



## **Deliverable D2.4**

### **Recommendations on how to adapt SOPs and tools**

**Due date of deliverable: 28/02/2021**

**Actual submission date: 14/09/2022**

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## Project details

Project acronym	PROACTIVE
Project full title	Preparedness against CBRNE threats through cOMmon Approaches between security praCTitioners and the Vulnerable civil society
Grant Agreement no.	832981
Call ID and Topic	H2020-SU-SEC-2018, Topic SU-FCT01-2018
Project Timeframe	01/05/2019 – 31/08/2023
Duration	52 Months
Coordinator	UIC – Grigore Havarneanu (havarneanu@uic.org)

## Document details

Title	Recommendations on how to adapt SOPs and tools
Work Package	WP2
Date of the document	14/09/2022
Version of the document	06
Responsible Partner	PPI
Reviewing Partner	CBRNE, DHPOL, RINI, WMP, UIC, ETICAS
Status of the document	Final
Dissemination level	Public

## Document history

Revision	Date	Description
01	08/02/2021	First Draft
02	17/02/2021	Revision
03	24/02/2021	Draft reviewed by CBRNE, DHPOL, RINI, WMP
04	27/02/2021	Final review by UIC
05	28/02/2021	Final Version
06	14/09/2022	Minor revisions after technical review

## Consortium – List of partners

Partner no.	Short name	Name	Country
1	UIC	UNION INTERNATIONALE DES CHEMINS DE FER (COORDINATOR)	France
2	CBRNE	CBRNE LTD	UK
3	PPI	POPULATION PROTECTION INSTITUTE (MINISTRY OF THE INTERIOR OF THE CZECH REPUBLIC)	Czech Republic
4	DB	DEUTSCHE BAHN AG	Germany
6	UMU	UMEA UNIVERSITET	Sweden
7	DHPOL	DEUTSCHE HOCHSCHULE DER POLIZEI	Germany
8	RINI	RINISOFT LTD	Bulgaria
9	WMP	WEST MIDLANDS POLICE AND CRIME COMMISSIONER	UK
10	ETICAS	ETICAS RESEARCH AND CONSULTING SL	Spain
11	SESU	STATE EMERGENCY SERVICE OF UKRAINE	Ukraine
12	UKHSA	UK HEALTH SECURITY AGENCY (DEPARTMENT OF HEALTH – PUBLIC HEALTH ENGLAND)	UK
13	SPL	STATE POLICE OF LATVIA	Latvia
14	AGS	AN GARDA SÍOCHÁNA – NATIONAL POLICE FORCE IRELAND	Ireland
15	FFI	FORSVARETS FORSKNINGINSTITUTT	Norway
16	NPH	KOMENDA GŁÓWNA POLICJI	Poland

## List of acronyms

Acronym	Definition
ATF	Analytical Task Forces
CBRNe	Chemical, Biological, Radiological, Nuclear, and explosive
D	Deliverable
DIM	Detection, Identification and Monitoring
EEAB	External Ethical Advisory Board
EMS	Emergency Medical Service (ambulance)
EOD	Explosive Ordnance Disposal
EU	European Union
FRS	Fire Rescue Service (fire brigades)
GDPR	General Data Protection Regulation
JESIP	Joint Emergency Services Interoperability Principles
(J)SOP	(Joint) Standard Operation Procedure
LEA	Law Enforcement Agency
LRFs	Local Resilience Forums
OPIC	Operation and Information Centre
PHA	Public Health Authority
PPE	Personal Protective Equipment
PSAB	Practitioner Stakeholder Advisory Board
SAB	Security Advisory Board
SOP	Standard Operating Procedure
T	Task
WP	Work Package

## Executive summary

Deliverable 2.4 is part of the second Work Package of project PROACTIVE that focuses on the engagement of Law Enforcement Agencies (LEAs) and other Practitioners. This deliverable presents an analysis of Standard Operating Procedures (SOPs) for Chemical, Biological, Radiological, Nuclear & explosive (CBRNe) incidents which are important for a successful coordinated response to CBRNe threats.

The analysis covers relevant topics related to taking evidence (e.g. hazard detection and location, threat assessment, sampling plan, identification of CBRN agents, decontamination, scene management, victim care and victim management). A special focus of analysis of SOPs was on crisis communication since communication is a key element in CBRNe threats and incidents, including both communication towards and among first responders, communication with the public, including vulnerable citizens, and with the media.

The biggest challenge for the analysis was obtaining direct access to SOPs (especially those employed by Police Authorities) as they were mostly reported as classified or for internal use only, even from some of the project partners' countries. This issue was addressed in two ways. The model of coordinated response to CBRNe threats was built on: 1) the resources provided to the project by LEA partners for review and amendment, and 2) the analysis of CBRNe SOPs collected through a survey which was held through an online platform together with a Practitioner Stakeholder Advisory Board (PSAB) workshop using a polling methodology. The information from publicly available sources like guidelines and instruction tools were considered to complete the response process picture.

The report presents different aspects of the response process and describes commonalities and differences found in available sources, the information reported in the online survey about CBRNe SOPs and information collected through the PSAB workshop poll. Special emphasis was put on identification of preparedness to handle affected vulnerable citizens during CBRNe incidents.

The conclusion chapter includes a set of key practical recommendations. These will be further used in the PROACTIVE joint exercises and some of them have the potential of being further implemented in CBRNe SOPs. Many of these key recommendations touch upon the involvement of vulnerable groups in the process of preparedness, including communication strategies with citizens with different types of impairments.

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## 1. INTRODUCTION

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Chemical, Biological, Radiological, Nuclear & explosive (CBRNe) incidents, whether accidental or caused by terrorists, can have a major impact on society. The European research project PROACTIVE (*P*Reparedness against CBRNE threats through cOmmOn Approaches between security praCTitioners and the Vulnerable civil society) aims to increase practitioner effectiveness in managing large and diverse groups of people in a CBRNe environment. The project aims to provide in-depth research to facilitate the interaction between European Law Enforcement Agencies (LEAs), first responders and the vulnerable civil society.

The following deliverable is part of the second Work Package (WP) of PROACTIVE that focuses on the “Engagement of Law Enforcement Agencies and other Practitioners”. The WP provides insight into the perspective and methods of CBRNe practitioners also in regard to their awareness of the needs of vulnerable citizens in measures of preparedness and response in the context of CBRNe situations.

The deliverable presents the outcomes of the identification and analysis of Standard Operating Procedures (SOPs) and tools as well as recommendations for their adaptation. This task is not an isolated activity in the project but draws up on the results of all WP1 Tasks and WP2 Task 2.3. It was reported in the second study by PHE, “PROACTIVE D1.2 Findings from a systematic review of current policy for mitigation and management of CBRNe terrorism”, that current European guidelines and policies need to be updated and harmonised “to reflect the importance of recognising psychosocial aspects of CBRNe response” and “to ensure consistency in response” [1]. There was broad consensus among members of the Practitioner Stakeholder Advisory Board (PSAB), which was established under WP2 Task 2.1, on the WP1 outcomes which stressed the need for further examination of the current CBRNe procedures. To achieve this goal, it is necessary to identify and analyse Standard Operation Procedures (SOPs) employed by response agencies and then recommend approaches which could be tested during the project exercises and have the potential to be internationally accepted.

An SOP could be defined as a set of step-by-step instructions compiled by an organisation to help members carry out routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with regulations. The operational environment during effective CBRNe response relies on a multi-agency approach. This fact presumes that a way of joint cooperation of response agencies would be codified in an agreement or joint SOP (JSOP) as well.

SOPs for dealing with CBRNe preparedness, response and resilience were based on the previous experiences and the given capabilities of each individual country. The perceptions of risks have evolved over time, which has led to the development of doctrines and guidelines. There exist documents from international organisations (e.g., NATO) alongside national resources. These documents contain aims and recommendations on a strategic and tactical level and they are not considered as an SOP according to the above definition. They are meant to be translated into the SOPs and the JSOPs of the response agencies, and would therefore contain the detailed procedures of interest for this analysis. Whereas international documents and guidelines were easily found, the

acquisition of the national SOPs (especially from LEAs) for even research purposes has posed a real challenge.

A broad spectrum of documents related to CBRNe preparedness and incident response was identified during the WP1 literature review. However, most of the publicly available documents do not meet the definition of an SOP and are rather guidelines. Very few documents were able to meet our research criteria.

While obtaining more SOPs would have enhanced the research carried out in this deliverable, many challenges prevented this from happening: the confidential nature of these documents as well as a lack of SOPs directly related to CBRNe. Indeed, many details of effective CBRNe incident response are fragmented in other documents e.g., for psychosocial support or for vulnerable groups' needs.

## 2. METHOD

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The following part introduces the key terms used and the methodological approach for both parts of the study.

### 2.1. Explanation of key terms used

To ensure a coherent understanding of the terms used, the report defines the following key terms which are used in both parts of the study.

The term **CBRNe incidents** (Chemical, Biological, Radiological, Nuclear, explosive) refers to incidents that occur in the context of terrorist attacks (being the main focus of the project), natural hazards, accidents/technical emergencies or warfare. The term further refers to operations that require the specific use of CBRNe related SOPs (see below). The survey is only concerned with CBRNe incidents with a medium to high extent of damage. These include, for example, accidents in a factory that affect a large number of people inside and/or outside the factory and terrorist attacks with CBRNe substances that affect a large number of people. Minor damage cases, such as an oil spill or a household accident involving chemical substances, are not covered.

The term **Vulnerable Citizens** refers to members of the public with needs that differ from those of the average population when being affected by a CBRNe incident. This may include children, pregnant women, persons with physical or psychological disabilities, chronic medical disorders, acute health conditions or addictions, older persons with functional limitations and health restrictions, institutionalised individuals as well as their caregivers and companions. Vulnerable citizens also include persons with limited proficiency of the respective national languages or with restrictions regarding use of transportation, as well as individuals who are not prepared to undress for decontamination.

**Special needs** include restrictions in communication (sign language, interpreting, plain language, etc.) and restrictions in mobility (wheelchair, cane for the blind, acoustic signals, etc.).

**Practitioners** comprise “Law Enforcement Agencies (LEAs; typically police organisations), first responders (e.g., civil protection agencies, fire brigades, ambulance) and related stakeholders including private and public bodies, transport and logistic operators, etc. who provide support to

official responders and international during response, national and municipal authorities and civil society organisations such as those that help persons with disabilities and crisis management.” (cf. PROACTIVE Grant Agreement).

The term **SOPs (Standard Operating Procedures)** comprises official instructions set up by an organisation or institution to facilitate their forces to operate in an experienced manner during complex tasks and responsibilities. Their aim is to assure that the performance represents quality, efficiency and uniformity to reduce misconceptions and failures. SOPs include for example fire service regulations, rescue service guidelines, official training policies and briefing information.

The term **area of responsibility** refers to both the geographical region as well as the thematic area to which the participant/institution/organisation is assigned. Thematic areas encompass all tasks related to CBRNe protection and recovery.

**Measures** are adapted to the specific requirements of each phase of CBRNe management. **Measures of prevention** or respectively of mitigation of CBRNe effects focus on risk analyses, the research on CBRNe agents, identity checks, sales restrictions, data networks and the like. **Measures of preparedness** for a CBRNe incident are amongst others the training of certain rules of conduct for first responders in danger areas, the implementation of corresponding guidelines, and population education. **Measures of response** include tasks like the detection and identification of the CBRNe agents, first aid, crisis communication with the public, quarantine and protective clothing. **Measures of recovery** comprise the re-evaluation of the incident, the revision of the CBRNe SOPs and the opening of restricted areas.

The term **Communication channels** refers to all aspects of communication in the phase of prevention and response to CBRNe related incidents. With regard to the internal communication amongst practitioners, this includes verbal and radio communication system based communication. On the other hand, media communication between practitioners and affected people on site includes social media such as Twitter, Facebook, WhatsApp and homepages as well as radio, television, newspapers and press conferences.

## **2.2. Methodological approach of CBRNe SOPs identification and analysis**

The following part describes the methodological approach for the identification and analysis of CBRNe SOPs among LEAs and first responders across Europe and project partners. It was divided into two activities: 1) a literature review based on direct requests for the sharing of SOPs during project progress meetings, at the PROACTIVE online eWorkshop with Practitioners, EU LEAs, and Policy Makers (19<sup>th</sup> March 2020) and through professional contact networks as well as previous work within PROACTIVE in WP1 and WP2, e.g. T2.3) and 2) an online questionnaire survey which was combined with an interactive polling system during a PSAB workshop, entitled the “PSAB Workshop CBRNe SOPs”, held online on 8<sup>th</sup> February 2021.

### **2.2.1. SOP collection**

#### **2.2.1.1. Source 1 – Collection of SOPs from the literature reviews**

Literature references collected in the WP1 reviews were explored for in-depth content of the SOP documents. The documents which seemed to meet our definition of SOP were identified and

downloaded for further analysis when available. The project admits the difficulties connected to CBRNe SOPs gathering in the two ways: 1) language barriers and 2) confidentiality. The language limitation was quite easily overcome for subject matter experts, who simply used a basic translation of the table of contents and keywords. However, direct access to these documents for download is very limited as these documents are usually not available on the Internet.

#### **2.2.1.2. Source 2 – Direct collection of SOPs from project LEAs**

PPI asked the project partners to share their national documents during progress meetings (from the second progress meeting onwards). Collection of documents regarding German and Austrian resources were shared by DHPol. WMP, which has access to the relevant documents, expressed difficulties to share them due to confidentiality issues. These available inputs were still used within this report, despite not having direct access to the SOP by the researchers.

#### **2.2.1.3. Source 3 – Direct collection of SOPs from PSAB members**

Request of sharing the documents were disseminated to the PSAB group and the PSAB workshop in March 2020. The sensitive character of materials for direct sharing was confirmed by some PSAB members in the discussion and the willingness to share SOPs was below expectations. However, PSAB members showed willingness for cooperation on this topic if information could be gathered without requiring direct access to a given SOP. Thus, a new strategy was sought: the use of online surveys (see next section).

#### **2.2.1.4. Source 4 – internet targeted search**

An additional search on the Internet was conducted, focusing on documents mentioned in analysed texts as well as on searching based on keywords. The keywords were typically selected from available documents during content analysis in form of organisations (e.g. resilience forum, integrated emergency management), specific abbreviations (e.g. JESIP, ATF, IOR) and names of the documents found in footnotes or references (e.g. The 2015 Command, Control and Coordination of Major CT Operations).

The document analysis was accomplished by defining areas of interest, which were then compared among documents with possible classification by the countries or by the response agency type. PPI as the task leader made compilations of available resources and provided a draft document to the project task partners for review, who were able to amend this deliverable by providing facts from documents which were unavailable to the researchers from their respective national resources. It brought better chance of insight and correction of misunderstandings to national procedures from those countries directly involved in the research consortium and shed light on documents which the researcher team at PPI were not able to directly collect.

### **2.2.2. Online surveys (one questionnaire and one poll taken during a workshop)**

It was decided by the research team to deploy an online questionnaire survey among EU practitioners to overcome the issues associated with obtaining direct access to SOPs (see chapter 3). This method had proved to be effective in Task 2.3 and was expected to facilitate knowledge acquisition without needing direct access to SOPs by instead relying on the knowledge of the questionnaire respondents in the analysed area. The request to share SOP documents with the

authors of the study was also included in the introduction of the online survey and the option to indicate a willingness to do was incorporated as a question directly. In addition, a live poll was implemented during a workshop with the PSAB members to complement the main survey with additional findings.

These resources are referred to in the text as:

1. Identification and analysis of SOPs Survey
2. PSAB Workshop CBRNe SOPs Quiz Questionnaire

### **2.2.3. Study objectives**

Effective CBRNe response must be based on coordinated procedures, which need proper leadership on operational, tactical and strategic levels (when they are activated). This response system, based on SOPs, is not only established for CBRNe incidents but it is also necessary for normal operations and other incident types.

The goal of this deliverable is to focus on CBRNe related documents. However, many activities required for the proper execution of CBRNe response are not described directly in CBRNe SOPs but are codified, trained and used throughout all operations and thus are found in a multitude of related documents/SOPs. It was necessary to define areas of interest under CBRNe conditions, analyse them in detail and compare them among countries for the purpose of this study. Four main areas of interest, which are components of the response phase, were selected:

- Incident control and management – who is in charge of the incident, which response agencies are involved, who is responsible for the safety of responders, if capabilities and responsibilities of agencies are listed and what they are, area management, and communication;
- Communication – information flow towards and among first responders, and communication with the public, including the media;
- Taking evidence – hazard detection and location, sampling and identification, chain of custody and forensic aspects;
- Management of victims and casualties – rescue, decontamination, psychosocial aspects and vulnerable citizens' needs.

The objective of this study was to put together the findings from obtained documents, data from the online survey and workshop poll.

### **2.2.4. Sample design**

This study focused upon countries represented in the PROACTIVE consortium and the PSAB. However, responses from additional European countries as well as from outside of Europe were not excluded.



### 2.2.5. Sample inclusion criteria

Participants had to meet the following requirements:

- The survey focused on **LEA practitioners** with management responsibility.
- The term **fire fighter** referred to volunteer and professional practitioners. The survey focused on fire fighters with management responsibility.
- **Health professionals** primarily referred to first responders and their management and training level. This included paramedics, emergency physicians and doctors in the outpatient emergency department, as well as their nurses, psychological first-aiders, trainers and comparable emergency personnel. The survey focused on health professionals in leading positions. This included for example leading emergency physicians and chiefs of emergency response on site and the like. Additionally, CBRNe response and prevention instructors and certified rescue service training centre instructors were considered.
- **First responders** included members active in civil protection agencies like the German Technical Relief Agency (THW) or emergency psychosocial services like Crisis Intervention Teams.
- Sectors that are not actively involved in emergency situations have not been taken into account. These included for example nursing care for older persons, rehabilitation and General Practitioner surgeries.

### 2.2.6. Questionnaire development

PPI prepared a wide set of questions to address preparedness and response activities which was based on the picture of CBRNe incident countermeasures in the Czech Republic. This questionnaire had three main parts focusing on incident management, taking evidence and victim management, which reflects the study objectives.

The questionnaire was provided to task partners for review and was considerably edited. LEA representatives helped to identify the questions which pointed out sensitive facts. It was decided to split the questionnaire into two groups where sensitive questions were excluded from the online survey. These questions were thoroughly reviewed by the task research team and the sensitive questions were coded into an online polling system used during PSAB Workshop CBRNe SOPs.

The entire survey and poll took place in the official project language of English.

### 3. DATA COLLECTION

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#### 3.1. Data collection for the online surveys

The following sections describe the data collection for the online surveys: the online questionnaire and the poll which took place during the PSAB Workshop CBRNe SOPs.

##### 3.1.1. Information guidance

As part of the online questionnaire recruitment, PPI provided the following documents, which were passed on to the project LEAs and relevant practitioners across Europe (mainly through the PSAB):

- A mail template (Appendix A – Participant information sheet of Identification and analysis of SOPs survey) for Online Survey
- The questionnaire Identification and analysis of SOPs survey (Appendix B) for Online Survey
- PSAB workshop CBRNe SOPs quiz questionnaire (Appendix C) for PSAB Workshop

The execution phase of the online survey was from December 2020 to February 2021 and the survey was communicated several times to increase the number of participants.

Recruiting participants for the PSAB Workshop CBRNe SOPs and subsequent polling survey took place via:

- Invitations being sent to all PSAB members;
- Announcements published on Twitter and LinkedIn and shared with relevant projects (e.g., ENCIRCLE, BULLSEYE, TRANSTUN);
- Sharing the invitation by all PROACTIVE project partners within their networks.

The PSAB Workshop CBRNe SOPs polling took place on 8<sup>th</sup> February 2021.

##### 3.1.2. Ethics and safety

The two online surveys were conducted by PPI whose research activities are carried out within the framework of national and European data protection guidelines for security research. Therefore, all data was handled securely in line with national data protection legislation of the Czech Republic and the General Data Protection Regulation (GDPR) of the European Union, as well as with the PROACTIVE project's guidelines on data protection (D7.4 - Data Management Plan and Research Ethics and D8.3 - Materials and briefing for PROACTIVE exercises).

Given the cross-national character of the questionnaire, the survey had to be developed with an eye toward comparability across languages and cultures. Therefore, information about the study was designed in an appropriate form and in easily understandable, non-offending language. Following GDPR Art 4 on Definitions and Recital 32 on Conditions for consent, this information clarified the voluntariness of participation. In addition, information was prominent, unbundled from other terms and conditions, concise, easy to understand, and user-friendly.



By completing the online questionnaire, the participant electronically agreed (as a positive action to opt in) to an informed consent form that comprised all aspects of data handling and ethics and safety.

The surveys only collected anonymous data. It is therefore not possible to assign the questionnaire to a specific person and only the type of organisation and country were registered together with answers. However, there was a voluntary option to leave a contact email in the questionnaire as a way of contacting the participant in order for them to share documents with PPI, if they choose so. PPI did not capture any personal data of such contributors after the email communication was finished neither was there a requirement to use the official email address of the participant.

Contact details of the research team and ethical and data officer were provided for any queries in all provided documents and at the end of the survey.

The survey received the Project Ethics Officer Approval Reference: **PROACTIVE/PEO/7/11/12/2020**

The quiz received the Project Ethics Officer Approval Reference: **PROACTIVE/PEO/8/04/02/2021**

In this way, implementing a combination of data minimisation, informed consent and data security protocols, the fieldwork activities followed the basic principles of research with human subjects described in the Belmont report<sup>1</sup> and reported in D8.3, namely respect for persons, beneficence and justice.

## 4. SAMPLE DESCRIPTION

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The following table shows the online questionnaire survey participants country and response agency / area of expertise.

Online Questionnaire Respondents		
Participant No.	Country	Professional sector
1	Belarus	Military
2	Belgium	Fire Brigade
3	Belgium	Military
4	Canada	Law Enforcement Agency (LEA)
5	Canada	Law Enforcement Agency (LEA)

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<sup>1</sup> See at: <https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/read-the-belmont-report/index.html>

6	Canada	Law Enforcement Agency (LEA)
7	Czech republic	Fire Brigade
8	Czech republic	Fire Brigade
9	Czech republic	Military
10	Czech republic	Law Enforcement Agency (LEA)
11	Germany	EMS
12	Germany	Fire Brigade
13	Greece	Military
14	Greece	Public Health Service
15	Greece	Fire Brigade
16	Ireland	Fire Brigade
17	Israel	EMS
18	Italy	Fire Brigade
19	Italy	Consultant Organisation
20	Latvia	Law Enforcement Agency (LEA)
21	Latvia	Fire Brigade
22	Latvia	Fire Brigade
23	Netherlands	Law Enforcement Agency (LEA)
24	Norway	Goverment
25	Norway	Fire Brigade
26	Norway	CBRNe Medicine Unit
27	Poland	Rail Transport
28	Spain	Law Enforcement Agency (LEA)
29	Spain	Law Enforcement Agency (LEA)
30	Spain	Law Enforcement Agency (LEA)
31	Spain	Law Enforcement Agency (LEA)
32	Ukraine	Civil Protection
33	Ukraine	Civil Protection

34	United kingdom	Law Enforcement Agency (LEA)
35	United kingdom	Law Enforcement Agency (LEA)
36	United kingdom	Rail Transport
37	United kingdom	Rail Transport

Table 1 – Profile of participant of Identification and analysis of SOPs survey

## 5. RESULTS AND DISCUSSION

The following section presents the answers from the online surveys and sums up the findings from the documents' analysis. The topic of CBRNe includes many different sub-topics, to which an analysis will be made in this chapter. As such, this section is divided into four main chapters which differ in focus. The CBRNe incident control and management: SOP and beyond chapter analyses interoperability and communication and is about response agencies. The communication chapter highlights communication amongst first responders and also towards the public. The CBRNe incident information/data acquisition and processing chapter analyses evidence collection and is mostly focused on activities connected to sampling, detection and monitoring of CBRN. Lastly, the management of vulnerable victims and casualties chapter is about affected persons' and victims' care, decontamination and rescue operation and is thus oriented towards the general public. For the purposes of this study, the term CBRNe will continue to refer only to a terrorist attack.

