of reports on such technologies and incidents onto the Innovation Watch tool.
- Marketplace has been launched in November, 2019.

Currently the catalogue contains



2.1.3 ENCIRCLE Dissemination activities

The ENCIRCLE dissemination activities, which are coordinated by Falcon Communications are based on the released in 2019 communication and dissemination plan for Period 3. All dissemination activities were actively supported by the whole consortium. The dissemination activities included among many:

- Sharing information about ENCIRCLE activities through use of social media, ENCIRCLE website and websites of ENCIRCLE partners
- Release of ENCIRCLE eNewsletter Issue 2 – May 2019
- Release of ENCIRCLE eNewsletter Issue 3 – February 2020
- Release of ENCIRCLE Magazine issue 3 – September 2019
- Promotion of the Part b call topics

ENCIRCLE participated to many events to both promote ENCIRCLE project by presenting it but also to support other project.

- CBRN Research and Innovation (CBRN R&I) Conference – 20-23 May 2019 (BAES, Ouvry, Falcon)
- The CBRN symposium - 20-23 May 2019 (Ouvry)
- Toxi-Triage Project Field Trial - 22 May 2019 (Miksei, Environics)
- ENCIRCLE Workshop: Robotics in CBRN - 5 June 2019 (Falcon)

5-3 ENCIRCLE Impact

8

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- e-NOTICE - 21 September 2019 (BAES)
- The 13th CBRNe Protection Symposium - 23-25 September 2019 (Falcon, CBRN UK)
- Increased Readiness for CBRN Incidents Through Joint Exercises for First Responders - 26 September 2019 (PIAP)
- DSEI – September 2019 (CBRN UK, ADS)
- 21st International CBRN Symposium – 14 November 2019 (CBRN UK)
- NO FEAR-Stair4Security Workshop, November 2019, Rome – (UCSC, IAI)
- INCLUDING 1st Workshop on the Radiological and Nuclear Training in the EU, January 2020, Rome – (IAI, Miksei)
- RESIST Validation Workshop, CBRN training and equipment needs assessment, February 2020, Rome – (IAI, UCSC)

Robotics in CBRN – Workshop

The Encircle consortium showcased some of the leading work that European Commission projects have been doing in the form of a half day workshop looking at the use of robotics in CBRN. Unmanned ground vehicles (UGVs) and unmanned aerial vehicles (UAV) are the zeitgeist of CBRN response, with many forces utilising commercial off the shelf technology, what Encircle was able to do was bring a group of 50 responders together and brief them on what they might be able to do tomorrow. Encircle arranged for four projects, that had received European funding, to attend and explain how their projects would be able to benefit European response, these included Audros, TOXI-Triage, Rocsafe, and Terrific.

The delegates found the whole array of CBRN robotics research amazing, and many said that they didn't realise so much work was being done. For Encircle it was a great opportunity to place ourselves in the centre of this research and to provide the various members of the consortiums with a wider customer base.

CBRN R&I - Presentation and Live Poll

The CBRN Research and Innovation (CBRN R&I) conference is a relative newcomer to the European CBRN event calendar. This was now its third iteration, following on from previous events in Cap D'Antibes and Lyons, but it gets stronger and stronger each time. Nearly 400 scientists, researchers and first responders attended the four-day event, all keen to be able to share knowledge and make new contacts. Encircle was there in two ways, first as an exhibitor and secondly as a workshop presenter. The first element was the most straightforward, with a series of information and dissemination materials that Encircle consortium members handed out to delegates and answered their questions, after this Clive

Goodchild and Thierry Pollet first gave an overview of the project, explained the aims of the interactive poll they were going to conduct, and then took the delegates through the process. The discussion was lively, and despite the differing knowledge levels in the room there was an engaging group, keen to understand the role of standards in CBRN development more as well as the role that Encircle could provide in a more robust European CBRN industry.