### 5.1. CBRNe INCIDENT CONTROL AND MANAGEMENT: SOPs AND BEYOND

This section is focused on analysis in incident management. This area consists of general expectations for initial preparedness and the ability to recognise the nature of a CBRNe incident, principles of joint working, incident command and safety operations. These components create a basic framework for effective CBRNe response.

#### 5.1.1. Incident Management

The surveys' results demonstrate that SOPs are vital for CBRNe incident management. When asked if agencies have their own documents for dealing with CBRNe incidents, all participants declared that such a document exists (Figure 1).

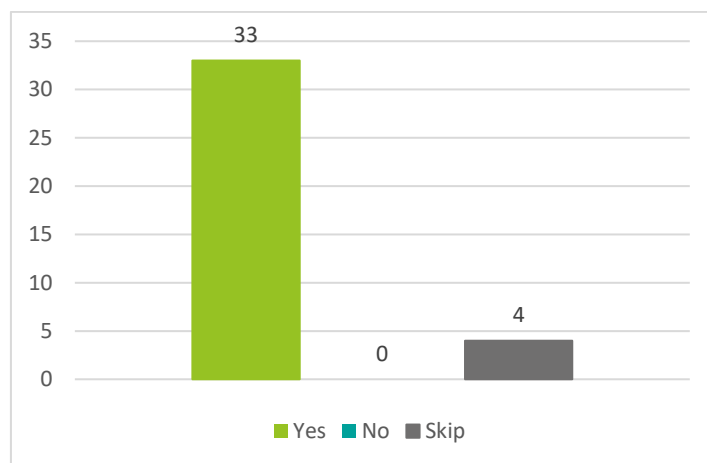


Figure 1 – Internal organisation/agency documents relating to CBRNe incident responses (Source: Q2, Online Survey)

The review of SOP documents demonstrated that the following elements occur in SOPs and guidelines for safe and effective operations: checklists, aide memoires or flowcharts for incident commander and other commanders to go throughout the intervention from initial phase to the end.

However, some key aspects of CBRNe response cannot be addressed solely by publishing an SOP. A good example of this is being able to recognise if a given incident is indeed a CBRNe incident. This is accomplished through the training of all levels of responders since every intervention starts at the local level. Overall, based on the responses to the PSAB Workshop CBRNe SOPs polling, all or at least some first responders have had training in the initial response phase for CBRNe incidents (Figure 2).

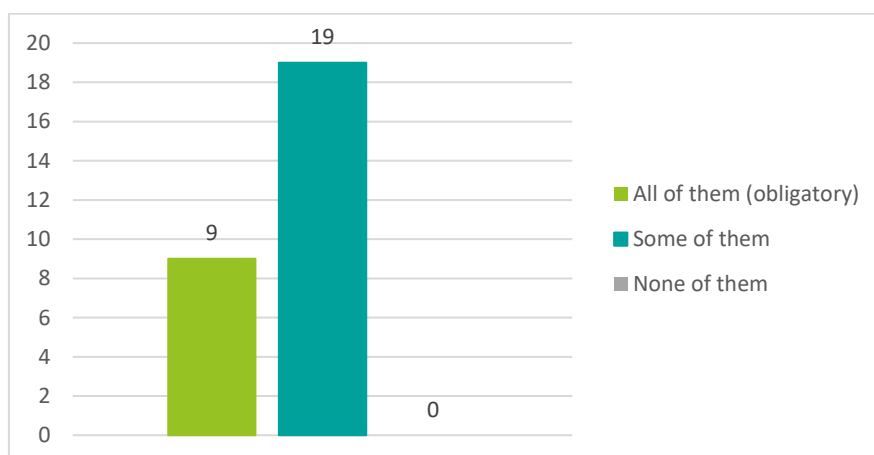


Figure 2 – Training of specialist first responders in initial responses to CBRNe incidents (Source: Q2, PSAB Workshop)

### 5.1.2. Joint Arrangements and Operating Principles

The importance of multi-agency oriented cross-sectoral cooperation in case of CBRNe attacks is emphasised in the EU CBRN Action Plan 2017. CBRNe response principally requires the same set of procedures from initial response phase to resilience of situation. Data from available resources (findings from PROACTIVE report D2.3, SOPs and questionnaires data) show that major differences between countries exist when it comes to which agency is responsible for leading an intervention.

Moreover, even in a given country the leading agency may change depending on the nature of the incident and what the priority is during an operation. For example, for particular tasks (e.g., explosive ordnance disposal – EOD) or when there is a security issue linked to a CBRNe incident (e.g., suspected threat, possible link to terrorism, associated criminal background), LEAs have the lead in order to neutralize the threat and secure the zone for the safety of all responders. Further, once the threat was identified and neutralized and there are no longer any security concerns, the firefighters can start to assist the persons in danger and “save” the victims. The shift in the leading role between agencies needs proper explanation. Priority of life saving influences the tactics and way of intervention throughout initial operation as well as special operation response later. Police or another response agency in leading position supervises and coordinates other agencies with this priority in mind, which could mean that the majority of operations in the incident site are temporarily performed by fire brigades and emergency medical staff under their own subordinated leadership. However, change in overall leadership to another agency, which is based on clear principles, should never be an impediment for achieving the main goal.

The questionnaire results demonstrate that the level at which an incident is managed varied greatly amongst participants, as seen in Figure 3.

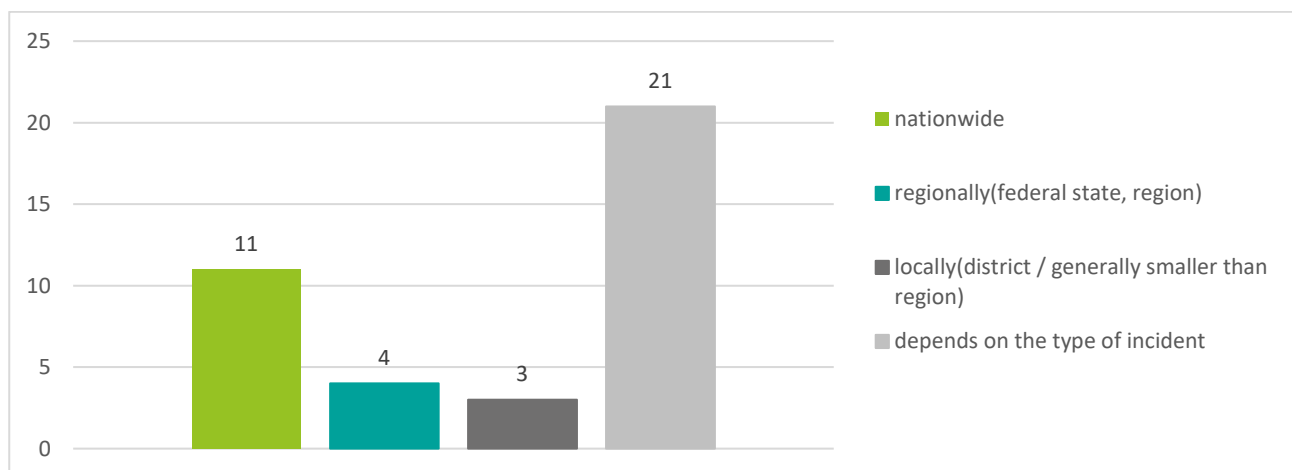


Figure 3 – Levels of coordination and management of CBRNe incidents, from national to local (Source: Q14, PSAB Workshop)

This implies the need for each response operation to be coordinated. Figure 4 demonstrates that statutory documents of a multi-agency level is common. Closer communication with participants of the online questionnaire showed that some, e.g. Germany, could point to a general legal framework of civil protection while others, e.g. the Czech Republic, no longer involve civil protection in CBRNe incidents.

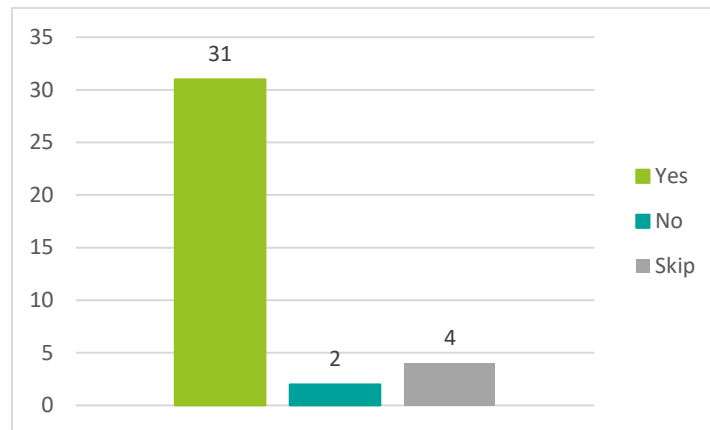


Figure 4 – Presence of statutory documents governing operational policies and procedures within a CBRNe response organisation/agency (Source: Q1 Online Survey)

Effective intervention is based on the cooperation of the response agencies which require some form of agreement created in the preparedness phase. Agencies cooperate in joint operation together in an integrated system in e.g., Integrated Rescue System (IRS, Czech Republic) or Integrated Emergency Management (IEM, UK). Integrated response isn't created specifically for solving CBRNe incidents but mostly for common daily operations. Nevertheless, it creates a framework for a jointly coordinated effort. Principles of joint operations, mandatory responsibilities and cooperation mechanisms could be found in JSOPs (Joint SOPs). Policies and procedures that promote joint working form the basis of the doctrine for responding services in an integrated system. Applying simple principles for joint working is particularly important in the early stages of an incident, when clear, robust decisions and actions need to be taken with minimum delay, in an often rapidly changing environment (e.g., Joint Emergency Services Interoperability Principles – JESIP – Figure 5).

Principles of joint operations differ in form and level of documentation among European countries and each could even have special regulations for CBRNe incidents. We can observe different response agencies within each individual country in most of Europe – e.g. regional, local or company FRSs, number of LEAs – metropolitan, state, transport and military police as well as many ambulance services (e.g. Malteser Hilfsdienst, Die Johanniter, Rotes Kreuz). This fragmentation of the agencies is not an issue as they mostly intervene on their home ground and represent the same stakeholders (LEA, FRS, EMS). It is necessary to establish a mechanism of national cross-border cooperation for these services for major events or for the specialised capabilities they provide. One example of this type of flexible approach is the deployment of German detection, identification and monitoring (DIM) resources (Analytical Task Forces – ATF) which are city fire rescue service units under normal circumstances. Federal principles mean that if they are deployed in CBRNe operation out of city limits, the basis of their authority changes to reflect this [3].

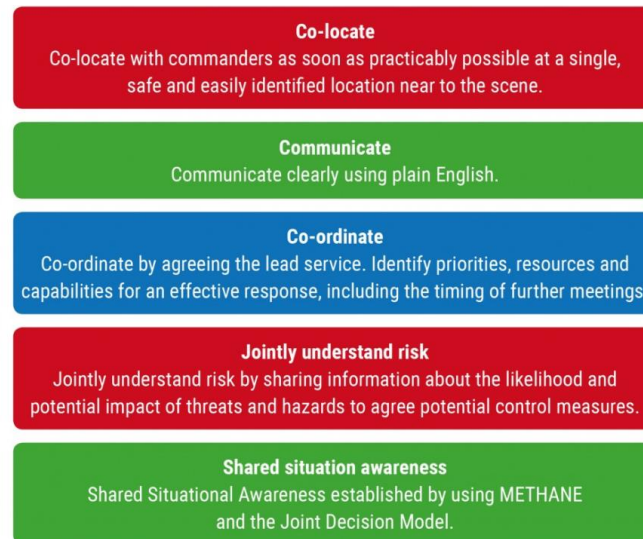


Figure 5 – The five Working Principles of Joint Emergency Services Interoperability (Source: JESIP.org.uk)

#### 5.1.2.1. Case studies

##### *German example*

German regulations of CBRNe incidents demonstrate the strong role of the federal states and how the situation may differ on lower organisational levels (e.g. district level) [4]. The civil protection (BBK) creates templates for operations which are implemented by response agencies. These documents named DV (Dienstvorschrift) have code numbers which remain the same among agencies, e.g., DV 100 for command and control (Führung und Leitung im Einsatz) and DV 500 for Hazmat and CBRNe (Einheiten im ABC – Einsatz), and the code of the agency stays in front – FRS (FW), Technische Hilfswerk (THW), etc. There are principles for interoperability of the specialised units (ATF) beyond the area limits of their normal operations [6]. Although these documents contain the scheme of command structure, there are no exact specification of roles of involved response agencies. This could be explained by the high level of heterogeneity for the responsible organisation for this particular task and it could be said that these documents are more task oriented than organisation oriented. This approach could work very well for a localised incident when all response agencies are familiar with their roles.

Given the high deployment of volunteers, Germany focuses, above all, on the provision of special equipment, such as the CBRN-Reconnaissance Vehicle, the measuring line component, the Decontamination Lorry “Personnel” and the ATF. Support from federal organisations including federal police, BBK, THW is possible on each level of intervention. Synchronisation with support from different geographic area needs to be very well planned during operations. Based on the fact that there is no standardised dedication of roles of FRS or police in command of CBRNe incidents among federal states and information about interoperability of the services are ambiguous it is difficult to make any description for German procedures as a whole. Nevertheless, developed strategies in some areas (e.g., psychosocial support) are discussed later on (see chapter 5.4.4).

### ***Italian example***

The Italian system of CBRNe response is based on the principles of civil protection. The Italian National Fire-Fighters Corp, as a fundamental actor of the Italian system of Civil Defense, is requested to intervene also in response to CBRNe events of intentional or malicious nature, such as those deriving from sabotage or a criminal or terroristic action involving the use of such substances. With specific reference to terrorist attacks, the Ministry of Interior, through the National Department of the Fire Brigades, the Public Rescuing and the Civil Defense, adopted in September 2002 the “Guidelines for the chemical, biological, nuclear and radiological intervention following a terroristic attack”. Guidelines put particular emphasis on the necessity to forbid the transit in the concerned area to personnel not explicitly authorised, to preserve eventual evidence besides taking into consideration that the terrorists could be among the subjects that receive aid or among those deceased. Of particular importance is then the connection between the law enforcement agents, mostly for the delimitation and access control of the attacked site, the identification and the control of the persons involved or present, the evidence collection and conservation and the first phases of the investigation. [42]

### ***UK example***

Complex and multi-agency oriented documents for CBRNe response were found in the UK. The basic document for the development of doctrines and SOPs is the Civil Contingencies Act (2004) [18]. The JESIP (Joint Emergency Services Interoperability Principles) series of documents was created in 2013 and updated in 2016. The three Chief Officer Associations – National Police Chiefs Council (NPCC), Chief Fire Officers’ Association (CFOA), Association of Ambulance Chief Executives (AACE) – have recognised the importance of delivering a consistent UK emergency service response which has been captured in joint doctrine under the JESIP framework [8]. The CBRN(e) Joint Operating Principles for the Emergency Services (JOPs) are a key part of meeting that requirement. SOPs for different subjects on different levels are created in accordance with these documents.

An important multi-agency approach in the UK is represented by Local Resilience Forums [22]. Local resilience forums (LRFs) are multi-agency partnerships made up of representatives from local public services, including the emergency services, local authorities, the NHS, the Environment Agency and others. These agencies are known as Category 1 Responders, as defined by the Civil Contingencies Act. LRFs are supported by organisations, known as Category 2 responders, such as the Highways Agency and public utility companies. They have a responsibility to co-operate with Category 1 organisations and to share relevant information with the LRF. The geographical area the forums cover is based on police areas. LRFs also work with other partners in the military and voluntary sectors which provide a valuable contribution to LRF work in emergency preparedness.

### ***Czech Republic example***

Czech Republic has the Act No. 239/2000 Coll. on the Integrated Rescue System and on amendment of certain codes, in latter wording, is the basic legal frame [10]. This law is complemented by agreement of response agencies and some specialised organisations which provide expertise or technical means upon request. These agreements specify the interoperability principles. There are JSOPs for major typical interventions which are signed by legal or methodological representatives of all involved response agencies. 3 of 16 of these JSOPs – subway



attack (chemical), dirty bomb (radiological) and white powder incidents (biological) – are directly CBRNe oriented and some other JSOPs complement them in the area of incident with mass character and psychosociological support. Creation of these JSOPs is covered by authority of FRS DG in cooperation with all involved agencies. The JSOPs are binding documents valid in the entire territory of the country.

#### 5.1.2.2. Case study comparison

If Czech and UK JSOPs sources are compared it could be concluded, that Czech CBRNe documents highlight preparedness for certain type of incident which is in this case a chemical incident directly to the specific venue of the Prague Metro (subway). These documents are CBRNe specific and procedures are detailed. On the other hand, UK documents which belongs to Local Resilience Forums (LRFs) [29, 37] are more generic in focus and CBRNe elements are part of an all hazard response approach. However, collected doctrines and resources cover all important aspects of a safe and effective response relatively in detail [8, 22].

Both concepts are based on detailed descriptions of responsibilities of individual bodies of the system notwithstanding if they are classical response agencies, higher level decision makers or state administration authorities. The SOPs structure is logical and follows the way of operations from the initial phase to the end the of intervention and include the aspects of declaration of CBRNe incident, informational awareness, sharing information among response agencies on site as well as among operational centres, meeting points and command post establishment, zoning, entry and exit routes, on scene command and control, level of independency and interoperability of response agencies, responsibility and consideration on the preservation of evidence for further forensic exploitation.

Response operation is further divided into phases in the UK system:

- Initial operational response;
- Transition;
- Specialist operational response.

There are important aspects for the operational level of response like checklist, schemes flowcharts and aide memoires. The UK documents are accompanied by a broad spectrum of aide memoires for different level of responders in the initial operational response (front line commanders, normal responders) e.g., IIMARCH for operational briefing or M/ETHANE mnemonic for passing information.

Task orientation instead of organisation orientation in German documents could be an inspiration on how to facilitate the harmonisation concept of SOPs on European level as well. It should be concentrated on defining necessary tasks during response operations and consequence management rather than harmonisation of responsibilities of response agencies among countries. In other words, an effective harmonisation might not be focused on *who* (the agency) but rather on *what* and *how* it should be done. It does not say it is finally easier system, however, it respects the current national or regional organisation of response and involved stakeholders. The enormous cost of standardisation through agencies and stakeholders was indicated in the free text Q26 PSAB Workshop CBRNe SOPs polling.

### 5.1.3. Incident command

Incident management and command structure are not standardised among European countries in case of CBRNe incidents. This section describes typical examples of the leadership. Command, Control and Co-ordination are important concepts in the multi-agency response to emergencies. The Emergency Response and Recovery Non statutory guidance [18] defines single agency command and control structures by the terms Gold, Silver and Bronze and the multi-agency co-ordination structures in the terms Strategic, Tactical and Operational levels which are widely used elsewhere. Hierarchy of command and control is an important part of doctrines and (J)SOPs for incident commanders. Incident command of intervention with hazardous materials (Hazmat) is the responsibility of FRS throughout all analysed resources. However, command in the case of a CBRNe incident, which is by its nature a result of a terroristic or malevolent hazardous material use, differs among countries.

As explained in JESIP, the nature of a CBRNe event requires that Commanders from each emergency services co-locate at scene as a matter of urgency to streamline appropriate decision-making processes [8]. The selection of the leading agency and incident command accordingly is based on the character of the intervention or it is based on principles of agreement signed by agencies. It might be common practice that selection of on-site incident commander is straightforward and doesn't block operations. The incident commander of joint operation acts as coordinator of the decisions and actions of all agencies on tactical and operational level of command, which doesn't mean this commander directs each step performed by the agencies especially during a major incident. Specialisation of tasks of section command appears with the increase of the incident size and complexity.

FRS incident commander could remain in charge of CBRNe incident (e.g., in the Czech Republic or Italy) whereas the situation in some countries depends on the incident character and location and police, FRS or EMS could take a lead (e.g., in federal organised state like Germany). It is not the most important which agency is in charge of an incident command if the way of response is systematic and effective. To achieve this goal the training of commanders of expected leading agency and regular and realistic joint exercises of involved subjects need to be performed, which was indicated by free text comments from PSAB CBRNe SOPs workshop polling (Q16, Q24, Q26). SOPs also should contain resources like checklists, aide memoires or flowcharts for incident commander and other commanders to go throughout the intervention from the initial phase to the end.

#### ***Police-led example (the UK)***

In the UK, police are in charge of operation under CBRNe (terrorism) character of the event [8]. CBRNe response led by police doesn't mean that FRS or EMS are excluded from their mandatory responsibilities [9]. It is accepted that from a FRS and ambulance service perspective the broad response to a hazardous material release (a HazMat incident) utilises most of the same resources and follows broadly similar processes as would be followed for a CBRNe event [8].

The tasking of Military EOD resources must be considered in the early stages. A CBRNe event is by definition terrorism thus render safe operation and EOD securing must be considered in the early stages of intervention. It is mostly responsibility of the specialised police or military units (MACP – military aid to civil power in UK).

### ***The FRS-led example (Czech Republic)***

Czech IRS documentation declares that incident commander is FRS commander unless the specialised law regulation provides otherwise [10]. Operation need to be commanded from the very first moment of the response and mechanisms to take over the command are established within FRS as well as between agencies. Joint operations are finally commanded by FRS or police officer. It is normal that FRS commands intervention even if there is dominant activity of other response agency. The reason is better experience of FRS in leadership especially in the case of mass interventions. It is assumed that this commander is professional firefighter (responder in general) with proper level of training in tactical or strategic command of the incident and at least basic level of training in CBRNe area. Incident commander convene staff on tactical level in case of bigger intervention where representatives of response agencies, organisation with written agreement on IRS operations and experts are involved. This is mechanism how non-leading agency could have direct influence on the operation management.