2.1.4 Innovation Watch

In order to monitor different media streams (social networks, news feeds, etc) for content from the main CBRN solution providers, main associations or clusters that may be of interest, the idea of web semantics and NSA-like methods has been further developed and customized for the CBRN topic since the beginning of the project. The dedicated user interface has been further developed since February 2019 and the BETA version of the tool. In particular, a “how to” (indicated in a menu as a “Guidance”) has been developed to guide the users through the different functionalities.

The tool “RiskRadar” has been customised for the CBRN domain and is available to monitor different resource streams for content from the main solution providers, main associations or clusters that might be of interest. The tool provides the results in 2 forms: A dynamic network clustering the topics and a list of articles (with links). The Innovation Watch aka Risk Radar is available for ENCIRCLE partners testing at <https://e2r2.risk-technologies.com> (username: encircle, password: encircle). Selected results are presented in the dedicated space in ENCIRCLE Dynamic Catalogue.

The screenshot shows a web browser window with the URL <https://e2r2.risk-technologies.com/Login>. The page title is "Risk Radar". The main content area features a heading "Please Enter Your Information" with a user icon. Below this heading are two input fields: "Username" and "Password". There are two buttons: a blue "Login" button and a blue "Sign in with LinkedIn" button. At the bottom, there are two links: "I forgot my password" and "I want to register".

The Innovation Watch user may first read the introduction to The CBRN Innovation Watch of ENCIRCLE, which provides description of the tool and rationale behind it.

The 3-step approach of ENCIRCLE used in Innovation Watch includes:

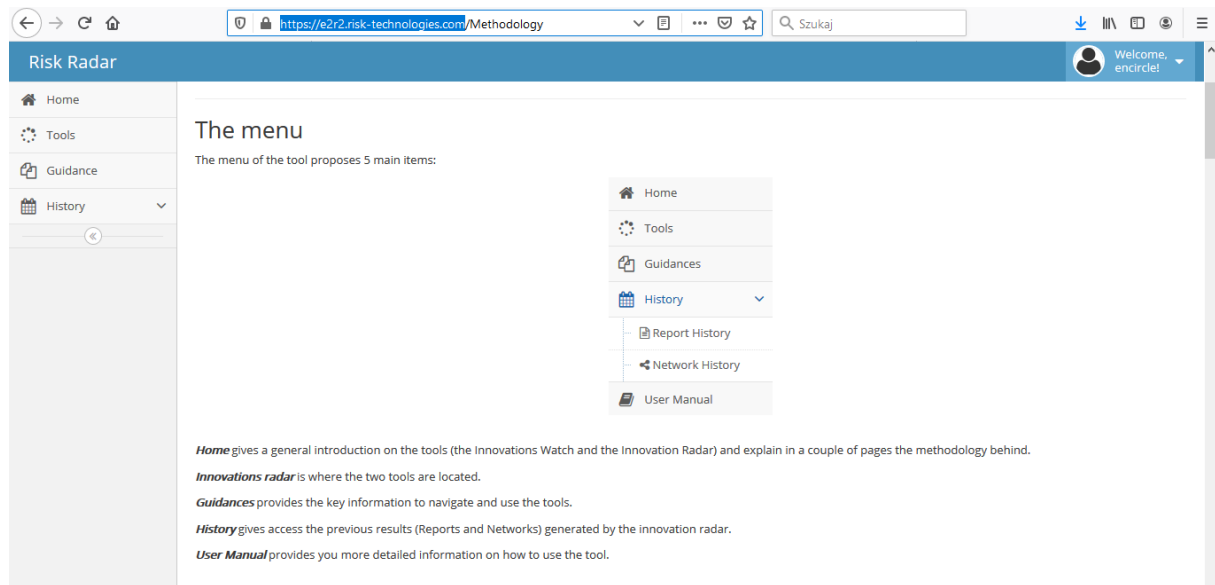
Step 1: Identify and monitor novel online content for a certain topic

Step 2: Identify potential high impact trends - evaluating the retrieved online content to identify those texts and documents that have the highest potential for impact with using an unsupervised, quantitative big data analysis

Step 3: Visualize recommendations - providing recommendations for new innovations to be included in the ENCIRCLE catalogue by identifying those topics within the high-impact documents that have the highest novelty value



In order to make easier the use of Innovation Watch tool the “Guidance” section has been prepared and additionally the parts that were superfluous have been removed. The aim of Guidance section is to give the necessary information on how to use the innovations watch online tools to identify potential new innovations. The print screen of the part of Guidance section is shown in image below.