#### **5.1.4. Safety of operations**

While the aim of the operations is to protect lives and property, another clear objective is to complete mission in a safe way. The severe nature of CBRNe hazards requires that safety and security of operations be a priority. Early identification of a potential CBRNe hazard and rapid implementation of safe operation arrangement is crucial to protect health and lives of the responders and public. One such area where safety is paramount is when responders enter the hot zone. The questionnaire results demonstrate that there is variation in responsibility (Figure 6). However the majority of the participants indicated that the safety of all responders entering the hot zone is on an individual agency.

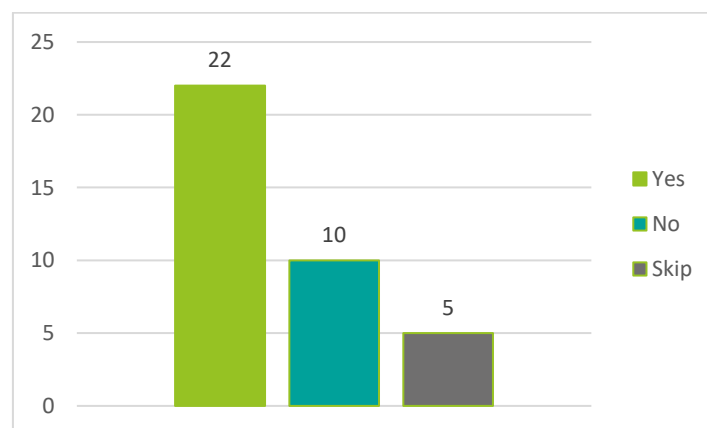


Figure 6 – The safety of CBRNe incident responders. Is there a single point of responsibility at the scene?  
(Source: Q3 Online Survey)

The SOP analysis demonstrated that the safety of responders is the responsibility of the incident commander, who determines a safety officer to control movement into and from different intervention zones, proper use of protective equipment and the deployment time of responders. Indeed, the definition of access direction (upwind) and safety zones (hot zone, warm zone and cold zone, outer zone) are one of the first steps of a safe operation. This is supported by generic perimeter size (shortest distance is 50m or 100m) followed by measurement of pre-defined safety levels for the given contaminant e.g., radiation levels in the case of R&N agents. The delegated safety officer then

controls the deployment of forces in the dangerous zones by registering entry and exit times in the hot zone and checking the use of appropriate personal protective equipment prior entry.

Another safety tool found in the analysed SOPs are casualty checks. Indeed, some CBRNe elements are fast acting and therefore if a casualty is found, the UK has developed a way to deal with such an incident safely Figure 7 [8, 33]:

- Step 1 One person incapacitated with no obvious reason: approach using standard protocols;
- Step 2 Two people incapacitated with no obvious reason: approach with caution using standard protocols;
- Step 3 Three or more people in close proximity, incapacitated with no obvious reason: use caution and follow step 'Plus';
- Plus – Follow up actions for affected individual or for the first responder.

We can conclude additional details from the analysed documents. Access to the hot zone is most often controlled by FRS but police could also be the only ones to do that task. Military responders act under military control in Italy, but they act in coordination with civil command. Other options were as follows: FRS is the only agency trained and equipped to enter the hot zone, regulation of movement in zones is based on the decision on tactical level, everything is incident and agency based, access control is only performed if the zones are established. It could be concluded that SOPs should address the process of access control to the safety zones and that the current situation is fragmented. Nevertheless, responsibility of one agency to play the role of safety officer at least to the hot zone is a working concept.

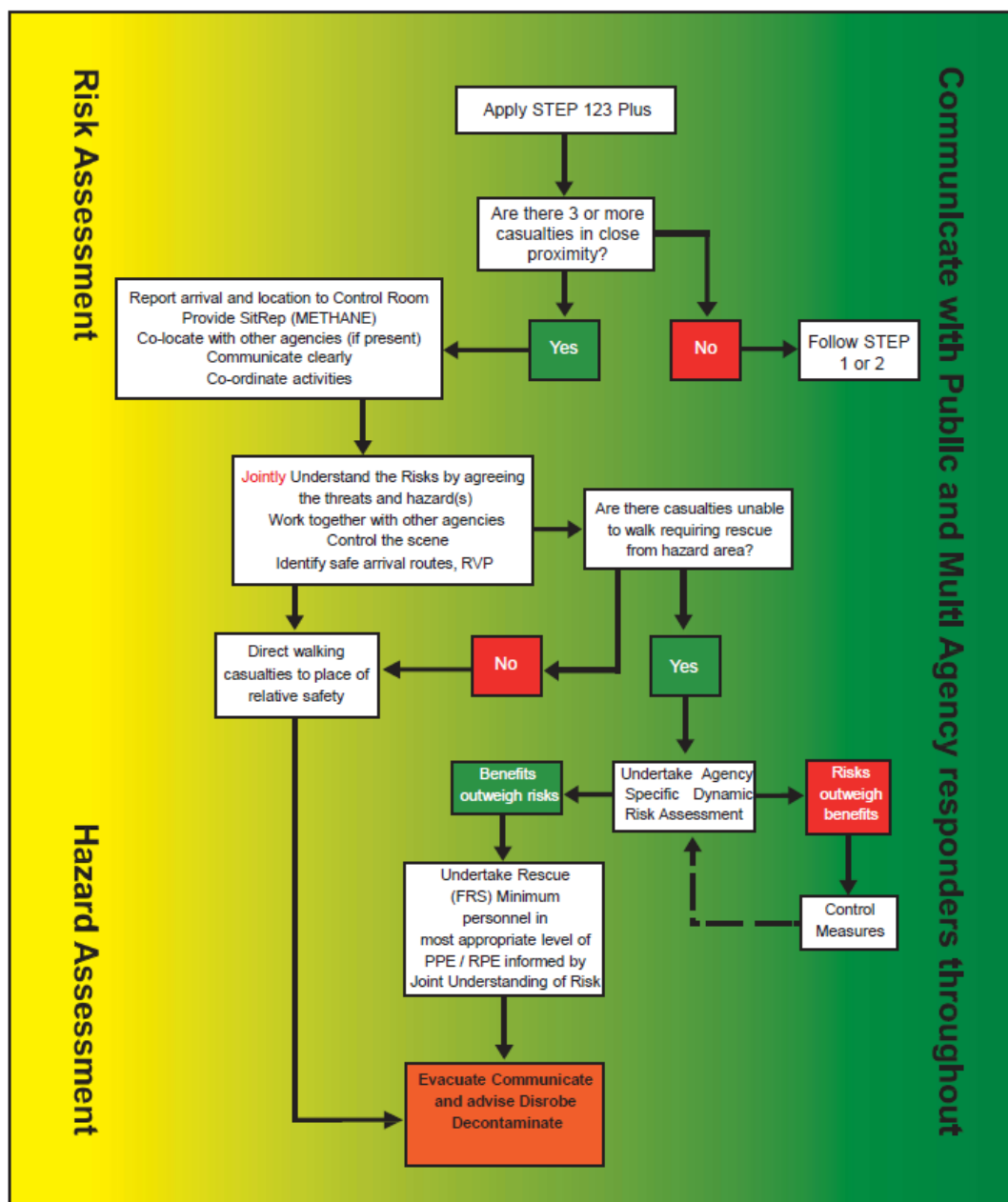


Figure 7 – The UK casualty-based approach to initial CBRNe incident assessment, 'Step 1-2-3 Plus' (Source: JESIP.org.uk)

## 5.2. Communication

This section describes approaches to information flow towards and among first responders, and communication with the public, including the media. System of delivery of information to responders relies on radio and data communication from different technical origins. Detailed descriptions of the technical solution is beyond the scope of this deliverable. This chapter focuses instead on the ways and means of communication used in European countries among responders and to the public and which leads to an effective response.

### 5.2.1. Communication towards and among responders

Communication with the media is an important part of CBRNe response. The majority of participants of the online study agreed on the fact that communication with media is specified in an SOP (Figure 8).

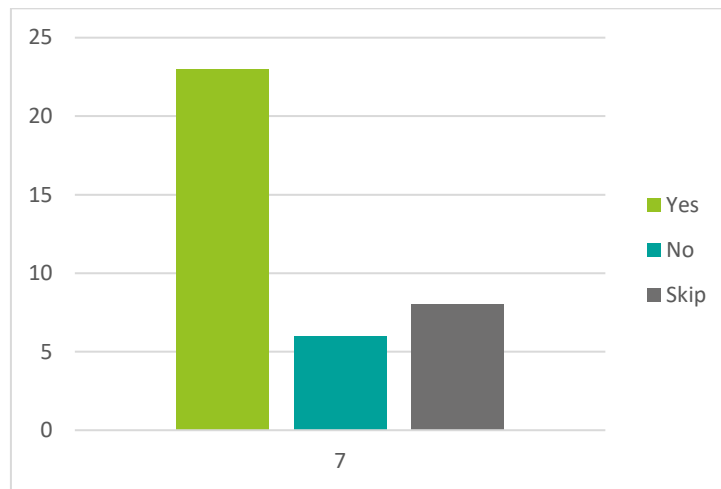


Figure 8 – Is communication with the media specified in SOPs? (Q7 Online Survey)

The SOPs demonstrate that the media is informed by a dedicated spokesperson who draws information from the incident through a person determined by the incident commander with the aim to summarise and harmonise information from stakeholders. Photo documentation and shooting of film footage from the site of the emergency is carried out with the agreement of the intervention commander and upon supervision of the representative of LEA active on criminal proceedings, which authorise the performance of this activity. Police approve the scope of information and data provided from the place of intervention with the exception of submission emergency information to the population.

The first information about an incident is normally obtained from an emergency call (often 112) or as a report from a field unit through Operation and Information Centre (OPIC). The alarm system slightly varies between countries in regard to the profile of the dispatch system. There could be a joint OPIC or OPICs of individual response agencies and they could be either supported by a dedicated CBRNe dispatcher or by specialised CBRNe centres [2]. If information is shared among OPICs of all response agencies it is necessary to have a procedure designating information flow among OPICs [8, 11-15]. The leading OPIC is responsible to spread the alarm and provide information to strategic level stakeholders, catchment hospitals and the media.

Incident commander staff is the fundamental centre of on-site information sharing and situational awareness. There is connection and communication to OPIC and to the commanders of involved response agencies. The mechanism of information sharing is defined in the JSOP and SOPs for CBRNe in simplified form in according to general principles of the communication strategy and specifics are pointed out (e.g. subjects for notification).



Figure 9 – Encouraging situational awareness in CBRNe first responders: The METHANE mnemonic from the UK (Source: JESIP.org.uk) [8]

While standardised basic nonverbal signals of body language signalled mostly by hands (e.g. danger, break of operation, return, rescue) need to be established and are vital during operations, they are not specific for CBRNe and as such were not listed in the studied SOPs in detail.

### 5.2.2. First responder communication with the victims and public at CBRNe incident scenes

Engagement of affected persons via cooperation between response agencies helps the efficiency of the intervention. There are many factors which influence this process, some of them are specific under CBRNe conditions. We can separate this topic into two groups: capability of responders to handle the communication (way of communication) and engagement of affected persons to follow the rescue operation (understanding of instructions).

When it comes to the way of communication, SOPs state that the instruction provided by responders shall be unambiguous, clear and correct. Communication of instructions to the public could pose the risk of delay in operation and needs to be adapted to a situation. This doesn't mean that responders might give up the explanation, however, they might not delay the operation for cooperating with the public because of individuals or groups who doesn't follow the operation instructions [28]. Further, it is important that responders clearly communicate what they know about the incident, what is being done to help affected people and how they can help themselves. This will help foster public trust and confidence in responding organisations and help promote compliance with emergency interventions [33].

Following points are recommended to responders to consider for communication to the public:

- What they know of the nature of the incident, even if it is just that more help is on its way;
- What the emergency services are doing and that these actions will help;
- That medical assistance is coming to them – they should not leave the scene;



- That the advice and instructions from the emergency services should be followed;
- That those who are capable should assist others who are injured or less able to carry out tasks – if they can.

Vulnerable groups might be of a special concern when they could be present on the incident scene. Participants of the online study indicated that relatively weak awareness exists on the presence of persons with special needs being at the place of the incident (Figure 10). If this information is available, it is connected with facilities of special type like elderly houses, psychiatric or rehabilitation hospitals and objects of protected housing for mental or physical impairment persons.

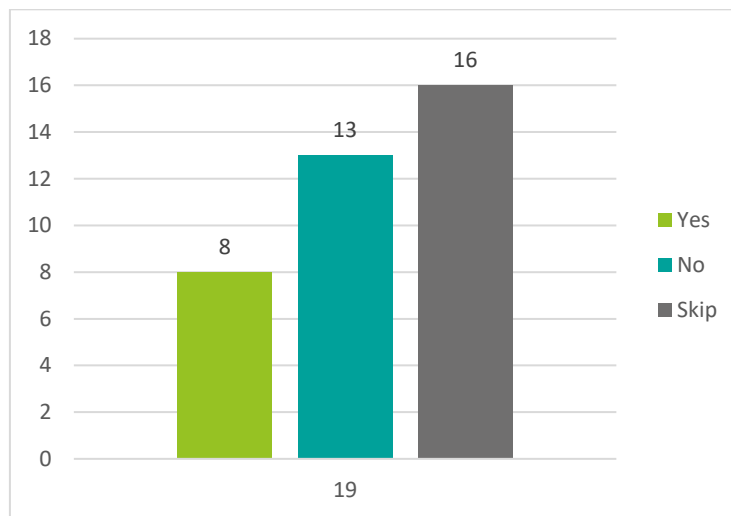


Figure 10 – Is there any information on the presence and needs of vulnerable people within geographic areas (such as numbers, types of disability) available at the Dispatch Operations Centres? (Q19 Online Survey)

Preparedness of responders to appropriate communication is influenced by the level of training as well as technical obstacles connected to personal protective equipment. Procedures and guidelines advise to communicate with affected persons, however, they are mostly not CBRNe specific. Responders in full face masks or self-contained breathing apparatus (SCBA) have almost no possibility of facial expressions. Intelligibility of the speech through diaphragm is lowered. This could be important when information might be shared with person without proper knowledge of the local language.

European countries are not harmonised in the training level of communication with the public for LEAs and first responders. Communication abilities improve with experience during the service carrier but systematic training shall be involved. Training of the communication abilities might be based on realistic scenarios, deployment of trained actors as well as on volunteers of the groups with special needs (e.g., mentally ill people, visually impaired people, hearing impaired people or people with language disabilities or lack of local language knowledge).

Communication between first responders and CBRNe incident-affected persons could be further compromised under CBRNe-incident conditions. The effect of some chemical nerve agents can to varying degrees induce miosis, impaired vision, restlessness, convulsions or loss of consciousness. Botulin toxin can induce speech difficulties double or blurred vision, anxiety, loss of control over



body, and paralysis. This can change the behaviour of individuals in ways that could appear similar to people with particular vulnerabilities e.g., dizziness, visual impairment, lack of coordination, impaired mental state and slurred speech and these can in turn decrease the ability of individuals to understand or follow instructions. This effect is known as situational disabilities<sup>2</sup> and demonstrates how anyone may be vulnerable during a CBRNe incident. Further, essential difficulties of people with special needs could pose the risk of their improper first triage based on their visual or verbal reaction.

Detailed information about communication during the events with a large number of people, psychosocial support and communication with groups with special needs could stay apart of analysed dedicated CBRNe SOPs [8, 13-14]. This could lead to neglecting this aspect in training or during operation. However, an operational SOP remains handy only if is kept simple. The solution is proper training of all aspects of communication among responders and to the public which involves specifics of CBRNe environment (communication impairment in personal protective equipment – PPE, influence of intoxication, etc.) and public including groups with special needs.

Information about warning of vulnerable groups are shown in Figure 11. It is obvious from shared details that if there are some special procedures to warn persons with special needs than these are limited to the TV broadcast in sign language. There is also the possibility to send SMS to the people listed in a database maintained by an agency. Czech law on FRS contains opportunity for people with special needs to be listed in a database at OPIC and they would be contacted in case of an emergency. Registration of mobile numbers into warning systems maintained by local authorities is also a common way forward.

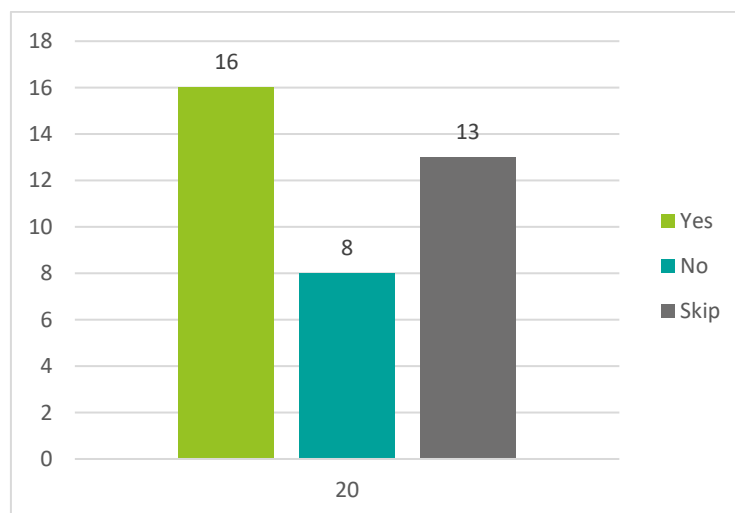


Figure 11 – Are there procedures for warning vulnerable groups in a given area during large-scale events? (Q20 Online Survey)

<sup>2</sup> Gjøsæter, T., Radianti, J., & Chen, W. (2019). Understanding Situational Disabilities and Situational Awareness in Disasters. In Z. Franco, J. J. González, & J. H. Canós (Eds.), Proceedings of the 16th International Conference on Information Systems for Crisis Response And Management. Valencia, Spain: ISCRAM.

### 5.2.3. Means of communication beyond the incident scenes

Communication is a key element in CBRNe threats and incidents and it is composed of remote information flow including media and local sharing of information at the operation ground. This chapter describes the examples of communication means mentioned in the analysed SOPs as well as some modern tools which have the potential for wider acceptance among response agencies.

There is a legal right to directly enter radio broadcast and television which could be used in case of a serious mass event. This option is rather considered for warning of an emergency situation connected to large area leakage like a nuclear power plant accident which requires measures for sheltering or evacuation. Reaching a majority of population by TV or radio broadcast requires a trigger signal to attract attention. Traditionally sirens are used as the signal of emergency which is localised in the inhabited or industrial areas. Area density of the sirens mostly allows poor focus of the warning but it is very apparent. There are attempts to involve new means of communication based on mobile phones.

System of sirens and other methods for population warning were identified in the study entitled “Proposed new directions to advance civil protection system in the Czech Republic” funded by the EU Civil Protection (EU Grant Agreement no. 808786). The siren network is maintained at least in 12 European countries (Denmark, Estonia, France, Croatia, Italy, Latvia, Lithuania, Germany, Norway, Slovenia, Sweden and United Kingdom). The trigger of the siren signal is mostly controlled by civil protection services of FRS but it is available for use to relevant stakeholders (police namely in Denmark).

OPIC controls the system of notification and warning in the Czech Republic, which is built from 1991. The notification part is used either to inform responders about incident and the warning is focused to public. The warning is composed of system of sirens and speaking sirens covering inhabited areas. Even speaking sirens has sound level loud enough to be heard inside of building. This system is regularly tested each month and could be used to trigger signal of general warning or spoken message to the inhabitants in the selected area. JSOP for chemical attack in subway counts on use of this system for warning of citizen in the area. The warning is similarly used in case of spill of chemical factories or fire with toxic fume blowing in direction to an inhabited area.

SMS are used as one way of the notification especially for strategic response level stakeholders, but they are used for warning the public as well by several European countries [16]. SMS way of communication could also reach blind or visual impaired people if they have appropriate cell phones – speaking phones. The message could bring also the link to the website, social media (e.g. Twitter). There are some mobile applications designed for interaction with response agencies. However, they were not designed especially for CBRNe.

Country	Sirens	SMS	Mobile application
Czech Republic	Systematic + speaking sirens	Partly	Záchranka
Denmark	Systematic	-	Application 112 and Mobile Alert (Mobilvarsling)
Estonia	Yes, isolated	Pilot project	Ole Valmis – preparedness database

France	Systematic	Yes + traffic signs	-
Croatia	Systematic + speakers	Yes (localised, and push SMS)	-
Italy	Systematic	-	-
Latvia	Systematic + speakers		LT-Alert CB
Lithuania	Systematic	planned	-
Germany	Yes, isolated	-	SatWaS + MoWaS, application NINA (BBK)
Norway	Cities	Yes (localised)	-
Slovenia	Systematic	-	Application SPIN
Sweden	Systematic	Yes	Application Krisinformation
United Kingdom	Systematic	Planned	-

Table 2 – Use of communication means in European countries

Precise focus of SMS differs but they could be at least sent to selected areas of the network. The GSM network has the technical solution to push a message through local base transceiver station (BTS), known as SMS cell broadcast (GSM network). Technically, it could spread emergency information for people with mobile phones in the range of this individual BTS signal if the network is not interfered for security reasons. This way of emergency communication could fail if mobile phones has the settings disabled for these messages.

#### 5.2.4. PSAB Workshop Results: CBRNe SOPs perception

An important factor for effective response is if SOPs suit the needs of involved response agencies. We tried to analyse the perceptions of first responders and subject matter experts on current CBRNe SOPs during the PSAB workshop. Current SOPs are not considered as completely easy to read and understand by all participants (Figure 12).

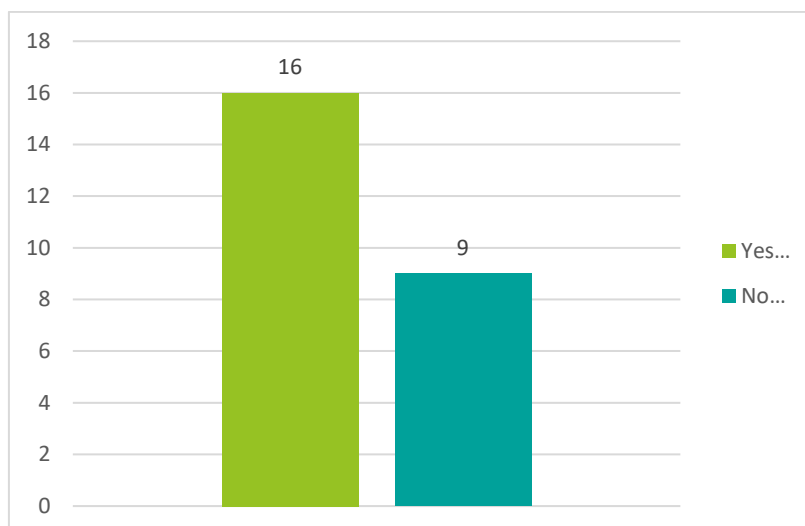


Figure 12 – Do you find SOPs relating to CBRN events easy to read and understand? (Q15 PSAB Workshop)

The ideas provided by participants on possible improvement could be summed up in these points:

- Clear, structured, easy to understand, “big letter + easy text”;
- Using plain and common language;
- Call for common elements of threats in contrary to scenario based and specific;
- Call for nationwide SOPs with individual agencies obligations;
- Use of aide memoires, checklists, bullet points, charts and schemes.

The reactions of the participants on the information content of SOPs regarding communication to the public is shown in Figure 13. The question on improvement brought some complex insights.

- *Typical SOPs are rather tactical and deal mostly with scene management, which leads organisations to rely on their All Risk Crisis Communication Plan to deal with the more strategic aspect of communication. While this can work with some on-the-fly modifications, the plan should clearly outline the differences between other events and CBRNe incidents, as the later can typically cause wider impacts due to the lack of familiarity of the public with these threats and the presence of a motivated offender / group who may attack again or imply he will do so (Canada).*
- *Information is generic and each situation will require a specific or bespoke message to communicate with the public. Information plan must be very dynamic to the situation (Ireland).*

A German participant pointed out on the variety of agencies, which is quite common in the German response model, and difficulty of holding universal messages valid for a broad spectrum of scenarios. A Greek participant mentioned that even the communication plan was classified confidential.

Ideas provided by participants on possible improvements of the communication strategy to the public in SOPs could be summed up in these points:

- Leaflets, info sheets, aide memoires, posters or boards – communication resources as a part of SOPs;
- Include instructions for containment, evacuation and decontamination;
- Key messages for large groups and communication templates.

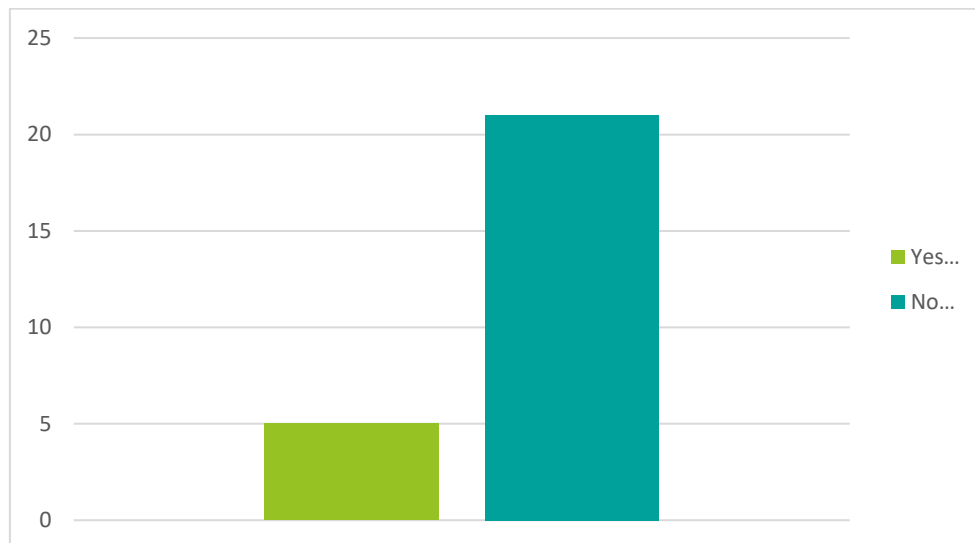


Figure 13 – Do SOPs give you the information you need to communicate with, and manage, members of the public? (Q17 PSAB Workshop)

Almost all participants of the workshop declared deficiency in SOPs. Information on vulnerable groups' needs was not covered enough (Figure 14). Common agreement on this was accompanied by some suggestions for improvement:

- Information how to “reach” and engage different vulnerable groups;
- Information how these people react;
- Helpful words and positive communication strategy;
- How to identify persons with special needs;
- Communication with larger groups and with visual impaired people;
- Vulnerable citizens life value is equal to the other (need of balance and robustness of overall operation).

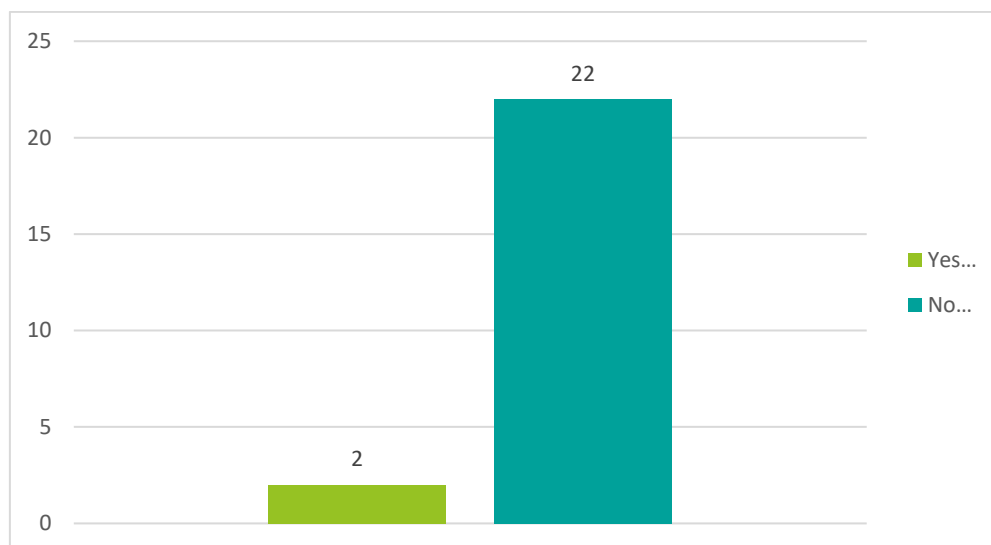


Figure 14 – Do SOPs include enough information relating to the needs of vulnerable groups? (Q19 PSAB Workshop)

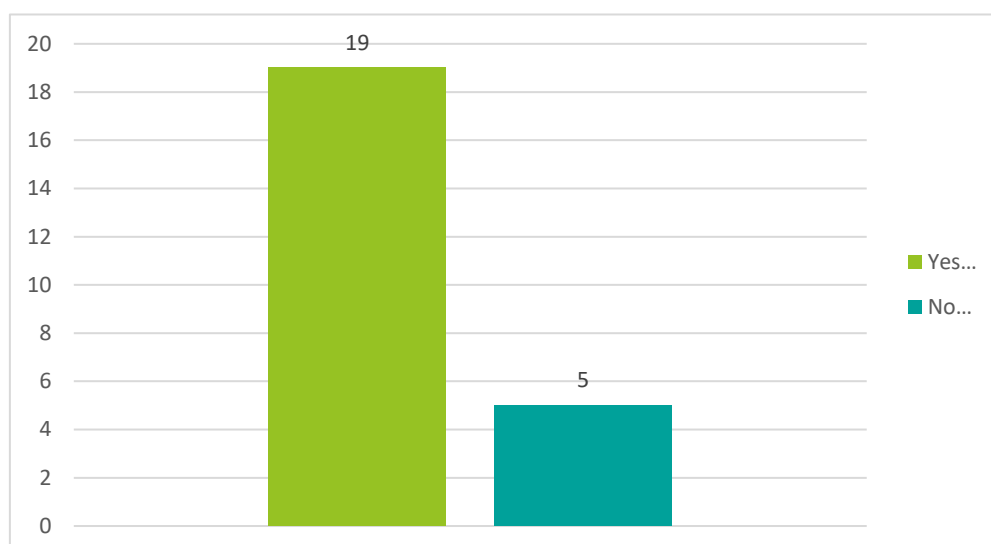


Figure 15 – Do SOPs give you the information you need to deal with incidents? (Q21 PSAB Workshop)

Figure 15 shows that the majority of participants agreed with proper information content in SOPs others than on vulnerable groups. However, there is still space for improvement:

- Contact to specialised support;
- More information on agencies coordination in detail;
- Recognition of incident (awareness);
- Schemes who/what/where;
- Handling of victims.

A very interesting point was raised about using technologies in relation to SOPs content. Whereas modern technologies are used to assist responders (e.g. with information about CBRN agents from databases), SOPs from the “old school” could be still observed. Paper form cannot suit the need of different level of responders as there are contradictory requirements for content details. Electronic forms connected to tools and apps were pointed out.

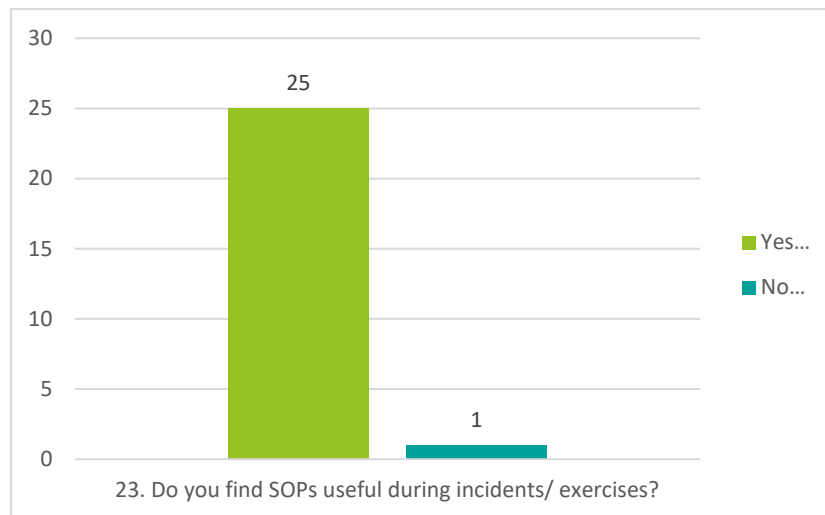


Figure 16 – Do you find SOPs useful during incidents/exercises? (Q23 PSAB Workshop)

There was almost uniformity in answering the question if SOPs are useful (Figure 16). Space for improvements were identified:

- For regular practice of activities;
- For joint focused exercises;
- Open debriefing and update of documents based on lessons learned;
- Stress on short, simple and scenario based documents;
- Multi language documents (e.g. Belgium).

The last topic addressed during the workshop was the question of greater standardisation and how to achieve it (Figure 17). There is not an agreement between participants. Some participants declared this effort as “definitely useless.” There was a common point that different countries have different risk profiles and differences in organisational deployment exist. Thus, standardisation of all stakeholders and agencies would be extremely difficult. Nevertheless, there were elements identified where progress towards standardisation could bring benefits to responders. There was mentioned:

- Clear lines of communication for support on European level referring to SOP;
- Need to identify best practices through training and lesson learned prior to standardisation;
- Need for leave pride and chauvinism behind in assessment of practices;

- Establish exchange of trainers and train the trainers practice on common basis.

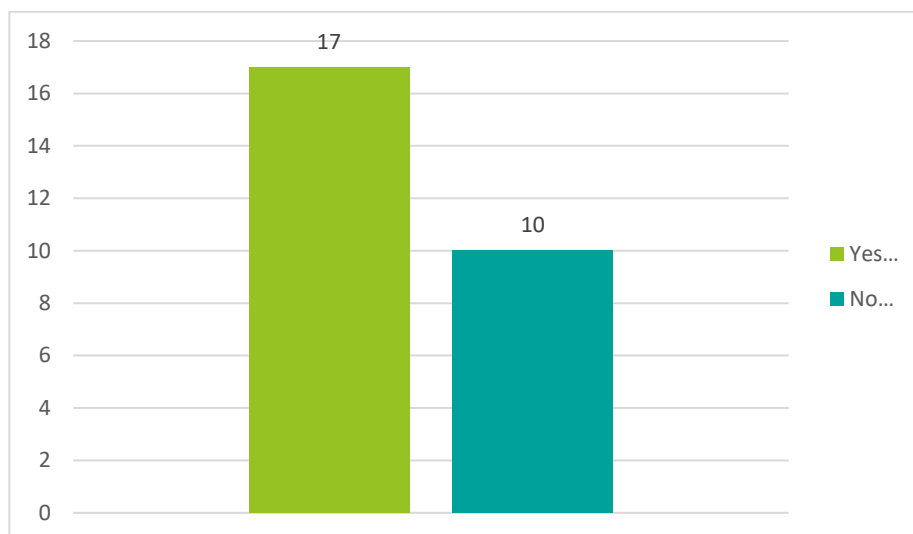


Figure 17 – Would you want greater standardisation of SOPs across countries? (Q25 PSAB workshop)

### 5.3. CBRNe INCIDENT INFORMATION/DATA ACQUISITION AND PROCESSING (TAKING EVIDENCE)

In the case of a CBRNe incident, the topic information/data acquisition and processing is a necessary activity for successful event response. We will use the shorter term of “taking evidence” in this document. Even if the topic “taking evidence” does not belong to an initial part of a CBRNe incident, it is needed to start its explanation from the primary phase of the disaster management cycle named prevention phase. The analysis of CBRNe incidents established the basis for the formation of documents that set out procedures for the response of individual intervening units during a CBRNe incident. The main documents for managing a CBRNe incident are JSOPS.

Taking evidence as a part of CBRNe management occurs during all phases of the disaster cycle. The first phase of the disaster management cycle is named prevention phase. Analysis of CBRNe incidents led to identification of strengths and weaknesses in this area. The conclusion determined a necessity to create an integrated system of response, where all needful units will be involved.

The second phase of the disaster management cycle named preparedness phase brought together experts from relevant rescue organisations, who elaborated binding documents for dealing with the CBRNe incident. Previously mentioned JSOPs have been worked up. These documents are mandatory for all units of the integrated rescue system. JSOPs will be analysed here and further compared with other European documents related to the topic “taking evidence”.

Preparedness phase means “to be prepared”. If rescue units might be prepared to deal with a CBRNe event, all relevant documents must be ready. Risk identification is a fundamental task for proper intervention. The documents stated in Table 3 – List of selected documents on CBRNe agents and intervention procedures provide basic information on the dangerous substances and, where appropriate, the correct intervention procedures are published. The information provided in these documents was the basis for the correct processing of many JSOPs. The “taking evidence” itself is always a part of the response phase that is the third part of the disaster management cycle. For



easier understanding of the “taking evidence” analysis, the CBRNe topic will be discussed separately in groups C (chemical), B (biological) and R (radiological). Group E (explosives) will not be solved in this document, because explosives, if used within a CBRN incident, are not used separately but always in connection with C, B or R (N) substances.

Name of document	Content / Information	Publisher / Link
<b>Wireless Information System for Emergency Responders (WISER)</b>	CBRN identification, human health information, protection etc.	U.S. National Library of Medicine
	Link <a href="https://wiser.nlm.nih.gov">https://wiser.nlm.nih.gov</a>	
<b>Emergency Response Guidebook (ERG)</b>	CBRN agents, protection	The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration
	Link <a href="https://www.phmsa.dot.gov/hazmat/erg/erg-2020">https://www.phmsa.dot.gov/hazmat/erg/erg-2020</a>	
<b>IHS Jane's CBRN Response Handbook</b>	CBRN emergency response plans, efficient on-scene procedures	IHS Global Inc IHS: Email: <a href="mailto:customer.support@ihs.com">customer.support@ihs.com</a> ISBN: 978-071062998-2
<b>Practical Guide for Medical Management of Chemical Warfare Casualties</b>	Guidebook for medical practitioners who care for the victims of chemical warfare	OPCW
	Link <a href="https://www.opcw.org/resources/assistance-and-protection/practical-guide-medical-management-chemical-warfare-casualties">https://www.opcw.org/resources/assistance-and-protection/practical-guide-medical-management-chemical-warfare-casualties</a>	
<b>First Responders Handbook: Hazardous Materials – CBRNE</b>	CBRNe agents	Swedish Civil Contingencies Agency (MSB) ISBN: 978-91-7383-412-4
<b>WMD Response Guidebook</b>	CBRN agents	NCBRT Email: <a href="mailto:info@ncbrt.lsu.edu">info@ncbrt.lsu.edu</a>

<b>The International CBRN Training Curriculum</b>	Guidelines for CBRN training	NATO Civil Emergency Planning Civil Protection Group
	Link for English version <a href="https://www.nato.int/docu/cep/cep-cbrn-training-e.pdf">https://www.nato.int/docu/cep/cep-cbrn-training-e.pdf</a> Link for Russian version <a href="https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2016_08/20160826_160825-cbrn-curriculum-ru.pdf">https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2016_08/20160826_160825-cbrn-curriculum-ru.pdf</a>	
<b>Guidelines for First Responders to a CBRN Incident</b>	Guidelines for responding to a CBRN incident	NATO Civil Emergency Planning Civil Protection Group
	Link <a href="https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2016_08/20160802_140801-cep-first-responders-CBR.pdf">https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2016_08/20160802_140801-cep-first-responders-CBR.pdf</a>	
<b>Recommendations on Sampling for Hazard Control in Civil Protection</b>	Sampling of chemical, radiological and biological agents	Federal Office of Civil Protection and Disaster Assistance, Germany
<b>Training Manual: Psychosocial Crisis Management in CBRN Incidents</b>	Psychosocial management in CBRN incidents	Federal Office of Civil Protection and Disaster Assistance, Germany
<b>Dangerous Chemical Substances Directory - Express Information in Symbols</b>	Identification of chemical substances from symbols	Kiev, Chornobylinterinform 1998, Ukraine (in Ukrainian language)

Table 3 – List of selected documents on CBRNe agents and intervention procedures

“Taking evidence” is not a single operation. It is composed from various measures as information gathering, scene assessment, threat assessment, hazard identification, location of dangerous substances, detection and identification of substance, taking samples etc. Every measure of C, B, R (N) group will be described from the perspective of different responding organisations for each below described activity.

The complexity of the whole process of “taking evidence” (from grey to yellow colour) is explained in Table 3.

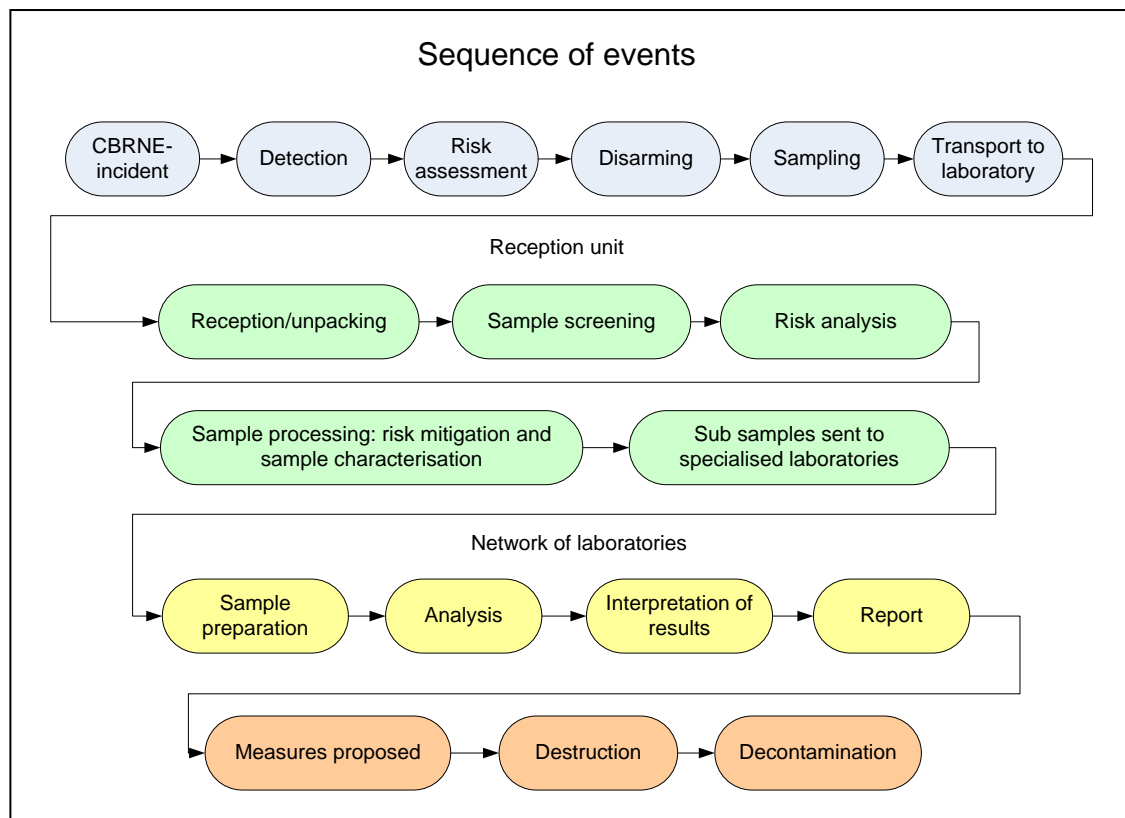


Figure 18 – sequence of taking evidence triggered by a CBRN incident (source SLAM workshop)

The subject “taking evidence” is divided into three consecutive activities:

- Information gathering (it means scene assessment, threat assessment, place of leakage of dangerous substance);
- Substance identification (it means detection and identification of substance);
- Taking samples (it means taking samples, packaging and transport).

A terrorist attack is a huge scale event that requires cooperation of many organisations. For purposes of this document, only the main responding forces related to “taking evidence” as police, fire fighters, military forces etc. will be mentioned here. If any additional organisation has a crucial importance in dealing with “taking evidence” during a CBRNe incident, it will be mentioned.

This analysis section structure differs from the other part of results because procedures for individual C, B and R&N agents are different.

### 5.3.1. Case study: The Czech Republic response procedures for “taking evidence”

#### 5.3.1.1. In general

In case of a CBRNe terrorist attack, the main coordinating and managing organisation for the elaboration of binding documents is the Fire Rescue Service of the Czech Republic (FRS CR). Main legislative documents are named: Joint Standard Operating Procedures (JSOPs). For a CBRNe attack we elaborated three documents that describe a C-attack (Reaction on chemical attack in an underground), B-attack (Finding an object with suspected presence of B-agents or toxins) and R/N attack (Dirty bomb). These documents are signed by the highest representative of every designated organisation and therefore the JSOPs are binding for every institution that is mentioned there. The leading responding unit in case of a CBRNe incident is always the FRS CR, and main coordinating body in case of a CBRNe incident is The Operational and Information Centre of Fire Rescue Service of the Czech Republic (shortened in this document as OPIC). The Police of the Czech Republic (PCR) also plays an irreplaceable role in the event management. PCR itself and its special units as an air service, special antiterrorist units etc. are also involved in dealing with a terrorist attack. In some incidents, special units from private or state-owned companies may also be included in the assistance. These organisations have also signed a contract for assigned tasks under the JSOPs, so they can be called in to help. As the example is the National Institute for Nuclear, Chemical and Biological Protection (SUJCHBO) that upon OPIC request provides expert support to basic units of the Integrated Rescue System (IRS) to provide an efficient reaction to threats to population or the environment, potentially coming from a release of highly dangerous and/or CBRNe compounds.

If the finding of a C, B or R substance is associated with a suspicion of a booby-trapped system, the pyrotechnic service of PCR is always called for elimination of the potential source of the explosion.

#### **5.3.1.2. Chemical attack**

A chemical attack is considered as one of the most probable terrorist events from the CBRNe group. The Czech Republic has elaborated special JSOP that determines the roles of all organisations that can be summoned to respond if necessary. Leading responding organisation is FRS CR, that is also the main institution when elaborating JSOP documentation.