Finally, a five pages article dedicated the innovation watch tool has been written for the 2nd ENCIRCLE newsletter published in May 2019.

Efforts have now to be invested into the selection of the online sources to be screened by the tool in order to improve the relevance of the results obtained.

2.2 ENCIRCLE COMMUNITIES

2.2.1 ENCIRCLE practitioner and technological communities

The activities dedicated to development of ENCIRCLE practitioner's community included:

- A mailing campaign to all the Practitioners and Customers community was done by both IAI and UCL, sharing the last ENCIRCLE Newsletter and inviting them to visit the Catalogue, in order to "remember" about ENCIRCLE and in line with the actions agreed during the last ENCIRCLE meeting about keeping the Community alive (June 2019)
- The Romanian PROECO CBRNe Cluster was invited by IAI to join the ENCIRCLE Community and Catalogue. IAI also invited the Romanian Cluster PoC to circulate the invitation among its network of practitioners (July 2019)
- A mailing campaign to the Italian CBRN-P3 Cluster was conducted by IAI sharing the last ENCIRCLE Newsletter and inviting to register to ENCIRCLE communities and Catalogue and to share the invitation with the potential interested stakeholders. This

action was deemed useful since the Cluster is growing and there are recent new members which can be potentially interested in joining (July 2019)

- All the INCLUDING project participants were invited twice to access the ENCIRCLE Dynamic Catalogue (November 2019 and March 2020)

The activities dedicated to development of ENCIRCLE Technological and Industrial Community:

The activity concerning the technological and industrial community development during this year 3 was oriented to dissemination on the ENCIRCLE project evolution by direct emailing to the community members, by series of face to face meetings with industrial suppliers during professional events Ouvry participation.

- Preparation, advertisement, information and Catalogue promotion during the 3rd CBRNe conference in Nantes, May 20-23, 2019.
- Open Encircle workshop dedicated to “Standards and Interface“ using SLIDO polls tool, May 22, 2019
- Translation of the SLIDO “Standards and Interface” and questionnaires practitioners answers from the eNOTICE - Gurcy Exercise, May 21-23, 2019
- Invitation to the industrial community to finalize their registration process by direct mailing and ensure optimal identification of their tools for an effective communication with the community of practitioners, August 2019
- Information and Catalogue promotion during the 13th CBRNe Protection Symposium in Malmö, September 2019
- Information and Catalogue promotion during MILIPOL Paris, November 2019
- Invitation to the industrial Community by direct mailing to follow the 2020- FIRE IN project looking for technological providers meeting their capability gaps, January 2020
- Discussion on networking with TRANSTUN project, January 2020

2.3 MARKET AND BUSINESS SUPPORT

2.3.1 Market analysis

The initial market analysis that was completed formed the inputs for the Integration and Interoperability surveys. The results are summarised here:

- A reasonably commonplace acknowledgement that capability gaps and needs within the CBRN market do exist
- An acknowledgment of marked differences between the Military and Civilian (e.g. “First Responder”) parts of the CBRN Market
- A sense that Standards relating to CBRN were generally either missing or underdeveloped

A copy of the Report can be accessed from the “CBRN Marketing” forum within the ‘Networks & Groups’ part of the ENCIRCLE Dynamic Catalogue and projects have been encouraged to comment on the findings via the forum.

Following on from that Report the Market and Business Support role will in future be supported via the use of the ADS.CBRN UK Sales Opportunities tool posting CBRNe business opportunities to the ENCIRCLE Networks & Forum group.