- a. Information gathering: if any suspicious subject is assessed as a chemical agent (C-agent) and the event is considered as a terrorist act, this event is immediately reported to the OPIC that start to activate and coordinate all responding bodies. Leading responding organisation is FRS CR. The role of an incident commander is always given to a fire fighter. FRS CR provides initial chemical reconnaissance and survey of the scene. If a C-agent is detected, its location is also assessed. The next activated institution is the Police of the Czech Republic (PCR) that provide traces of the perpetrator and maintain order at the scene. PCR also investigate witnesses and gather all possible information.
- b. Substance identification: primary detection of an unknown C-agent is carried out by the reconnaissance units of FRS CR. Some public places of high importance have also their own detection systems that can give first detection information on a C-agent. Results of initial chemical reconnaissance must be confirmed. It requires assistance of special units equipped with exceptional detection and identification instruments. For this purpose special FRS CR units of named “Analytical Task Forces” (ATF) equipped with special analytical instruments as GC/MS spectrometers, IMS spectrometers, FTIR spectrometers, UV/VIS spectrometers etc are activated. These units can also monitor a contaminated area with the special scanning FTIR system SIGIS and other devices. Depending on the scale of the incident other relevant units as special Czech Police departments and the Czech Army can be summoned to extend the number

of monitoring units. The OPIC can also activate additional specialised organisations as the “National Institute for Nuclear, Chemical and Biological Protection” (SUJCHBO) to provide technical and analytical support using its mobile analytical laboratory for on-site monitoring of C-agents, their sampling and analyses.

- c. Taking samples: if the C-agent is identified on the spot, samples must be taken and transported to designated laboratories for further analysis and verification of results. Sampling is performed by the same organisations that were called upon to identify the chemical substance. Taken samples are usually transported to laboratories of ATF FRS CR or SUJCHBO. The PCR assist in the transport of samples and generally ensure safety. For a long-distance transport it is possible to call an air service that enable to deliver transport to the laboratory much faster than land transport. Special transport boxes are used for safe storage and transport of dangerous samples.

#### **5.3.1.3. Biological attack**

A biological release is likely to become a major public health emergency. It will have strong similarities to the outbreak of a naturally occurring virus, such as SARS and may take days to first become apparent and weeks to evolve. For this reason, biological attacks can be hard to detect and/or identify. Unless the release is announced, detection and minimisation of casualties will be dependent upon early identification of unusual patterns of illness by doctors and laboratories. The Czech Republic has elaborated special JSOP that determines roles of all LEAs that can be summoned to respond if necessary. Leading responding organisation is again the Fire Rescue Service of the Czech Republic (FRS CR), that was also the main institution for working up JSOP documentation. This chapter will be again divided into three sections: information gathering, substance identification and taking samples.

- a. Information gathering: if any suspicious subject is assessed as a biological agent (B-agent) and the event is considered as a terrorist act, this event is immediately reported to the OPIC that start to activate and coordinate all responding bodies. Main responsible organisation is again FRS CR. The role of an incident commander is always given to a fire fighter. Members of PCR search the area around the suspect subject and take measures to reduce a risk. Initial biological reconnaissance and survey is carried out by the Public Health Authority (PHA) that belongs to the Ministry of Health of the Czech Republic. If a B-agent is detected, its location is also assessed. PCR provide traces of the perpetrator, maintain order at the scene, investigate witnesses and gather all possible information.
- b. Substance identification: primary detection and identification of an unknown B-agent is carried out by regional units of PHA. OPIC as the main coordinating body activate and convene other relevant organisations to support detection activities on site. The state institution SUJCHBO and / or the Czech Armed Forces, which have their own mobile laboratories and special detection equipment, are also asked to assist. Detection results are reported to OPIC that initialise additional response activities. Results of biological detection must be confirmed in a specialised stationary laboratory.
- c. Taking samples: samples are taken by regional units of PHA that are equipped with appropriate sampling tools. Support is given by SUJCHBO and / or the Czech Armed Forces that can help with their special detection devices. Samples of B-agents are transported to designated

laboratory in SUJCHBO in special box, where results of the initial detection are verified and confirmed. OPIC is informed and appropriate measures are taken.

#### **5.3.1.4. Radiological attack**

A "dirty bomb" is one type of a radiological dispersal device (also called an RDD) that combines conventional explosives, such as dynamite, with radioactive material. A dirty bomb is in no way similar to a nuclear weapon or nuclear bomb. A nuclear bomb creates an explosion that is millions of times more powerful than that of a dirty bomb. This study results from Czech documents that are compared with similar ones from different EU countries. The main Czech JSOP document named "dirty bomb" is evaluated in the following lines. Radioactive nuclides in general and nuclear material nuclides has the same risk in this form (no nuclear blast is expected). From this reason analysis will be pointed just at R-agents and not at a nuclear attack.

The extent of a dirty bomb contamination depends on a number of factors, including the size of the explosive, the amount and type of radioactive material used, the means of dispersal, and weather conditions. Those closest to the RDD would be the most likely to sustain injuries due to the explosion. As radioactive material spreads, it becomes less concentrated and less harmful. Prompt detection of the type of radioactive material used will greatly assist local authorities in advising the community on protective measures, such as sheltering in place, or quickly leaving the immediate area. Radiation can be readily detected with equipment already carried by many emergency responders. A terrorist attack with a dirty bomb necessarily needs an explosive system for immediate effect, so explosives will be certainly used in the attack. Therefore, the assistance of the pyrotechnic service that is a part of Police forces will always be necessary. As in all previous chemical and biological events, the leading organisation in this R-intervention is again FRS CR, that was also a main leading body in working up the JSOP documentation.

Incident commander during a "Dirty bomb" intervention will be a member of FRS CR who will communicate to OPIC – asking for needful resources and help. The OPIC communicate with other units and coordinate their assistance. Within a "Dirty bomb" event the pyrotechnic service of PCR for elimination of the source of the explosion will be activated.

- a. Information gathering: making prompt, accurate information available to the public may prevent the panic sought by terrorists. Initial survey is aimed at disposal of explosives that is performed by the pyrotechnic service of PCR. PCR also provide traces of the perpetrator, maintain order at the scene, investigate witnesses and gather all possible information. Initial main radiological information is gathered by members of FRS CR.
- b. Substance identification: an essential task is to check the presence of radioactive substances, identify and mark the focus of radiation, identify sites and forms of contamination etc. These tasks are realised by FRS CR and other specialised organisations that are activated. Different institutions and experts can strengthen or alternate within a radiological incident: the State Office for Nuclear Safety (SUJB), National Institute for Nuclear, Chemical and Biological Protection (SUJCHBO), the National Radiation Protection Institute (SURO), special units of FRS CR named "Analytical Task Forces" (ATF), special units of the Czech Army etc. Radiation monitoring can be also provided by air service. All institutions are well equipped with special radiological devices. The Czech Army and other organisations cooperate with the incident commander on the basis of JSOP, inter-ministerial agreements and other legislative documents.



- c. Taking samples: samples are taken by the first responders operating in the contaminated area, so FRS CR units are responsible for taking samples. If intervening units are from different organisations they can be asked to take samples, too. The incident commander is responsible for this coordination that depends on the equipment of individual responding units. If possible, taken samples are transported to designated stationary laboratories. Special PCR units as air service can fasten the transport. Every transported sample is also safely guarded by police units during its manipulation and transport. Results of the identification are immediately reported to the incident commander and OPIC who immediately propose measures to minimise the consequences and protect the population.

### **5.3.2. Case study: the role of LEAs in case of “taking evidence” in the United Kingdom of Great Britain and Northern Ireland (UK)**

#### **5.3.2.1. Chemical attack**

This chapter outlines roles and responsibilities of main agencies and sectors that are likely to become engaged in the “taking evidence” in case of a terrorist attack. A CBRNe attack is the type of incident where interoperability rules and principles must be used. Lead Government Department (LGO) in case of CBRNe terrorism (including direct or indirect release of CBRNe materials) is the Home Office (in UK) and the Northern Ireland Office (in Northern Ireland). For improvement of joint incident response a JESIP (Joint Emergency Services Interoperability Principles) tool was established that enables more organised, structured and practised multi-agency response in the UK. JESIP’s stated aim is to ensure the blue light services are trained and exercised to work together as effectively as possible at all levels of command in response to major or complex incidents (including fast moving terrorist scenarios) so that as many lives as possible can be saved[14]. JESIP contains many joint doctrines for all responding units. One very important document is named “Responding to a CBRN(e) event: Joint Operating Principles for the emergency services [8] that forms a core element of the Government’s new National CBRN(e) Operational Response Framework, developed to reflect up-to-date scientific evidence to provide a rapid, flexible and scalable response to a CBRN(e) incident.

In the event of a CBRNe terrorist incident in Great Britain, the Home Office would initially assume lead government department responsibility for dealing with the effects of the emergency. The Home Office would be supported by other departments including the Department for Environment, Food and Rural Affairs (Defra), which also has the responsibility in England for co-ordinating the government’s contribution to the decontamination and recovery phase of such incidents or emergencies in the open environment [18]. The response involves the central government as a key player, and the military is likely to be brought in. It is critical therefore that the response is genuinely multi-agency and communication between all agencies is of the highest quality. Roles of LEAs will be similar for C, B and R (N) groups, because Great Britain addresses the CBRNe under one common heading of terrorism. Information was gathered from a publication named “Emergency Response and Recovery Non statutory guidance accompanying the Civil Contingencies Act 2004 [18] and from other professional documents.

It is generally accepted that the first members of the emergency services to arrive on the scene should make a rapid assessment and report back to their control room (that has a similar role as the

Czech OPIC). The control room that receives the initial report should, in accordance with established plans, alert the other emergency services and relevant partner agencies. In accordance with their own procedures, those agencies will then alert personnel or activate appropriate response and recovery plans to the level they judge necessary. Agreed protocols should be in place to alert any commercial or industrial organisations whose premises, services or personnel could be affected, or required as part of the response and recovery effort.

The main role in responding to a terrorist attack is played by Police services. The police oversee any criminal investigation. Where a criminal act is suspected, they must undertake the collection of evidence, with due labelling, sealing, storage and recording. They facilitate inquiries carried out by the responsible accident investigation bodies, such as the Health and Safety Executive (HSE) or the Air, Rail or Marine Accident Investigation Branches etc. If there is the possibility that an emergency has been caused by terrorist action, then that will be taken as the working assumption until demonstrated otherwise [18]. In case of a CBRNe terrorist attack, for example dealing with suspect package or material that must be identified, the police conduct the risk assessment, manage the incident, arrange the sampling of suspect material, identify exposed persons, maintain the isolation of the affected area etc [19]. Where the task may be labour intensive and cover a wide area, assistance should be sought from the other emergency services, the Armed Forces or volunteers.

Fire and rescue authorities are designated just to extinguish any fire and rescue anyone trapped by fire, wreckage or debris. They will prevent further escalation of an incident by controlling or extinguishing fires, rescuing people, and undertaking other protective measures. They will deal with released chemicals or other contaminants in order to render the incident site safe, or recommend exclusion zones. They may also assist ambulance services with casualty-handling, and the police with the recovery of bodies.

Some fire and rescue services have access to their own scientific support. However, if the incident is a suspected or confirmed CBRN(e) event, scientific support should only be requested through police channels. National resilience capabilities are the resources provided under the New Dimension programme which are considered to be an integral element of a national response. National Resilience responders have access to detection, identification and monitoring equipment. More information is stated in the “Fire and Rescue Service Supporting Guidance to the National Co-ordination and Advisory Framework [20] and “Control Measure – Request National Resilience resources for detection, identification and monitoring [21].

In case of a CBRNe terrorist attack, for example dealing with suspect package or material that must be identified, the police play a crucial role. The police conduct risk assessment, manage the incident, arrange sampling of suspect material, identify exposed persons, maintain isolation of the affected area etc. Any terrorist incident is a crime and the Police Incident Commander remains in operational command. As soon as it appears that a terrorist threat has been made or terrorist action has taken place, the police will notify the central government and the national plan will be brought into operation to augment local resources [22].

### **Information gathering, substance identification and taking samples**

The previous paragraphs reported on the coordination of the event and the specific tasks for different response organisations. Specific tasks in the area of information gathering, substance identification and taking samples are listed in this paragraph. Detection, sampling and monitoring are provided in



UK by special teams. Assessment and monitoring for a deliberate release of chemical or biological material would be done by the emergency services or specialist agencies e.g. Dstl, Porton Down or AWE Aldermaston, but it may be some time before national resources arrive on the scene. Information about the properties of any CBRN materials, their behaviour and how they react with other substances is an important issue for local authorities and their partner organisations, to enable them to take the right actions in the remediation and long run recovery phases of an incident. This information will normally be available through the Joint Health Advisory Cell or Consequence Management Liaison Officer on the Government Liaison Team [22].

#### **5.3.2.2. Biological attack**

For a CBRNe terrorist incident in Great Britain, the Home Office would initially assume the lead government department responsibility for dealing with the effects of the emergency. As the terrorist act is in the UK dealt with in a similar way for all CBRNe agents, activities as information gathering, substance identification and sample taking for B-agents is already mentioned in chapter 3 that describes these activities for the whole CBRNe group. Biological agents may be difficult to detect, and in most cases detection will involve the use of specialist equipment by trained personnel. Early recognition of a covert release of a biological agent requires that clinicians remain aware of the possibility, and are willing to alert and consult specialised advisers. The UK have also increased the number of military and police personnel.

#### **5.3.2.3. New ways and challenges in UK system of “taking evidence” for C and B agents**

Being alert to the unusual, the unexpected, and the case that “just doesn’t fit” is critical. In this context, the UK has developed on-line training for its healthcare professionals, which aims to enhance existing training in preparing to respond during a terrorist attack or accidental release. Early indication that an attack has taken place and early detection of agents will assist in ensuring that medical countermeasures such as antibiotics and other drugs are available in a timely and effective manner. In this regard, the UK constantly keep under review options for enhancing the UK’s medical response through stockpiling drugs and vaccines to mitigate the effects of exposure to an attack. The UK Government has established a National Network of Laboratories (NNL) for the rapid analysis of chemical and biological material to accredited standards. This is an example of the Government working across departments and with private industry. The Office for Security and Counter Terrorism (OSCT) is leading, supported by the Ministry of Defence and the Home Office Scientific Development Branch (HOSDB), to establish further forensic capabilities from recovery of materials through their analysis. These capabilities include: improved techniques for at-scene sampling, accredited methods for laboratory analysis in a range of evidence including environmental samples, food and body fluids, detailed guidance on optimal handling and storage of clinical samples. The UK has conducted a comprehensive review of detection, identification and monitoring equipment and has collaborated with industry and international partners to assess existing biological detection equipment in particular. Such systems vary from those that are portable and relatively simple in operation to those that are sophisticated and can be operated remotely and automatically. One of the key challenges in this UK strategy is understanding and countering CBRNe threats. As noted in the UK’s annual Confidence-building Measures (CBM) submissions, the Home Office funds a programme aimed at enhancing the UK’s capability to minimise the risk of a CBRNe terrorist incident. Key elements of this work focus on detection and analysis of chemical and biological materials.

#### 5.3.2.4. Radiological attack

Special radiological incidents as a "dirty bomb" will be analysed in this paragraph. Dirty bombs are multi-hazard weapons. In addition to radiation exposure, they may inflict explosive hazards as well as mechanical hazards from shrapnel in the device or resulting from building collapse. The tasking of Military Explosive Ordnance Disposal (EOD) resources must be considered in the early stages of a CBRN(e) event. It is the responsibility of the Police to formally declare that a CBRN(e) terrorist event is underway, however this may not be confirmed for some time and should not delay the Initial Operational Response (IOR) or Specialist Operational Response (SOR). Deployments should always be subject to a task specific risk assessment. All organisations that may deploy into the hot and warm zone should be briefed on the hazards and risks that have been jointly identified by commanders. For example, additional specialist responders, such as scientists from Atomic Weapons Establishment (AWE) or Defence science and technology laboratory (Dstl), Forensic Management Teams (FMT) or Explosive Ordnance Disposal (EOD) may also be working in the scene during an incident and will be represented in the command structures. Within a R-incident as a dirty bomb etc. the various bodies across the UK who regulate the use of radioactive substances and radiation generators as Department of Health, Health and Safety Executive, Health and Safety Executive for Northern Ireland, Office for Nuclear Regulation and UK Environment Agencies will be involved [23]. It must also be recognised that, as time progresses, there may be a requirement for information gathering and sharing on a multi-agency basis.

#### 5.3.3. Case studies comparison of procedures for "taking evidence" of CBRNe terrorist attack in the UK and the Czech Republic in general

The basic procedures for response and "taking evidence" are almost identical in both UK and the Czech Republic (CZE). Even if the leading organisation is different in the UK and the CZE, the main rules of response and strategies are very similar.

The main identical principles of response in UK and CZE are listed below:

- The most important rule for managing the CBRN event is the interoperability of all involved units, that are led by one strong and the most experienced organisation (Police services in UK, Fire Rescue Service in CZE);
- Orders and coordination come from a single centre that gathers experts from different areas (Control Room in UK, OPIC in CZE);
- All involved units follow uniform principles (SOPs), which are obligatory for everybody;
- Joint training activities are crucial for managing the situation (JESIP in UK, joint exercises of IRS units in CZE);
- Science plays an important role in improvement documents and final procedures.

#### 5.3.4. Evaluation of "PSAB workshop CBRNe SOPs quiz Questionnaire"

In this chapter only questions relevant to the topic "taking evidence" that means questions from no. 2 to no. 14 of the "PSAB workshop CBRNE SOPs quiz Questionnaire" (see Appendix C) are analysed. The answers to the questions confirmed the fact that sampling and detection measures

are performed by different organisations in different countries. The questions were aimed at obtaining information on detection and sampling at the scene of the CBRNe incident. The aim was to assess the possibilities and methods of these activities in individual countries.

The initial detection of an unknown substance brings very important information that results to decision which protective measures should be set up for both the endangered population and the intervening rescuers. Only two thirds of the interviewed respondents answered that they have detection teams among the first-line units. These first-line units are equipped with different detection technique depending on their tasks. Following Figure 19 shows specification of first responders for field detection. First responders mainly detect R/N agents and C-agents, they can detect also explosives, but they usually are not intended for biological detection.

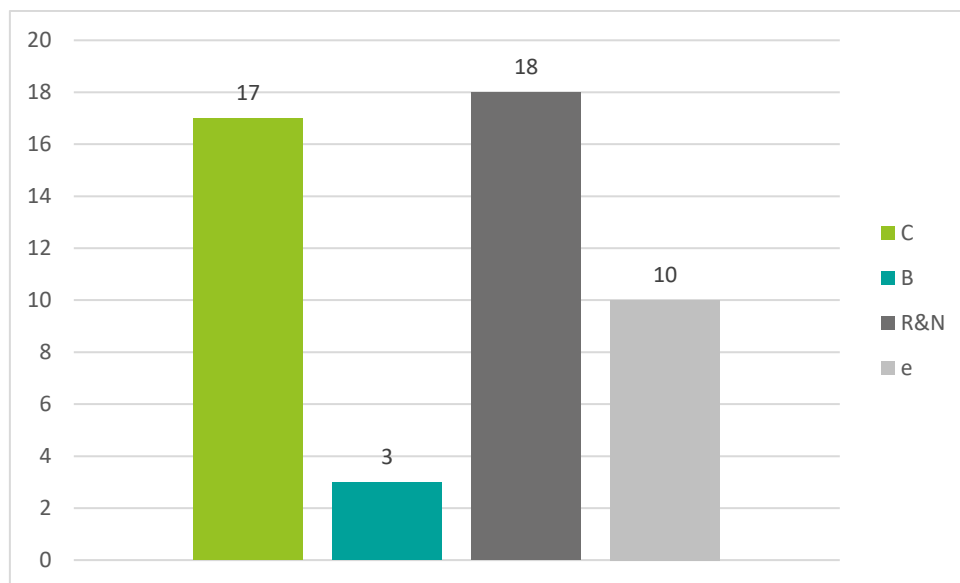


Figure 19 – Type of agent detectable by initial response agency (Chemical, Biological, Radiological/Nuclear, explosive) (Source: Q3 and Q4 PSAB)

Some countries have their own field laboratory that is a very important tool for identification on site and can fasten identification of unknown agents. If the unknown substance is identified at the scene by first responders or by personnel of the field laboratory, verification of the result and confirmation of identification in a special laboratory is always required. Therefore, the samples should be transported to another location for additional analysis. From the questionnaire results that sampling and detection can be carried out by different units that means by different procedures. Following Figure 20 and Figure 22) show different handling of unknown samples.