2.3.2 Business Models and Plans and Financial Instruments

A list of financial instruments have been included on the ENCIRCLE project website (<http://encircle-cbrn.eu/resources/funding-instruments/>) and in the forum. However the European Commission site already provides this function: https://europa.eu/youreurope/business/finance-funding/getting-funding/access-finance/index_en.htm and therefore the project will point to this site rather than duplicate effort.

During the last year the business maturity model has been developed further and used to baseline two out of the three SME led Part B projects (EU-SENSE and TERRIFIC) to identify the initial gaps that will need development to improve the business success of the projects. Initial discussions on plans for exploitation have also been conducted. Most of the areas support required from the projects has been around dissemination and awareness and standards. On the standards area, ENCIRCLE is collaborating with Stair4Security, and ENCIRCLE Consortium members have a role in supporting three current CEN Workshop Agreements (Trial guidance Methodology; Interoperability and Common Simulation Space)

5-3 ENCIRCLE Impact

14

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2.3.3 Sustainability of the cluster

The consortium has held an initial meeting in the last quarter of 2019 to start planning the sustainability of the ENCIRCLE cluster and conduct a lessons learnt on the project. The initial thoughts were discussed with the project officer and external examiners at a review meeting in January. The sustainability plan will be developed and finalised by the summer of 2020.

2.4 INTEGRATION AND TECHNICAL SUPPORT

2.4.1 Standards and Interfaces

During the reporting period, Tecnoalimenti continued updating and revising the list of CBRN standards. In particular sections “Protection”, “Information Management” and “Medical countermeasures” was updated. Below are the extracts from the list with updates.

STAC	Category	Sub-Category	CBRN	M/C	INT/EU/NA	STANDARD	TITLE	PURPOSE	PREFERRED
..
F2	PROTECTION	Clothing			EU	EN 13034	PROTECTION AGAINST LIQUID CHEMICALS	Type 6 clothing provides limited protection against small splatters and fumes from liquid chemicals. In general, this type of clothing is made of water-repellent but not completely waterproof material	
F2	PROTECTION	Clothing			EU	ISO 16073-1:2019	Wildland firefighting personal protective equipment	Standard about personal protective equipment (PPE) covering the torso, neck, arms, hands, legs, feet, head, eyes and hearing that is used for wildland firefighting.	
F2	PROTECTION	Clothing			EU	ISO 22612:2005	Clothing for protection against infectious agents	It assesses the resistance to penetration through barrier materials of bacteria-carrying particles.	
F2	PROTECTION	Clothing			NATO	STANAG 7132 : 2008	PERSONAL PROTECTIVE AND FIREFIGHTING EQUIPMENT REQUIREMENTS FOR FIRE AND EMERGENCY OPERATIONS		

STAC	Category	Sub-Category	CBRN	M/C	INT/EU/NAT	STANDARD	TITLE	PURPOSE	PREFERRED
..
6 7	Situation awareness & assessment Intelligence	Protocol			EU	ETSI SR 002 180	Emergency communications; Requirements for communication of citizens with authorities/organizations in case of distress (emergency call handling)		

STAC	Category	Sub-Category	CBRN	M/	INT/EU/NA	STANDARD	TITLE	PURPOSE	PREFERRED
..
8.1	Medical countermeasures		CBRN		NATO	STANAG 2068 : 2005	EMERGENCY WAR SURGERY		
8.1	Hygiene requirements				NATO	STANAG 2136 : 2014	REQUIREMENTS FOR WATER POTABILITY DURING FIELD OPERATIONS AND IN EMERGENCY SITUATIONS		

In addition, a standard for the Hygiene requirements category was added in the "medical countermeasures" section.

All updates were shared on “Encircle - Networks & Groups” Encircle also continued the work of identifying the most common wired communication interfaces.

2.4.2 Integration Platforms and Human Factors

The Integration Platform document (T5.2 Platform Integration) has been finalized. The challenge is that there is no standardized official term and definition for “integration platform” by the ISO (the International Organisation for Standardization) or CEN (European Committee for Standardization). The document is going to give some definitions for future use. The document can be found from the ENCIRCLE Forum.