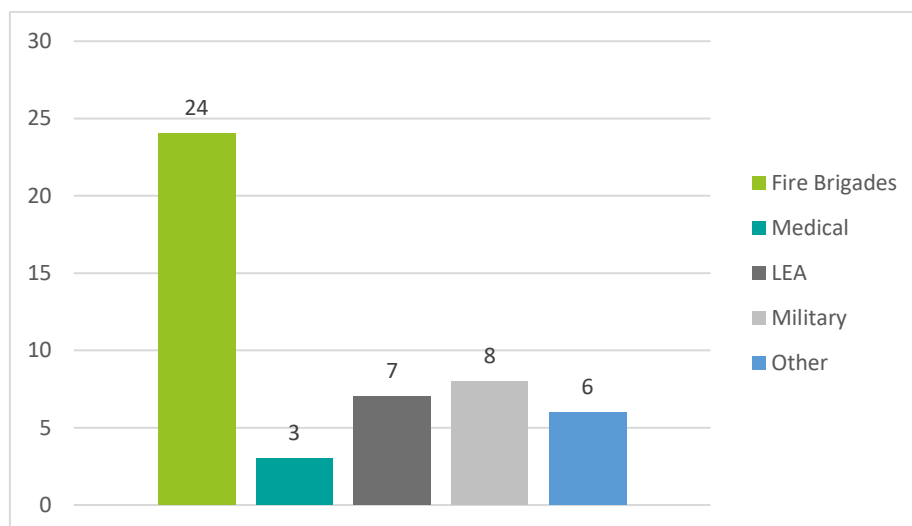


Figure 20 – Type of rescue body performing an initial detection of unknown substances (Source: Q7 PSAB Workshop)

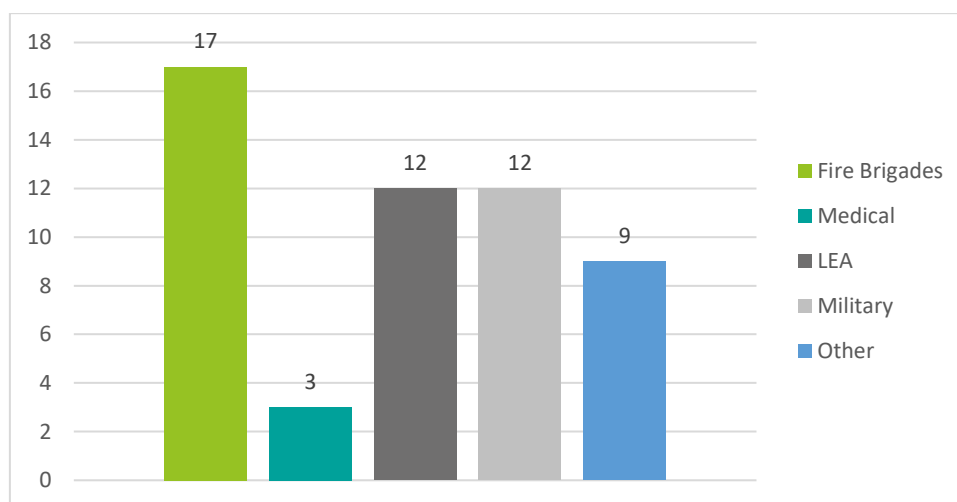


Figure 21 – Type of rescue body performing sampling of unknown substances (Q8 PSAB Workshop)

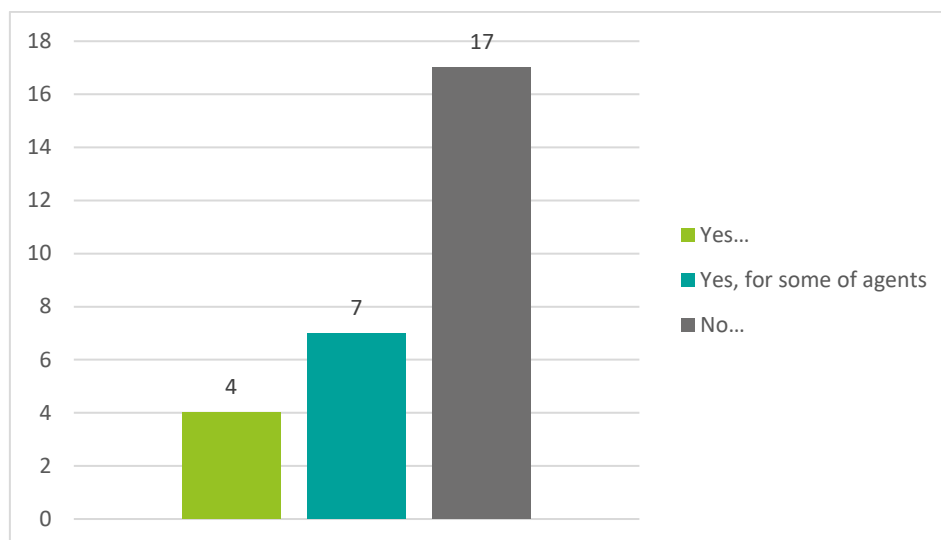


Figure 22 – Is initial detection of a CBRN substance and its subsequent analysis in the laboratory provided by the same organisation? (Q9 PSAB Workshop)

The type of organisation that performs detection and sampling may differ not only with respect to the type of the agent but also with respect to the type of the event. In many countries, another organisation is responsible for the above mentioned activities in the event of a terrorist act or in the unintentional release (Figure 23).

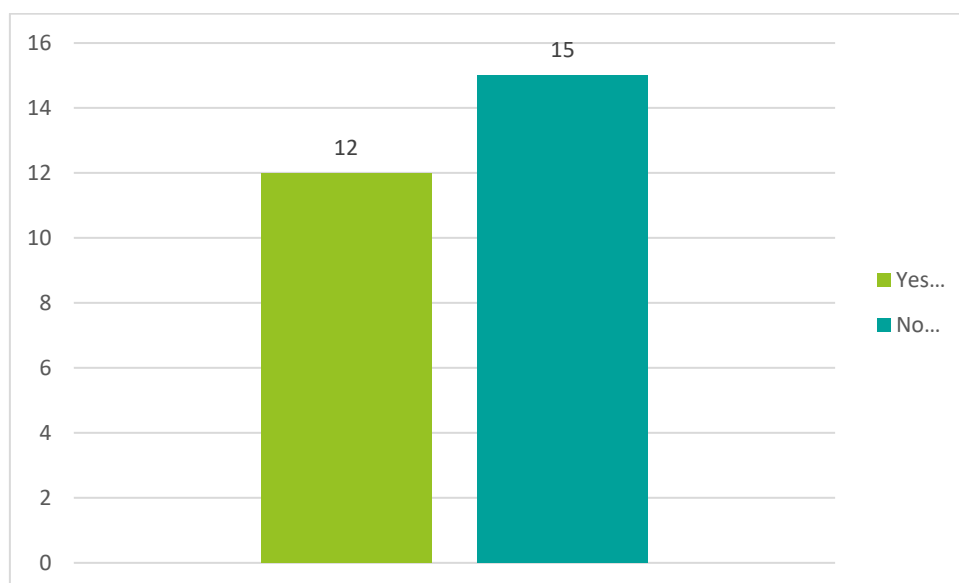


Figure 23 – Is the detection and sampling of unknown substances carried out by the same organisation in the event of a terrorist attack (generally for forensic purposes) as in the case of an unintentional substance leak or industrial accident? (Q10 PSAB Workshop)

The situation where the leakage of an unknown substance is considered as a terrorist attack, the event is solved in the forensic regime, and even here specific activities such as detection and sampling are performed by different organisations in different countries (Figure 24).

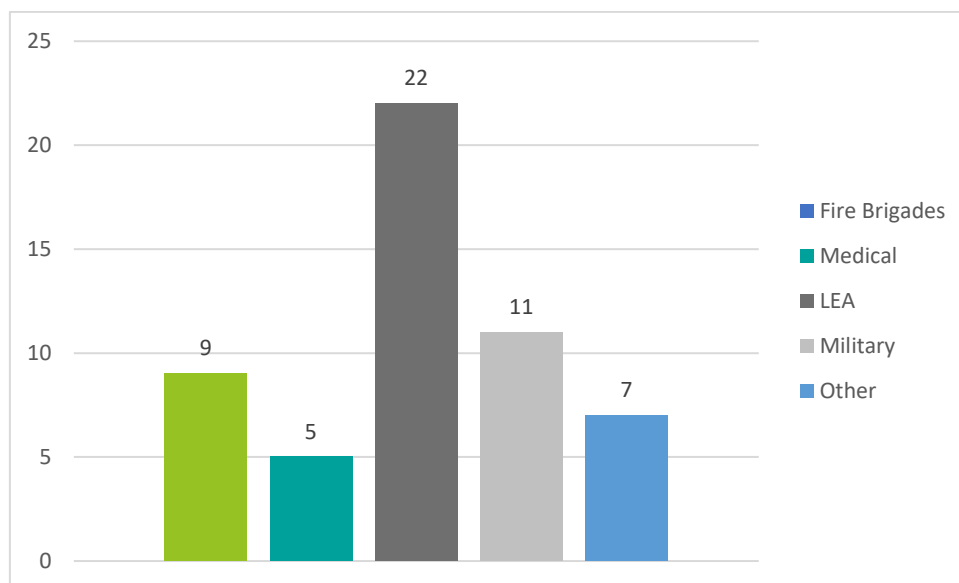


Figure 24 – Type of organisation performing detection and collection of unknown substances for forensic purposes (Q11 PSAB Workshop)

The last type of questions concerned the methodology of detection and sampling procedures. How is this ensured when the activities are carried out by different organisations, which often hand over the same samples? How is the correctness of the final result ensured? Question no. 12 is: “Are there organisations that develop methodological procedures for the correct detection and sampling of substances in CBRN incidents by the first-responders’ units? Please specify the organisation or just indicate Yes/No”. Answers were different, but only half of the responders answered Yes, that means that the other half does not have developed methodological procedures. Question no. 13 followed on from the previous question. If first responders have methodological procedures, these procedures are not compulsory for all involved organisations. The following Figure 25 illustrates whether methodological procedures are mandatory for all involved organisations or not.

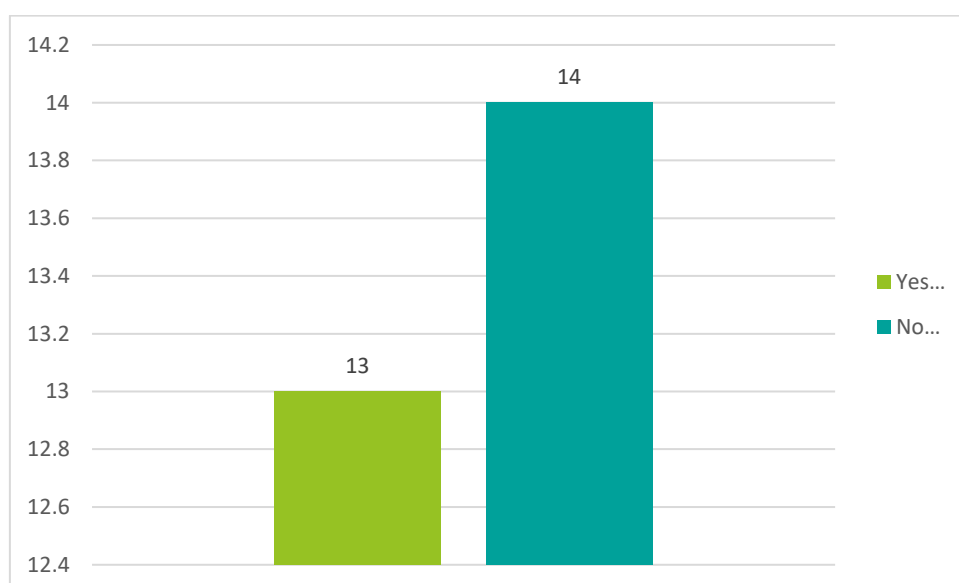


Figure 25 – Methodological procedures at a CBRNe incident: Are they mandatory for all involved organisations/agencies? (Q13 PSAB Workshop)

Reflection on the results of the questionnaire led to the following recommendations. Each state has its own rules for response action in the contaminated area. These activities are performed as the individual SOPs are set up. To improve the overall situation, it would be necessary for individual teams to act according to standard procedures that are internationally recognised at least in neighbouring countries. This should be true mainly because a CBRNe event does not have to be only national but can also cross-borders. Therefore, it is necessary to perform unified procedures and harmonise them. In the current research we have not found the cross-border element as the vital part of analysed CBRNe SOPs and this intervention would be definitely even more challenging. The cross-border operational aspects should be addressed in follow-up projects, for example in specific situations where the SOPs might not be the same in two neighbouring countries and for which there might be a significant communication (at least language) issue both between the responders from different countries and between the responders and the victims present in a cross-border setting. The cross-border coordination was recently tested in the TRASNTUN project (<https://transtun-project.eu/>) in a cross-border tunnel between France and Spain during a real-life exercise involving chemical agents.

This opinion has been discussed and approved by many negotiations, as exemplified by the following statement of the EU project SLAM: “The use of CBRNe threat agents is an international crime and several highly stringent regimes have been developed in order to assess, whether or not CBRNe agents are used in breach of international or national laws”. Some examples of such regimes are the NATO handbook for Sampling and Identification of Biological and Chemical Agents (SIBCRA AEP-10) and the Blue Book of the Finnish Institute for Verification of the Chemical Weapons Convention (VERIFIN), which have largely been adopted as standard procedures for the Organisation for the Prohibition of Chemical Weapons (OPCW). Such “standardisation” focuses only on some aspects of the full concept of standardisation. Having a forensic character, elements like chain of custody and documentation are high-lighted. In such not fully standardised regimes, annual validation of laboratory performance using inter-calibration exercises are an important quality control. Similarly, the EU CBRNe Action Plan discussed the relative importance of standardisation of analytical procedures from sampling to laboratory identification [24].

### **5.3.5. How to enhance a preparedness to be ready for incident response and “taking evidence”? Comparison of different training activities and recommendations for diversity**

Testing different national specifications and unifying the rules into the one functional complex should be the purpose of joint training exercises. If joint exercises use various state principles of response and the latest scientific knowledge, then it is possible to obtain the most optimal procedures.

Population Protection Institute participated in and organised many both national and international trainings under the auspices of various organisations. It seems appropriate to briefly characterise the main advantages and disadvantages of below mentioned chosen training events.

- Swiss Basic, Advanced and Exercise Courses (organised by OPCW, held in Spiez, Switzerland by Swiss Armed forces): although the training was conducted by military units, the response methodology was the same as for the Czech fire fighters. Swiss precision and military discipline were the advantage of the training.

- Introduction to the International CBRN Training Curriculum - Course for Trainers of First Responders to CBRN Incidents (organised by NATO, held in Bad Neuenahr – Ahrweiler, Germany by the Federal Office of Civil Protection and Disaster Assistance): excellent setting of practical and theoretical activities. Emphasis was also focused on psychosocial assistance of first responders, which was one of the special benefits of the training.
- Introduction to the International CBRN Training Curriculum - Course for Trainers of First Responders to CBRN Incidents (organised by NATO, held in Almaty, Kazakhstan by the Civil Protection Training Centre): the amazing effort and hospitality of the instructors did not balance the ratio between practice and theory. The training was only theoretical. The practice was only in the form of demonstrations.
- Assistance and Protection Course for Instructors from African States Parties (organised by OPCW, held in Tshwane, South Africa by South African Armed Forces): the different location amplified the experience gained in Africa. The advantages of the training were both in the implementation of national scientific improvements – for example for protective suits and detection equipment. Another great advantage was a special type of training, which consisted of many short response activities, where everyone tried the role of an incident commander.
- Assistance and Protection Course for Asian States Parties (organised by OPCW, held in Seoul, Republic of Korea by the Armed Forces of South Korea): although the overall response system is the same worldwide including in South Korea, their response procedures are different and sometimes surprising. The participants were surprised by a different technique of the collected samples decontamination, where the decontamination solution was sprayed directly into the sample bag containing collected sample. It was interesting to watch and think about dissimilar procedures.

Each of the above mentioned training events had its own specifics and peculiarities, thanks to which it was possible to see the response of rescuers with different eyes and learn new experiences. If joint training event is organised, each involved organisation should highlight its specifics and strengths and use them in training activities. Diversity brings in new ideas and experiences, and people can learn from each other. Bringing in different ideas and perspectives leads to better problem-solving. Standardisation cannot be the only aim that we are focusing on. Let's think about the saying of Mary Parker Follett: *"Unity, not uniformity, must be our aim. We attain unity only through variety. Differences must be integrated, not annihilated, not absorbed"*.

## 5.4. VICTIM AND CASUALTY MANAGEMENT

Protecting people's lives and health is one of the most important tasks carried out by emergency services at the scene of the intervention in all cases. Saving lives concerns both those directly affected by the emergency – in Czech Republic usually under the responsibility of the Fire Rescue Service (FRS) and the Emergency Medical Services (EMS), which provide evacuation of persons and provide emergency pre-hospital care. The second group whose lives may be at risk are persons who are in the vicinity of the emergency site or are heading towards it – their protection is mainly entrusted to the Police of the Czech Republic, which is charged with closing the area around the



emergency to prevent the free movement of persons into the emergency area. The last step in the rescue of persons is the provision of acute inpatient care by hospitals.

Arrangements like this one can be seen in other documents as well. On site - ambulance services have the biggest responsibility, and they are supported in this role by Firefighter units. LEA organisations usually create the environment for the Ambulance and Firefighter services to perform rescue [8].

In events with a large number of injured people, it is necessary to consider the limited capacities of the forces and resources of the emergency services. In such cases, it is necessary to proceed to the sorting of the injured, which takes place either directly at the scene of the emergency or in close proximity to it. This activity is usually carried out by the EMS. The START method (Simple triage and rapid treatment) is used for sorting. First responders using START evaluate victims and assign them to one of the following four categories [13]:

- Deceased/expectant (black);
- Immediate (red);
- Delayed (yellow);
- Walking wounded/minor (green).

The rescue agencies of the analysed states are implementing some sort of triage. The START method/algorithm is frequently used. The organisation usually responsible for triage is the ambulance service.

The above can be said of all emergencies in general.

#### **5.4.1. Specifics of CBRNe incident**

A significant modification of the procedures for the rescue of persons occurs in case of an intervention with dangerous substances, especially in case of a CBRNe incident, where the action of a dangerous substance is usually associated with a high number of people affected (injured).

Due to the presence of a dangerous substance inside the Hot/Warm zone, the use of personal protective equipment is necessary during the intervention. The highest degree of protection is even required in cases where the nature of the dangerous substance is not identified. Responders that are equipped and trained to operate in such a level of protection are mainly FRS units. Therefore, in the case of a CBRNe incident, only FRS can enter the Hot/Warm zone. When the threat is known, and it is possible that a lower level of protection can be used special EMS teams can enter the danger zone in those specific cases [11, 12, 13, 15].

Firefighters are usually best equipped to operate in the Hot zone (higher level of protection) across states in Europe. Firefighters are therefore deployed as the primary component inside the Hot Zone. In the event of a CBRNe incident, they have the main burden of rescuing people inside the Hot Zone.

In other countries it is similar at least in the initial response. Later on, some ambulance units can be equipped with better PPE and be in fact deployed inside the Hot Zone dependent on the nature of the hazard. Like HART (Hazardous Area Response Teams) in United Kingdom [8, 9, 18].

### 5.4.2. Rescue and Triage

The very rescue of persons during a CBRNe incident consists mainly in preventing further harmful effects of the dangerous substance on the affected persons and treating injuries caused either by this substance or by another cause in connection with the incident (mechanical injury, shock ...) Sorting (triage) people affected inside the Hot/Warm zone is a complex task. The fact that the responders are in protective equipment makes it significantly more difficult to examine the unconscious victims. Sensory evaluation of the condition is practically impossible. Therefore, it is impractical to use the START method and instead a simplified “first” or “toxic” triage. Classification is much more simple and consists basically of persons showing signs of life – persons who do not show signs of life [13]. The procedure can be summarised by the following points:

- Persons capable of movement alone are led out through the decontamination station for persons (mass decontamination);
- Injured people showing signs of life are carried out of the area and pass through the decontamination station for victims;
- Person showing no signs of life are the last to be taken out of the zone. The examination of the victim's body and recognition of life extinction is always carried out by a doctor (EMS).

People with physical or mental disabilities can present additional difficulties for the first responders in an initial triage. The simple “toxic” triage is robust whereas more detailed procedure can lead to incorrect classification into categories based on the particular disability and behaviour of these people (see 5.2.2.).

After crossing the decontamination site, the affected persons are subjected to further sorting (second triage) by the EMS group. Based on this classification, the affected persons are divided, provided with identification and sorting cards. Based on sorting, persons are provided with pre-hospital emergency care, are transported to medical facilities, or moved to the assembly of evacuees, where they are provided with psychosocial assistance [13].

This procedure is similar in other countries. So called “snatch rescue” in UK means to take victims and transport them quickly from the harm’s way to some safer area. There is usually performed first somewhat less complex triage (sometimes named “Toxic triage”) and the second triage is performed after decontamination (START etc.) [8].

There is some sort of triage sorting performed before decontamination in other countries as well. Answers from our questionnaire confirm this (Figure 26). Triage is performed either directly in the Hot Zone by responders with sufficient protective equipment. Firefighters can be trained to do this or it is performed by special ambulance units capable of deployment inside the Hot Zone. In other cases, firefighters will only transfer the affected persons to decontamination (Hot / Warm zone border) and here a triage is performed by ambulance personnel using lower degree of protection.

Triage sorting is done by medical personnel in the cold zone after affected persons are evacuated from the contaminated area in some cases.

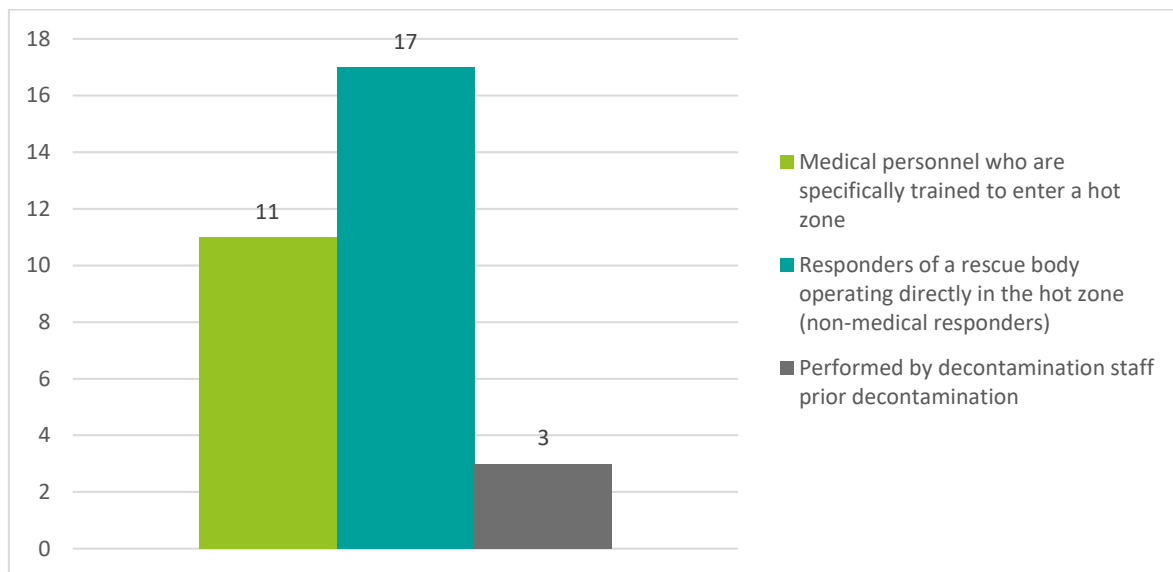


Figure 26 – Type of personnel responsible for CBRNe incident triage (Q5 Online Survey)

An example from United Kingdom could be used. In JESIP it is written that 1st Toxic triage is done in CCP. Toxic Triage must balance clinical needs against radiological hazard. Priority 1 patients with life threatening injuries should not have their treatment and transfer delayed for decontamination. The Ambulance Service defines casualties and prioritise in the following manner:

- Priority 1 (P1) Casualties: Patients with a high priority for either immediate emergency medical care or immediate emergency life-saving decontamination or both;
- Priority 2 (P2) Casualties: Less severely affected patients who need either emergency medical care or early decontamination to prevent further intoxication;
- Priority 3 (P3) Casualties: Patients with slight to moderate intoxication and without contamination at a level that requires immediate action. Of these P3 casualties a percentage will leave the scene and self-present to local hospitals and clinics;
- Fatalities.

2nd triage is undertaken after the decontamination process in a Casualty Clearing Station (CCS). Pre-hospital care is provided here. An Ambulance Loading Point (ALP) is placed nearby for patients to be placed in ambulances for transfer to hospital [8].

#### 5.4.3. Special modifications based on the nature of the incident

The character of the CBRN substance is essential. Its level of danger, and specific threats may further modify the basic procedures. Chemicals have a fast dynamic of effects on the organism. It is crucial to stop direct contact with such substances very quickly. Compared to biological and radiological contaminants, the time window is short: minutes (CWA) to hours (TIC) in most cases [26]. Urgent medical care (CPR, administration of antidote) can be performed inside the Hot zone

only in justified cases. Also, in case of radioactive contamination priority can be given to quick transport of victim to a hospital (skip complete decontamination). More precisely, decontamination will be limited to gentle cutting and removing of contaminated clothing [8, 11]. We see similar procedure in other documents, and it is mostly in case of radiation contamination when this priority of medical care has priority over decontamination. Additionally, some US guidance documents contain provisions for the administration of lifesaving medical care in the contamination reduction zone or concurrently with decontamination, in circumstances where the patient's condition poses a greater risk of death or morbidity than the ongoing exposure itself [26]. In case of B-agents in the Czech Republic. A regime of total anti-epidemic measures is established, and preventive and prophylactic measures of potentially contaminated persons are established. The Public health authority will order these measures [12]. Currently available means cannot detect biological contamination quickly enough and in sufficient capacity in the field. In Germany, in case use of B-agents is suspected, there are special procedures in victim management. Potentially contaminated persons are separated from non-contaminated people and they are held by the police until the public health authority representative arrives. Persons are selected only on the basis of a professional estimation based on their proximity to a contaminated object or person. This separation does not apply in life-threatening situations requiring immediate medical treatment [27].

#### **5.4.4. Basic Psychological and Psychosocial Assistance**

Many documents pay attention to psychological and psychosocial assistance during and after the incident. For example: In Czech SOPs there is one dedicated to this problematic. When dealing with an emergency, account should also be taken of the potential psychosocial impacts on those affected by the event and on responders and other intervening persons. The need to provide psychosocial assistance is not only dependent on the severity of the situation and the number of people affected, but it is always necessary to consider the current state of the individual and his needs and response to the event. Psychosocial assistance is provided both in minor emergencies (individual misfortunes) and in major emergencies.

Persons affected are directly participants in an emergency, and particularly vulnerable groups include:

- Children;
- Older persons;
- People suffering from material need that threatens their survival;
- People with disabilities or intellectual disabilities;
- People living in collective facilities;
- People experiencing other trauma at the same time;
- People with psychological trauma in personal history;

- People adhering religion practice and from different ethnic.

In addition, they may be persons close to those affected (they may not be directly at the scene of an emergency), witnesses to an emergency and, in some cases, responders.

First psychological assistance and short-term psychosocial assistance are provided as part of rescue and disposal work. First psychological assistance is intended directly for those affected at the scene of the intervention and is organised by the intervention commander. Firefighters provide first psychological assistance to the affected persons in order to stabilise the affected person, which mainly consists in:

- Fulfilling basic human needs (fluids, heat, physical well-being, etc.);
- Ensuring a quiet and safe place (e.g., bus, emergency survival container);
- Meeting the need for the necessary information.

Psychosocial assistance in the context of rescue and disposal work is organised at the scene by the intervention commander. For this activity, the commander may use a specialist for that area. Short-term psychosocial assistance, during which cooperation with municipalities, local organisations and non-state non-profit organisations (NGOs) is established, is tasked with finding and ensuring the needs of those affected. If the need for psychosocial assistance persists, municipalities, local organisations and NGOs subsequently continue to offer medium- and long-term assistance [14]. The question of psychosocial assistance is frequently addressed in guidelines and SOPs [14, 26]. But the main emphasis is on a general approach to the people affected. Vulnerable groups appear in the documents and there are recommendations on how to work with such groups, but they are generally perceived as insufficient.

Some questions regarding vulnerable groups were asked in our questionnaire. Topics of assistance during decontamination will be discussed in a respective chapter. Here we want to focus on communication, rescue and support inside the Hot zone and immediately after affected persons leave the area of the incident. Answers show a big variability. Some SOPs are addressing the question of care of vulnerable people while others do not or they do not appear to address this topic sufficiently. Further, some respondents didn't know if there are SOPs focusing on this topic (Figure 27).

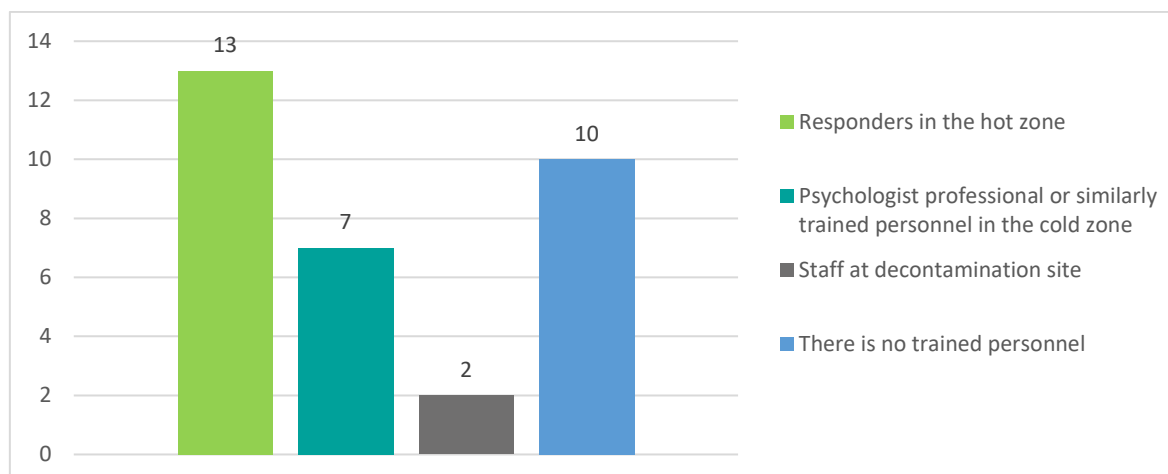


Figure 27 – CBRNe response personnel specially trained to take care of vulnerable groups during an incident (Q6 Online Survey)

One third gave the answer that there are no trained responders on site of an incident to deliver proper care for vulnerable people. One responder brought an idea to think about: “All responders are trained for saving lives regardless of how vulnerable they are.” This can be especially true of incidents involving the use of CWA, where it is necessary to get the affected persons to safety as quickly as possible. This kind of blurs the line between the vulnerable group and other affected people. Especially considering that the effects of some CWAs can significantly affect the mental state and physiology of those affected, that they basically become part of the vulnerable group. This, and the fact that affected persons will be in tremendous stress and be afraid for live will make identifying vulnerable group inside the Hot zone very difficult. And according to another question (Figure 28), there are many countries that do not have easy guidelines to identify vulnerable groups.

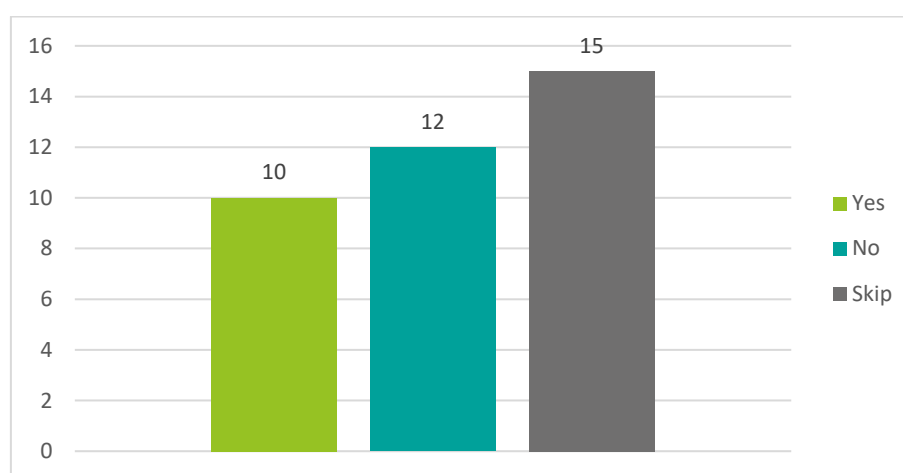


Figure 28 – National guidelines on how to identify and engage with vulnerable people during a CBRNe response (Q13 Online Survey)

To know how to communicate with vulnerable groups is very important and some countries developed some educational materials to help with this task (Figure 29).

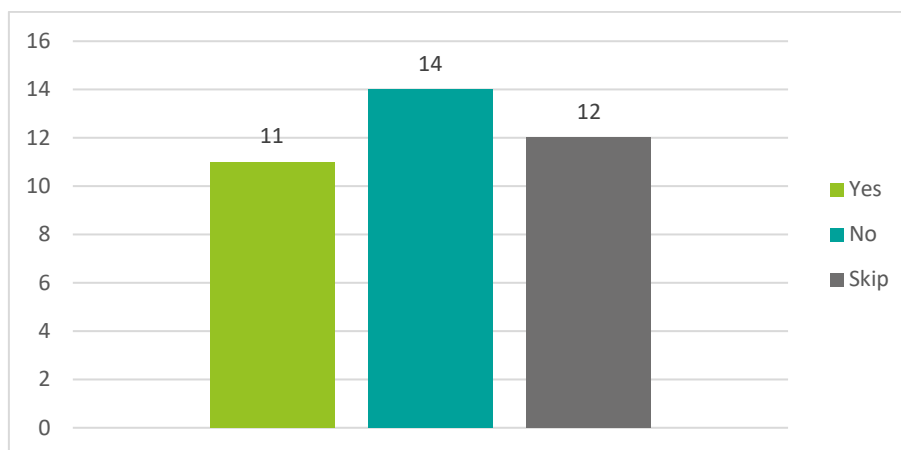


Figure 29 – Educational material available for CBRNe responders on communicating with vulnerable people (Q14 Online Survey)

And some organisations developed some special procedures to improve communication towards vulnerable groups (Figure 30).

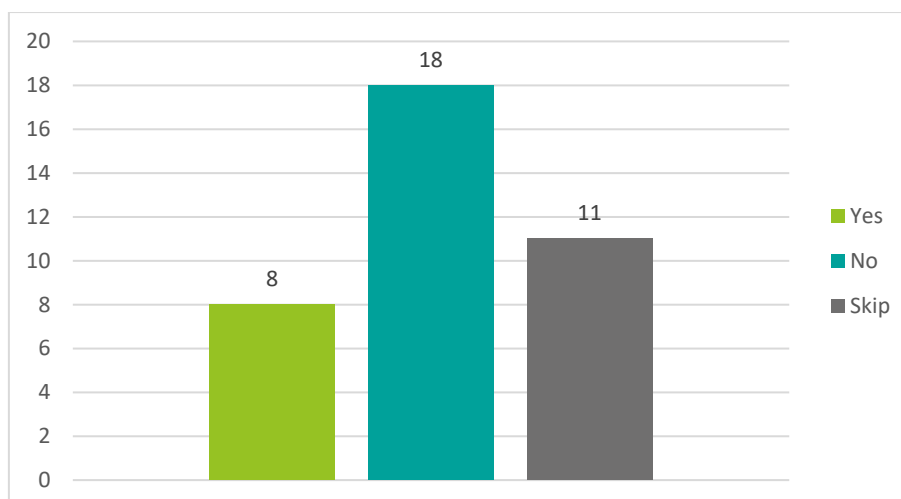


Figure 30 – Availability of specific procedures for direct communication with vulnerable people (e.g. pictograms, visual aids, sign language) during a CBRNe response (Q15 Online Survey)

According to answers in Figure 31, if vulnerable groups are addressed in SOPs, this is usually directed to specific vulnerable groups.

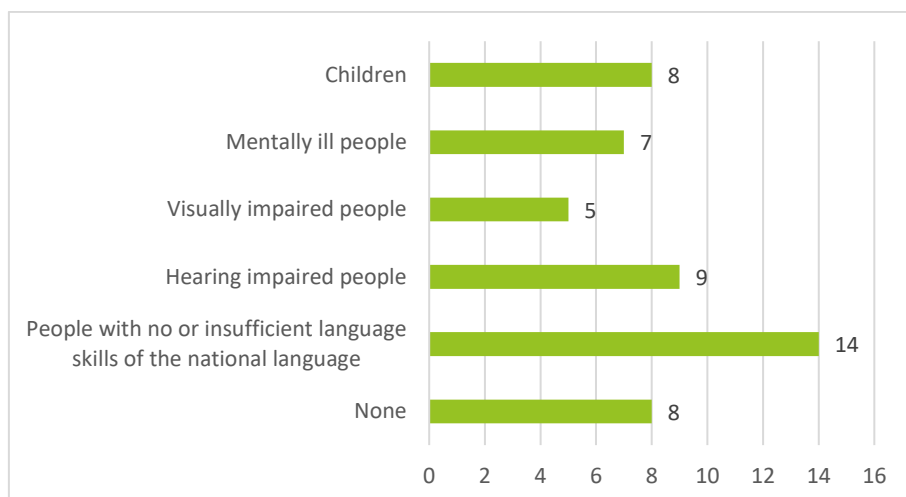


Figure 31 – Categories of vulnerable persons where communication resources are available (Q16 Online Survey)

And there are different responding bodies (Figure 32) when it comes to communicating with vulnerable groups.

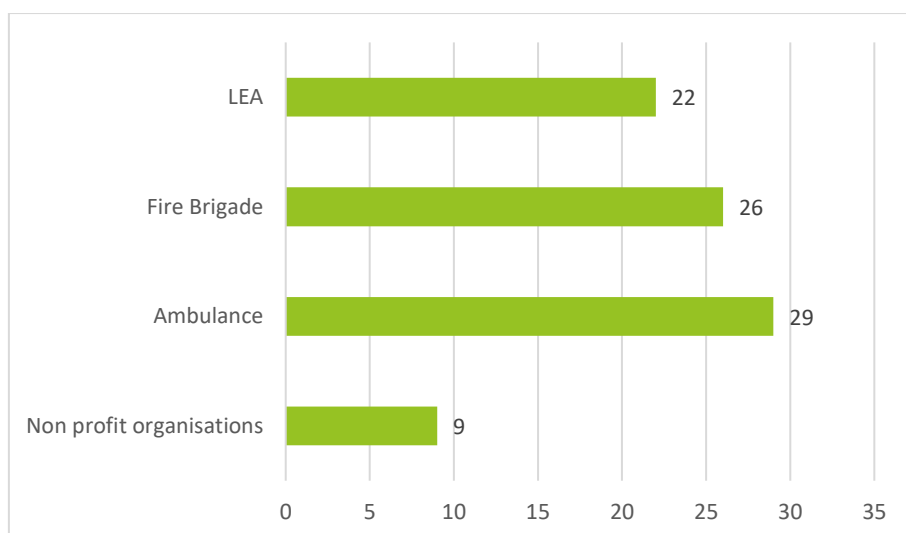


Figure 32 – Who communicates (instructions, helpful conversations) with vulnerable people at the place of intervention? (Q17 Online Survey)

Different approaches are also seen in form and frequency of training and exercises (Figure 33).



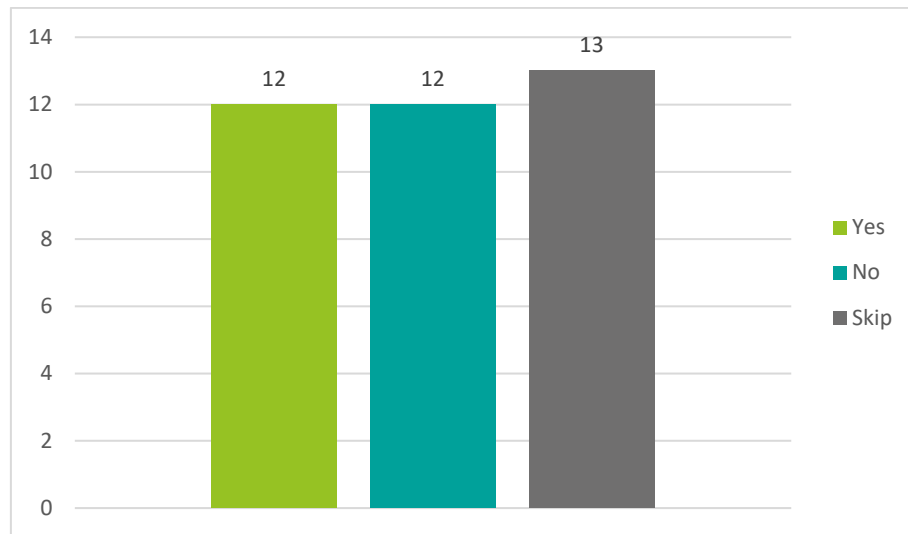


Figure 33 – Use of communication with vulnerable individuals during first responder training and exercises (Q18 Online Survey)

Even responders who train this type of communication do not train regularly. Often these trainings are voluntary. A very complex approach to psychosocial assistance and care of vulnerable groups can be found in guidelines from Germany. The document gives a short overview of the typical stress factors for each CBRN incident and provides historical examples [28].

#### 5.4.4.1. Difficulties associated with the use of PPE

For emergency services, CBRN operations are work under difficult conditions: own psychological fears and management of stressed public. Action forces operate alone in the danger area until the decontamination. They do not have access to psychosocial aid since Crisis intervention teams cannot be consulted because they are usually not trained in working in protective clothing and respiratory protection. Usually action forces try to comfort affected people by speaking calmly or by using body contact. In a CBRNe incident most units are unable to use these strategies since the PPE does only allow little interaction and communication.

Recommendations for CBRNe management [28]:

##### *Large-scale evacuation (to provide affected people a sense of range of motion)*

The movement of large groups is easier to control if action forces are mixed between the affected ones and split them in smaller groups. Nevertheless, there must be a significant distance between action forces and the affected people since their behaviour is unpredictable and own action forces must keep in mind their self-protection.

##### *Intact groups (groups of cohesive members are easier to handle)*

Search for a group-speaker (alpha leader) and inform him/her. He/she has to inform the belonging group. In case of separated members (injured ones) it is possible to allow one member to wait next to the injured one. If members have to be separated they have to be informed about the reason and how they can reunite afterwards.

Children should not be parted from their parents. If they have to be separated (injured parents) there has to be an attendant. The attendant could be another affected person.

If people tend to get more and more aggressive in a group they should be separated by directly speaking to single persons and by using personal roll calls.

### *Delegate tasks to affected people*

Involve the social competence of people using direct contact to individuals. An actual tasks calms people down and allows an action ability.

### *Basic psychological first aid by emergency services:*

- Say you're there, who you are and what's done;
- Speak, keep the conversation upright, listen "actively";
- Shield the patient from viewers;
- Search/offer careful body contact (hand, arm, shoulder);
- Strengthen the self-efficacy of the patients, give them simple tasks;
- Give information about injuries and further measures in understandable language;
- Do not lie to the patient;
- Say that everything humanly possible is done;
- Include relatives as far as possible;
- Say, when you have to leave the patient.

### *In no way, do not:*

- Blame;
- Pronounce accusations;
- Express worrying assessments or diagnoses;
- Discuss causes;
- Trivialise operations.

### *Speak under PPE*

It is still a way to comfort affected people also if the voice is quiet and twisted. This enables people to get to know the person behind the PPE. Since the voice (and therefore the messages) is not clearly understandable, use gestures to support the content. They recommend to:

- Underline instructions by "steering" people in certain directions;
- Clarify verbal utterances through gestures;
- If possible, communicate on the level of the affected (knees).

*Inform the affected in time and trustworthy*

*Allow valediction in case of death*

*Prepare further help in the prohibited area*

Psychosocial help and assistance to vulnerable groups is a complex issue and do not stop with the end of the intervention. Some SOPs giving some guidance how to approach this issue, but usually there are no "silver bullets" that can be used in any scenario. It is on the responder experiences and intuition at the end. Those experiences can be obtained only by training exercises and by real situation experiences.

#### **5.4.5. Decontamination**

Decontamination is an essential part of the process of preventing the spread of contamination outside the emergency area. All persons, all objects leaving the contaminated area, must undergo a decontamination process. People pass through the decontamination station for responders or victims. The objects are either decontaminated at the decontamination station for technique, or they are placed in special containers.

After the intervention itself, decontamination procedures are used to return the area to its original state. These procedures neutralise or remove hazardous substances from surfaces, objects, etc.

The technical implementation of the decontamination of persons is the responsibility of the FRS in most cases during CBRNe interventions in the Czech Republic (in the case of long-lasting major events, the Czech Army also carries out decontamination). Where it is necessary to establish decontamination stations at the entrances to hospital facilities, FRS forces shall also be used. Decontamination of B-agents can also be carried out by the Institute of Health. Decontamination of the area at the recovery stage is carried out by specialised companies [11, 12, 15].

Responsibility for decontamination varies in other countries. Firefighters usually play a major role in process and support other responders in this task, like in Germany where decontamination is mainly in competence of Firefighters and the German Federal Agency for Technical Relief (THW) [5]. But other agencies can have their own capability. For example, in UK, decontamination of the general public is a Health Service responsibility, usually carried out by the ambulance service at emergency incidents. When the ambulance services' resources are unable to cope with the number of casualties, mass decontamination should be carried out by the Fire and Rescue Service [8]. Non-firefighter responder decontamination (i.e., ambulance service, police, military etc.) should be the responsibility of the respective employer, however, in certain emergency situations the Fire and Rescue Service may carry out this function [9].

Detailed procedures for decontamination at the stations of decontamination of responders, decontamination of victims, decontamination of the technique is usually processed in internal documents of organisations responsible for this task. For example, in Czech Republic, it's "Battle

Rules of Fire Protection Units". Specific situations are then solved in Set of Type Activities of the IRS.

Decontamination procedures differ in procedures mainly in relation to variables. Decontamination of responders, decontamination of victims, and decontamination of vehicles. The second variable is the type of CBRN substance that needs to be decontaminated.

The aim is generally to reduce the threat either by reducing the concentration of the contaminant, chemically converting the toxic substance into a less toxic substance or by killing of microorganisms.

Decontamination site for responders is mandatory built on every incident in which contamination could be suspected. It is performed on surface of PPE garment of responders. The Chemical resistance of protective garment allows the usage of more aggressive agents in higher concentration for decontamination. Emergency decontamination should be considered in case of breakdown of personal protective equipment (e.g., ripped chemical protective clothing, breathing apparatus malfunction, injured wearer etc) [8, 11, 12, 13, 15].

#### **5.4.5.1. Decontamination of affected persons**

Fast removing of dangerous substances from affected persons is priority. Simple decontamination process starts by removing of clothes. Also improvised decontamination can be set up before proper equipment is on scene. Mass decontamination is set up in case of a large number of affected people (usually in competence of firefighters). Firefighters have special trailers in their equipment, which can be quickly disassembled into stations for mass decontamination of people. Persons after decontamination should be provided with simple replacement clothing. After examination non-injured persons are directed to assembly of evacuees site, where they receive psychosocial assistance. Injured persons will be placed to care of ambulance services [8, 11, 12, 13, 15].

A special type of decontamination is the decontamination of the injured (Clinical decontamination). Its purpose is the rapid removal of contaminants from the surface of the body and from possible injuries. The main aim is to prevent contamination of health professionals and doctors who will provide medical care to the injured. In justified cases, such as contamination by radioactive material and when a casualty is severely injured, priority can be given to transporting them to hospital before decontamination (priority of life saving). This type of decontamination is mainly in competences of firefighters. In some countries it can be performed by special teams of ambulance services, like in UK where contaminated casualties are treated individually by trained healthcare professionals (HART unit) using purpose designed decontamination equipment. It is performed on contaminated P1 or P2 casualties (non-ambulant), who are unable to proceed unaided through the MD process [8, 9].