For getting information from practitioners and end-users, the questionnaire of interfaces and interoperability conducted. The survey was also delivered to tens of individual Finnish CBRNE specialists. The SLIDO questionnaire was conducted in three separate CBRNE related events 2019. The questionnaire results were published in Encircle Newsletter - CBRNE Integration Challenges / August 2019 and in Encircle Magazine/Issue 3 2019.

There has also been presentation of ENCIRCLE during Toxi Triage project exercise Disperse in 23th of May 2019 Mikkeli, Finland.

Collaboration between Part B projects were established, and efforts have been continued since then.

2.4.3 Impact Policy and Exploitation

Identification of the documents describing security and defence procurement in various EU Member States has been finished. Due the fact that many documents and websites are only available in national languages, the analysis of the documents will be performed on the Polish and European documents.

Measuring of the impact of ENCIRCLE Dynamic Catalogue has been finished. Graphs showing the correlation between dissemination events and registration to catalogue + insertion of tools has been created. Also, other data has been elaborated. Whole work will be presented in the separate report. Measuring of the impact of ENCIRCLE forum has been started.

After successful establishment of the link between ENCIRCLE and iProcureNet projects, ENCIRCLE's representatives have been invited to participate in 1st iProcureNet Advanced Security Procurement Conference, which will be held in Lisbon, 31st March – 1st April. Details of the participation are being negotiated.

2.4.4 Human Factors

The questionnaire, published on the EU Survey platform, received 17 answers and was closed on August 20th, 2019. The responses were mostly from fire fighters, police officers, EMS and some other professionals, very experienced since the average of experience in the CBRN field is 11,5 years.

A complete analysis of the results was delivered in mid-January and can be found on the ENCIRCLE Forum. The analysis is organized in three sections: PPE, Detectors and UAV/UGV. Due to the scarcity of answers some of the areas were not analysed properly, as for chemical and biological detectors. These areas will be further analysed through the contact with other projects and/or with selected practitioners. The analysis was publicized through twitter and raised the attention of various stakeholders.

A strong link with PROACTIVE project (focused on HF in CBRN) was established, UCSC will participate on the behalf of ENCIRCLE at their next workshop.

UCSC has established a connection with the RESIST project and have participated actively in their workshop in Rome organized and held by IAI, which is a member of the RESIST company on 5th of February 2020.

2.5 FEEDBACK ON PART B RESEARCH AND DEVELOPMENT ACTIVITIES

2.5.1 TERRIFIC

The TERRIFIC project brings together 10 European organisations, all working together to deliver an important step change in the effectiveness of first responders during the first hours of a Radiological, Nuclear, explosive (RNe) incident. This will lead to reduced response times, less health and safety risks for the response teams and less human intervention in the operation, due to a higher number of automated processes and extended mobile detection capabilities.

The individual technological components needed for a significant improvement in this respect have progressively emerged over the past decade and include new detectors, drones, robots, dispersion models, information management and decision support software (DSS) packages.

The dynamically updated information made available by the TERRIFIC system and its components will enable the response team to intervene immediately, as adequate safety measures can be rapidly implemented. It is anticipated that the TERRIFIC solutions will have a significant impact for CBRNe responders in the early hours of an incident.

Just over 18 months into the project, some of the many questions that have been addressed with practitioners include:

- How can we better optimise the intervention of practitioners during the first 30 minutes after an RNe incident?
- How can we limit the exposure of first responders?
- How can we better anticipate the evolution of the hazard flows?

As a result of the many discussions, we have been able to define the specifications of the TERRIFIC system, as well as those of each of its components in terms of robustness, endurance, performance, but also the maintenance of operational capability.

In addition to numerous bi-lateral interviews, an interactive workshop was held in November 2018. Bringing together experts, consortium members and CBRNe practitioners,

the over-arching objective was to discuss practitioners' needs during the first hours of an RNe incident and to define the specifications of the TERRIFFIC system, based on a set of pre-defined scenarios.

As a result of the workshop and subsequent development work, the first TERRIFFIC Trial – an initial assessment of the existing technologies in the TERRIFFIC components – was hosted SDIS 73 in April 2019 in Chambéry, France. During the three-day assessment and training field trial, several radiation scenarios were utilised to challenge the components in both indoor and outdoor environments. This provided a strong baseline against which to evaluate the effectiveness and the potential of the various TERRIFFIC technologies – UAV, UGV, detectors, drone-mounted camera, Augmented Reality app and plume software modelling.

Against the background of these specifications, partners have worked hard to develop their respective technologies in the subsequent months. The first working prototype of the beta handheld detector, able to detect beta contamination in a high gamma background, was available and functional during the first trial. The UAV and UGVs with attached sensors, were further put through their paces, when they took part in a second trial in Gurcy, France. A larger drone was sent up to act as communications relay with a second, smaller drone being operated from outside and flown through a window, inside the building, down a flight of stairs into a room containing a simulated radioactive source. This was judged to have been a very successful evaluation of the components involved.

At the Interim Review in December 2019, each of the project partners summarised their progress to date to the Commission and reviewers and demonstrated genuine innovation in the components being developed, including the world's smallest gamma detector camera, a sensor able not only to locate a radioactive source, but to identify the type and dispersion. In addition, a completely new augmented reality solution will link to the command and control system, providing incident commanders with a whole host of new information from a RNe incident.

Following on from the trials, the technical team has continued to refine the individual technical components and are now focussing on the all-important integration phase. A three day integration meeting has been scheduled for 17th – 19th March at Coordinator ARKTIS' premises in Zurich. Should the current Coronavirus outbreak impact on any travel plans, however, backup plans are being prepared for remote testing and integration to be carried out.

Some of the solutions, including the augmented reality and command & control systems, are cloud-based, so it will be possible to make positive progress should the face-to-face meeting

not be feasible. This will include extending the API to the gamma camera with the simulated coordinates of the source being provided, the plume modelling for a solid source can also be created. A final decision on whether to hold a face-to-face meeting will be taken on 12th March.

In parallel, the dissemination and communication team is focussing on disseminating the project to CBRNe practitioner organisations and training establishments, including potential future customers. They are also addressing the Standardisation questions and developing the Exploitation and business plans in the second half of the project.

Consortium partners are currently also planning for the second Semi-Public Workshop and a further Trial of the components later in the year. Then a Final Trial will be held at the end of 2020 or in early 2021 with the final Public Workshop in Q1 2021. Practitioners will of course continue to be involved in the development of the TERRIFFIC system and their contributions will play significant roles in both the Workshops and the Trials.

Further information about the project is available from www.terrific.eu

The TERRIFFIC workshops have been supported and the business case maturity model has been updated and initial plans and recommendations for exploitation discussed. Collaboration on integration is being explored between BAES and one of the TERRIFFIC partners. The project was invited to the UK CBRN Symposium in November where there was a dedicated workshop to allow the project to have face to face conversations with practitioners and the project supported the TERRIFFIC meeting in January 2020.

2.5.2 EU-SENSE

The EU-SENSE project is a research and innovation action launched in May 2018 with time duration of 36 months. The project addresses selected technological gaps identified in the ENCIRCLE catalogue and International Forum to Advance First Responder Innovation's (IFAFRI) study.

The project proposes the development of a novel network of sensors for CBRNe application through the exploitation of various chemical detection technologies, machine-learning and modelling algorithms. In more detail, the project has a set of detailed objectives, which include:

- To improve the detection of large-spectrum of chemical agents via a novel network of sensors
- To improve detection accuracy and minimize false alarm rate
- To provide novel capabilities for training of CBRNe practitioners

5-3 ENCIRCLE Impact

20

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The status of the project for month 22 (February 2020), the consortium has developed the 1st generation prototype of the sensor node. The sensor node is composed of the following units:

1. Gas Detection Array – Personal (GDA-P) (AIRSENSE Analytics GmbH). Based on Ion Mobility Spectrometer H₂O chemistry (IMS) and Electrochemical Cell (EC)
2. Gas Detection Array – Personal (GDA-P) (AIRSENSE Analytics GmbH). Based on Ion Mobility Spectrometer NH₃ chemistry (IMS) and Photo Ionization Detector (PID)
3. AP4C (Proengin) - Flame Photometric Detector (FPD)
4. MO sensor array- Metal Oxide Sensor array
5. Microcontroller based sensor node unit



Figure 1 – The 1st generation of the sensor node (left), and chemical sensors applied in EU-SENSE (right)

The sensor node unit is able to collect the data from all above listed chemical sensors. The data are integrated into a data frame and encoded. Up to M22, the consortium has incorporated 3 firmware fixes into the 1st prototype, which largely improved the data stability, resolved connection problems and data loss issues. The 2nd generation of the node is at an advanced stage of development. In comparison to the 1st generation prototype, the new version will be characterised by:

- 1) Wireless access to the live data
- 2) Storing sensor configuration on the SD card
- 3) Remote commands from the network of sensors controller
- 4) Miniaturization – design over 50% smaller

Apart from the technology development, the EU-SENSE project has an on-going measurement campaign which is realized as a part of WP5. The purpose of the measurement campaign is to generate a database of the sensor readouts, which are tested during outdoor and lab conditions. The sensors are used to collect the background data as

well as sensor responses for the set of simulants. The results will be used during development of data fusion algorithms (classification, identification and concentration estimation), sensor model and environmental noise learning tool. The ongoing measurement session will continue until May 2020. Based on the achieved results and generated dataset, it will be decided if additional measurement sessions are necessary.



Figure 2 – EU-SENSE node setup during outdoor measurement session in Norway (source: FFI)

In near future, the project coordinator will participate in the following events in order to present the EU-SENSE innovations:

- 1) SPIE Defense + Commercial Sensing, 26 - 30 April 2020, Anaheim, California, United States (confirmed EU-SENSE presentation)
- 2) INTERSCHUTZ 2020, 15 - 20 June, Hannover, Germany (EU-SENSE stand)

The EU-SENSE Business case maturity model has been updated and gaps for development identified as well as initial exploitation thoughts. The project was invited to the UK CBRN Symposium in November where there was a dedicated workshop to allow the project to have face to face conversations with practitioners.

2.5.3 COSMIC

The COSMIC project started in October 2018 AND responds to the call for improved detection capabilities, and the project will be focussing on the gap in the security flow of container and inspection that can be exploited to smuggle CBRNE material. The project is progressing according to the plan with 8 deliverables submitted on time.

The COSMIC project develops 6 CBRNE sensors and system analytics software as described below

The sensors are:

- NA-NOSE for chemical and biological
- DMA-MS and GC-DMA- F-DMA for Chemical, Biological and Explosives
- Muon scanner for shielded Radioactive and Nuclear
- PDA for Biological in liquids and solids
- ES-CR-DMA-CPC for virus detection
- GC-DMA-F-DMA for explosives primary detection.

COSMIC has completed defining the requirements and specifications for each one of the sensors and has completed an extensive process to determine the CBRNE threat materials that need to be supported by each one of the sensors and that will be used along the project development and the field trials. The technology developers have purchased the simulants of the CBRNE materials and have started to test them in their development labs. To date the project has held two consortium meetings: in Rotterdam (December 2018) and in Tel Aviv (June 2019).

Due to the complexity of the field trials in CBRNE materials, preparations have begun early in order to verify that all the appropriate processes, procedures and licenses will be in place.

During the meetings the consortium have also visited the field tests sites where COSMIC will conduct the trials in the Rotterdam seaport and in the Haifa seaport.

For further information COSMIC has designed and launched the project website: <https://www.cosmic-cbrne.eu/> and has prepared a marketing package that includes a presentation, brochures of the project and all the sensors, and a video clip of the project.

Interactions and discussions with the ENCIRCLE project have involved the baselining of the business maturity model, inclusion of the project in the catalogue and promotion of the project at workshops and conferences.

COSMIC launched a new video clip that explains the technology concept of the project.

You can find it at the “home page” or “Technology” page (includes also brochures of all COSMIC sensors and system analytics) of COSMIC:

5-3 ENCIRCLE Impact

23

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Home page: <https://www.cosmic-cbrne.eu/>

Technology Page: <https://www.cosmic-cbrne.eu/technology>.

The baselining of the project with the Business case maturity model was completed and gaps identified, links are being sort with practitioners

2.5.4 Other Projects and Initiatives

Collaborative efforts with other projects and initiatives is summarised below

Project	Progress
COU	<p>March 2019 - Supported Panels on standardisation on CBRN-E and New actions in CBRN research. Findings from the session can be found on the COU site</p> <p>Network of practitioners meetings have been supported</p> <p>Supported workshops for the development of the new COU at SRE2019 and DG Home</p>
eNOTICE	May 2019 - Questioners and surveys to gather information on Integration and interoperability/standards
FIREIN	May 2019 - Supported 2 nd annual Dissemination workshop
NO-FEAR	November 2019 - Supported the NO-FEAR workshop and demonstration in Rome
ILEAD ILEANET TOXITRIAGE	May 2019 - Questioners and surveys to gather information on Integration and interoperability/standards
STAIR4SECURITY	November 2019 - Supported workshop, collaboration agreed between ENCIRCLE and Stair4Security
SRE 2019	November 2019 - Supported the Security Research event in Finland
TERRIFFIC	<p>July 2019 - Paris, supported their annual assembly meeting.</p> <p>January 2020 - Supported TERRIFFIC consortium meeting</p> <p>Collaboration being explored on integration between BAES and TERRIFFIC partner</p>

2.5.5 List of ENCIRCLE Resources

Resources Include:

Public deliverables		
Resource	Description	Location
Part B 2019	Call Topics	CORDIS
D4.1	ENCIRCLE Cluster Discussions Y1	CORDIS
D4.2	ENCIRCLE Cluster Discussions Y1	CORDIS
D4.3	ENCIRCLE Cluster Discussions Y3	CORDIS (Not yet included)
D5.1	ENCIRCLE Cluster Impact Y1	CORDIS
D5.2	ENCIRCLE Cluster Impact Y2	CORDIS (Not yet included)
Newsletters and Magazines		
Resource	Description	Location
Magazines	ENCIRCLE Issue 1, 2, 3	ENCIRCLE Website
Newsletter	ENCIRCLE Newsletter 1,2,3	ENCIRCLE Website
Information available in the ENCIRCLE Catalogue – Networks and Groups Forum		
Resource	Description	Location
Market Analysis	Results of Market analysis survey	CBRN Market analysis Discussion Board
Standards	List of CBRN standards Results of standards and Interfaces survey	General Discussion – WP5 standard
Human Factors	Summary of the Human Factors questionnaire Analysis	General Discussion – Human Factors

2.6 PLANNED ACTIVITIES IN 2020

Planned activities in 2020 include

Event	Activity Type	When/Where
2020 Part B Topics	Call for proposals	Mar 2020
iProcureNet	Support 1st Security Procurement Conference	Mar 2020
2019 Part B Topics winners	Initial collaboration	June 2020
COU	Support community of users and workshop	DRS Workshop Feb 2020
COU	Support community of users and potential CBRN workshop	27 th May 2020
eNOTICE	Support Joint workshop with H2020 SEC21 networks of practitioners FIRE-IN, NO FEAR, MEDEA, DAREnet at the international trade fair for the fire and rescue services, civil protection, safety and security INTERSCHUTZ 2020	June 2020
ENCIRCLE Cluster sustainability	Sustainability Plan	July 2020
SRIEE 2020	Support SRIE in Berlin	Dec 2020