There are challenges in the decontamination process that are not visible at first glance. In a CBRNe incident, it may be necessary to decontaminate police officers and their equipment. In that case, it is necessary to have a certain way in which the decontamination of sensitive material, especially weapons, takes place. In the Czech Republic, a procedure requires the establishment of arms supervision [11, 12, 15]. Those who are either temporarily removed from decontaminated police officers or over weapons that must go through a decontamination process. As well as processing other sensitive items that were found on site. When decontaminating those affected, personal belongings such as clothing and even personal belongings and valuables must be removed. How

these things are handled is often only marginally addressed in the procedures. Therefore, a question focusing on these issues was included in our online questionnaire (Figure 34).

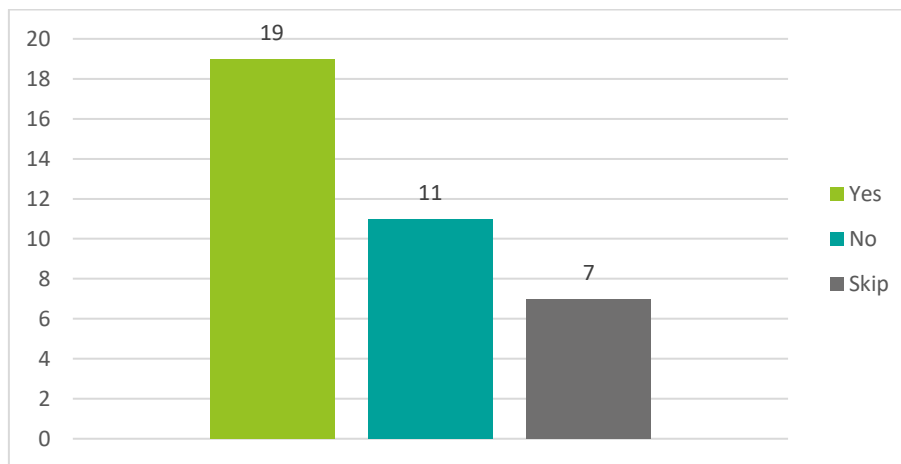


Figure 34 – Are procedures in place for securing, decontaminating and returning valuables, documents, weapons and sensitive equipment during and after a CBRN response specified in SOPs? (Q8 Online Survey)

Another question is how to process affected persons. Registration of persons who are leaving the area of incident is important in terms of care for affected and in later LEA investigation. This topic is addressed similarly in UK documents. All personal clothing and property, whether contaminated or not, should, wherever practicable, be recorded and linked to an individual. Such material may contain valuable intelligence or evidence and the continuity of its recording is vital. Therefore, a similar question was included in our questionnaire (Figure 35).

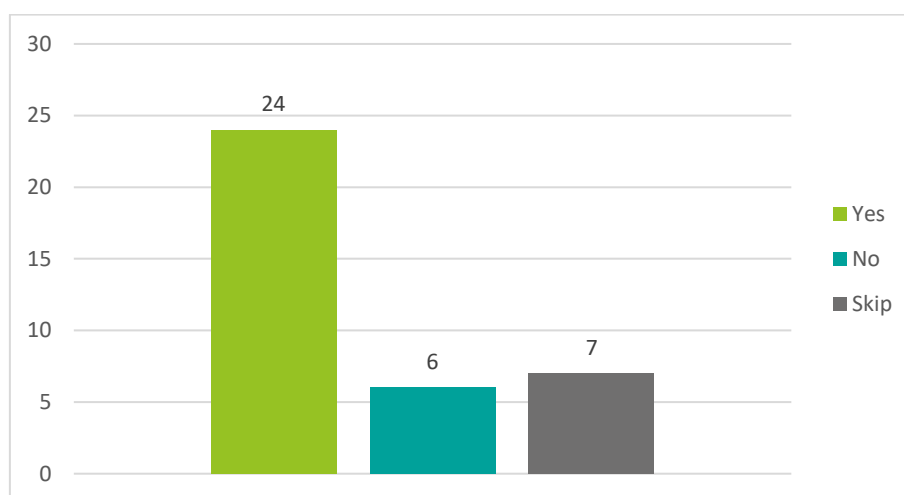


Figure 35 – Are SOPs/guidelines in place to register/record all affected persons leaving the scene of a CBRNe incident? (Q10 Online Survey)

Evaluating the success of the decontamination process is also a very crucial issue. Gamma and beta radiation is very easily detectable, and this allows its rapid measurement before and after the decontamination process. Responders can not only evaluate successful decontamination, but they can make decision if there is need for decontamination in first place. That can speed up the process of evacuation of affected persons. For example, in the Czech Republic there is a cut off value to decide if decontamination of persons is necessary. Normally it is 3 Bq/cm<sup>2</sup>. Below this value, the

person is considered uncontaminated. In the case of a massive release of radioactive material and a large number of victims, this value is increased to 100 Bq / cm<sup>2</sup>. However, persons below this limit are not considered uncontaminated. They just do not proceed to the decontamination station but are given instructions on how to decontaminate themselves [11]. Other hazardous materials are more problematic to detect. Chemical substances can be detected by various instruments, but those instruments can be very sensitive to water aerosols. That can make them impractical to use in some situations. Biological detection takes too much time to be practical in this usage at all. Here are answers to the question regarding the evaluation of decontamination (Figure 36).

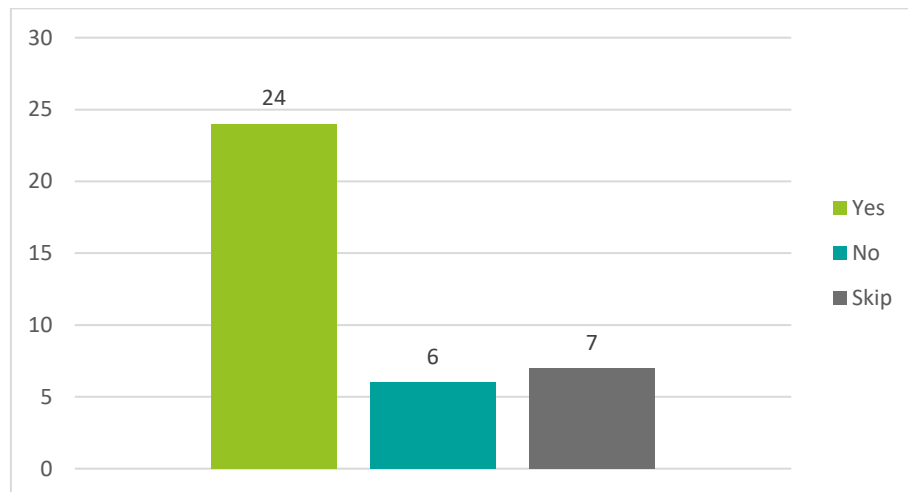


Figure 36 – Are there procedures/SOPs in place to effectively evaluate the decontamination of individuals at a CBRNe incident? (Q12 Online Survey)

Decontamination of vulnerable people is considerably challenging. This groups require additional assistance. Vulnerable groups may include infants, children, older persons, and pregnant women, as well as people who have functional or mobility impairments, live in institutionalised or congregate settings, have limitations due their religion (e.g. clothing), have limited proficiency in used language or have cognitive impairments. The question addressing this issue was included in our online questionnaire (Figure 37).

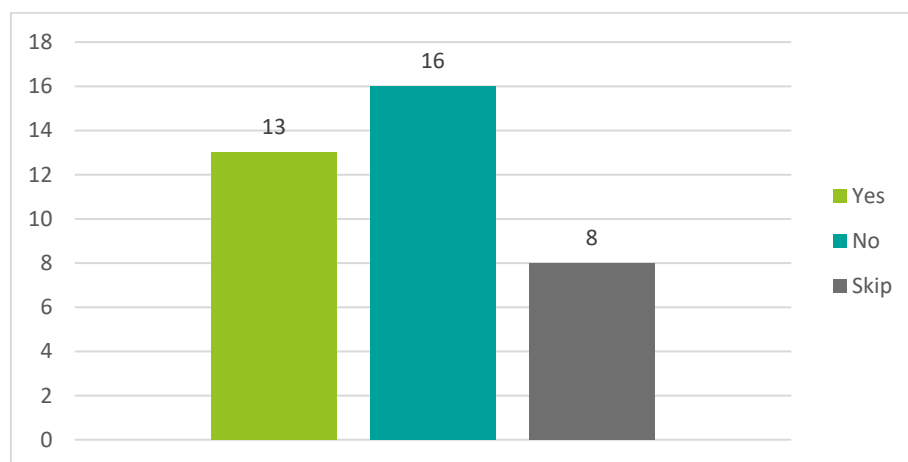


Figure 37 – Are there SOPs/guidelines concerning the decontamination of individuals from vulnerable groups? (Q9 Online Survey)

Planning, training, and communication with members of vulnerable groups should be practiced prior to an incident. It should be ensured that response plans include integration of additional personnel to assist patients through decontamination and/or pairing non-ambulatory patients with ambulatory patients to assist. Each responding organisation should have response plans that include specific protocols for those persons. There is list of some things to keep in mind when planning and executing decontamination of such groups:

- Make every effort to keep a child with a parent or trusted adult;
- Unless contraindicated due to medical needs, families should undergo decontamination together. A method to hold or carry an infant through decontamination must be in place;
- Patients with decreased mobility (e.g., in wheelchairs) may need to be transferred to a backboard or gurney and treated as a non-ambulatory patient;
- Patients should retain, to the greatest extent possible, all materials required for “normal” functionality (e.g., prosthetics, hearing aids, eyeglasses);
- Provide written and pictographic instructions for the decontamination process; translate to the most used languages within the population;
- Integrate behavioural health professionals early in the response, as resources allow;
- Take in consideration special needs of various religion or ethnic groups in population [26].

An insight from a German document devoted to the decontamination of vulnerable groups. Especially regarding specifics to Islam religion:

- Invite the affected ones to undress themselves from (outer clothing) to minimise incorporation. Explain the effects. This results in a calming effect;
- Inform the affected ones by using pictograms and written information material about the sense and purpose, the procedure and effect of the decontamination. The use of the information material must be trained in exercises;
- Use privacy shields for undressing.

The decontamination of Muslim women could be difficult since undressing in public is forbidden in terms of religion. There are three recommendations for action:

- You can refer to the central legal principle of Islam "emergency breaks command": In emergencies, actions are allowed, that are otherwise not allowed;
- Get the support and the permission to disrobe by the male escorts of the Muslim women (Preferably a respect person of the family or the group (e.g. the family elder);
- If possible, ensure that one religious respect person (imam) in the prohibited area (outside the decontamination area) becomes involved by the local psychosocial helpers.

However, the time required to convince people may in principle not compromise the decontamination process [28].



## 6. CONCLUSIONS AND RECOMMENDATIONS

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A CBRNe incident is often described as an event that has a low probability of occurring but will have a high impact if it does. Consequently, optimum preparedness and the response to the incident should be driven by the need to ensure they are both appropriate and fully effective in the circumstances. A key way for CBRNe responders to achieve this is the use of carefully devised, prearranged SOPs.

The participants at the PSAB Workshop undertaken as part of this study made a variety of observations and comments concerning SOPs and their use. They ranged from simplifying the language they are written in (to enable the fullest understanding by all concerned), to a request for detailed, case-oriented documents to be made available for study and action as required.

However, when trying to eliminate shortcomings in procedures, stakeholders should be careful to avoid solving minor gaps at the expense of overall performance. For an optimal response, a robust response operation must be combined with meeting the needs of vulnerable groups. This requires issues to be dealt with such as the definition of the minimal capabilities required to do this; the sharing of 'best practice', lessons learned as they are recognised and developed into SOPs, plus regular exchanges of trainers and trainees. Regular and realistic exercises at national and international levels should involve vulnerable individuals and representatives from their forums and support groups in the planning, preparation and implementation of the exercise. All of these could play a part in harmonizing the overall capabilities of CBRNe response agencies across Europe. Whereas regional or local SOPs should be precise in defining roles of individual response agencies the documents on national level or European harmonisation level should address processes, quality standards or task issues instead of pushing the universal agency roles and responsibilities.

### 6.1. Specific Recommendations for SOPs and Best Practice

This section sums up recommendations resulting from this study:

#### Key Recommendation 1

The needs of vulnerable groups should be taken into account and information about how to reach and engage with them, how and what to communicate to them need to be part of the responders' SOPs and training.

#### Key Recommendation 2

It is a widely held planning assumption that during the response phase only rescuers will be in the contaminated area. Action forces alone operate in the danger area until decontamination is complete. There will be no citizens present, and certainly not vulnerable ones. Consequently, responders will not be in direct contact with other people, and especially not with vulnerable persons while carrying out their tasks. This assumption should change as vulnerable individuals may well be left behind while others flee or are evacuated. If citizens do appear in the contaminated area, it will be necessary to deal with them using a special communication regime.

Special rules for communication between rescuers and victims of the CBRN incident are well described in a publication named “Training Manual: Psychosocial Crisis Management in CBRN Incidents”, which is listed previously in Table 3. [28]. The manual covers: “basic rules of psychological first aid for rescuers: say you're here, who you are and what's going on, speak, keep the conversation, listen "actively", shade the patient from the "spectators", seek / offer careful body contact (hand, arm, shoulder), strengthen the patient's sense of self-importance etc.”

In addition, during this study, a lot of practical advice was obtained on how rescuers should treat vulnerable persons or others who may panic due to the dangerous situation. This ‘hands on’ approach should be adopted within SOPs.

### Key Recommendation 3

Training should include activities where rescuers learn how best to deal with vulnerable people. Ideally, a psychologist should be present at each training activity to advise the rescuer on how to behave when working with vulnerable individuals. The training must be predominantly practical, perhaps with the role of a vulnerable person played by an actor, as was the case during the course “Introduction to the International CBRN Training Curriculum - Course for Trainers of First Responders to CBRN Incidents” provided by the “Academy for Crisis Management, Emergency planning and Civil Protection” in Bad Neuenahr – Ahrweiler, Germany (annual course).

### Key Recommendation 4

Preparedness means that the civil society must also be prepared. Vulnerable persons should, where practicable and feasible, also be prepared for a CBRN incident, they should know what to expect and what to do. The existence of this advice and guidance is a good start but it is also necessary to put them into practice and to start briefing and training vulnerable individuals. Some manuals exist for vulnerable groups in the Czech Republic, for example:

Handbook - "How to behave in an emergency". Designed for visually impaired children (Published by FRS CR) [43]

“Guide to proper contact with the blind” published by the Regional centre of registered services for the blind and visually impaired people ([http://www.tyflocentrum-ova.cz/bariery/ne\\_tak\\_ale\\_tak.php](http://www.tyflocentrum-ova.cz/bariery/ne_tak_ale_tak.php)), etc.

### Key Recommendation 5

Study and analysis within this Project show that whilst countries have preparedness plans which clearly define the roles and responsibilities of different organisations and individuals within them, vulnerable persons are not usually included in these plans. From this, an opportunity can be identified to conduct exercises, whether table-top, command post or coordinated practical field exercises, which draw together multiple agencies and different sectors and where vulnerable persons as a group are actively included. The guidance of a psychologist who has to be involved in this type of joint training activities may also be beneficial.

## Key Recommendation 6

To verify the functionality of SOPs in terms of how they may impact of vulnerable persons, it would be most advantageous to create a comprehensive exercise on CBRN incidents where the number and nature of victims are designed to stretch the capacities of the rescue units. Such an exercise should examine the following procedures:

- How to communicate with and respond to affected persons when wearing PPE, including interacting with people from vulnerable groups;
- How to perform a sensory examination of unconscious persons while wearing PPE;
- Specifically, how to perform the initial triage inside the Hot Zone (“first” or “toxic” triage);<sup>3</sup>
- How to evacuate affected people, including vulnerable individuals, from the Hot Zone;
- How to decontaminate the affected persons, in particular those who are persons from vulnerable groups, under stress or are injured;
- How to conduct triage after decontamination;
- Cooperation in the passage of information concerning vulnerable individuals between individual response agencies/organisations and hospitals/places of safety.

Exercises which are focused on the evaluation of these issues can reveal problems within SOPs and their implementation in responders training that may not be noticeable on paper. The lessons learned from these exercises could then be used to modify procedures and their SOPs.

## 6.2. General Recommendations for SOPs and Best Practice

A number of recommendations of a more general nature were identified from the Projects analysis of data in CBRNe related SOPs, the online CBRNe Questionnaire and at the sessions of the PSAB workshop. They are listed below:

- Visual communication resources should be promoted through SOPs and in practical use. They should include aide memoires, checklists, bullet points, charts and schemes and be used for incident briefing, situational awareness, communication (internally and to the public);
- Debriefing of exercises should be widely shared;

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<sup>3</sup> We acknowledge that triage is important as a whole and is a continuous process that will be performed in the field from the hot to the cold zones. This recommendation emphasizes the challenges that may arise in the hot zone triage because there are often not specially trained responders in relation to vulnerable groups.

- Lessons Learned should become Lessons Implemented as part of a dynamic process to constantly update SOPs;
- Harmonisation or possible standardisation of specific elements should be done through the sharing of best practices, during international joint exercises and through programmes of exchange for instructors;
- All response activities should be regularly updated according to the latest scientific knowledge;
- There should be full cooperation between individual units. If necessary, it should be statutory or even set out in law, to ensure all involved organisations comply;
- Proper preparation for a CBRN event is a major challenge, so it is necessary to conduct joint exercises regularly;
- Joint exercises require interoperability between all involved units and organisations;
- Relevant documents, handbooks, manuals etc. should be used to inform the CBRNe response, training activities, etc. NATO, OPCW, EU, national organisations, etc. all have their own documents. The analysis of suitable documents could be carried out in the framework of one or more EU projects;
- Joint exercises and training activities should be based on the same rules as own response: one leading organisation, proper coordination, everybody has to know his/her tasks and duties, rules must be set up etc.;
- The main training coordinator should have an overview of involved organisations, should know their strengths and weaknesses, and set up the training event just from their best parts (every organisation has a strong specificity, knowledge of which will help others to improve);
- Unification of basic rules enables the harmonization of approaches to strategic operational issues, such as types of training and regional or international cooperation. More detailed aspects of tactics, techniques and procedures, such as specialised local responses and activities should be the responsibility of individual organisations. In this way, diversity of resources and experience will smoothly integrate with wider and higher-level responses when required.
- Detection, sampling and the transport of samples should be performed according to standard procedures which should be mandatory for all participating organisations.

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## 8. APPENDICES

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- A:** Invitation letter of survey
- B:** Questionnaire of the online survey
- C:** Questionnaire of PSAB workshop quiz

## 9. APPENDIX A – PARTICIPANT INFORMATION SHEET OF IDENTIFICATION AND ANALYSIS OF SOPS SURVEY

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### PARTICIPANT INFORMATION SHEET

PROACTIVE Project Ethics Officer Approval Reference: PROACTIVE/PEO/7/11/12/2020

#### Background and aims of the research activity

The goal of project PROACTIVE is to enhance societal CBRNe (Chemical, Biological, Radiological, Nuclear and explosive) preparedness by increasing first responder's ability to effectively manage large, diverse groups of people. This will be accomplished by fostering common approaches between European safety and security Practitioners, in particular Law Enforcement Agencies (LEAs) and CBRNe First Responders. These are to be evaluated and validated against the needs and requirements of the civil society, especially considering vulnerable groups of citizens. These groups reflect the most important societal aspects, in line with the European Security Model (e.g. perception of security, possible side effects of technological solutions, gender- and age-related behaviour, and disabilities).

In that respect, the project PROACTIVE methodology is consultation with Practitioner-Stakeholders (e.g. Law Enforcement Agencies, CBRNe First Responders) and Citizens (through appropriate methods such as surveys, interviews and focus groups), followed by detailed examination of selected tools and procedures and the subsequent provision of three field exercises to evaluate their effectiveness via an effective, realistic, legal and ethical research platform.

This study is funded by the project no 832981 PROACTIVE  
(project funded by the European Commission).

#### Why is this research being conducted?

As part of the project PROACTIVE, Population Protection Institute (integral part of Czech Fire Rescue Service DG) is conducting a survey among law enforcement agencies and first responders (e.g. fire brigades, health services, civil protection) in multiple European countries. The survey will touch upon to an analysis of SOPs for CBRNe incidents which are important for a successful coordinated response to CBRNe threats. Special emphasis will be put on consideration of vulnerable citizens preparedness in procedures and guidelines. The survey will analyse commonalities and differences in SOPs for and responding to CBRNe incidents. It will provide an up to date picture of the state of CBRNe response defined in the procedures and guidelines across European countries.

## Why have I been invited to take part?

You have been invited because you work in one of the above mentioned fields. Even if you have no or little experience with CBRNe incidents, your information will be of great interest. In the following we will describe the criteria for participation in the survey:

- You work as either LEA (Law Enforcement Agent) or First Responder.
  - o The survey focuses on **LEAs** with knowledge of SOPs and guidelines.
  - o The term **fire fighter** refers to volunteer and professional practitioners. The survey focuses on fire fighters with knowledge in CBRN field SOPs and guidelines.
  - o **Health professionals** primarily refer to first responders and their management and training level. This includes paramedics, emergency physicians and doctors in the outpatient emergency department, as well as their nurses, psychological first-aiders, trainers and comparable emergency personnel. The survey focuses on health professionals with knowledge in the field of CBRNe countermeasures. This includes for example leading emergency physicians and chiefs of emergency response on site and the like. Additionally, CBRNe response and prevention instructors and certified rescue service training centre instructors are of great concern.
  - o **First Responders** include members active in civil protection agencies like the German Technical Relief Agency (THW), French Sécurité Civile or emergency psychosocial services like Crisis Intervention Teams.
  - o Sectors that are not involved in emergency situations are not taken into account. These include, for example, nursing care for the elderly, rehabilitation, General Practitioner surgeries and the like.
  - o Participants of the same organisation should command a post that reflects a considerably different management responsibility (e.g. emergency operators, vehicle crew members, crisis action committee personnel, instructors, personnel in crisis concept development and research).

## Do I have to take part?

No. You can ask questions about the research before deciding whether to take part. If you do agree to take part, you may withdraw yourself from the survey at any time during the completion of the survey without giving a reason.

## What will happen to me if I take part in the research?

If you are happy to take part in the research, you will be asked to complete the online questionnaire, which initially contains identification of your response agency and the state of origin. In the further parts of the survey, participants are asked about scene management, crisis communication, decontamination and other key elements of CBRNe response in the field, which are covered in the guidelines and SOPs.

The survey should take a maximum of 15 minutes. **The deadline for participation is the 6<sup>th</sup> of January, 2021.**

### Are there any potential risks in taking part?

As in other research projects, there is a risk - however small - of data being lost or stolen. To reduce possible risks, we will not collect any personal data in the questionnaire. The data is anonymous data. The research team at German Police University has access to the data. The research team's computers are protected by a firewall and secure passwords. To minimise the risk of data loss, regular backups of the data are made.

### Are there any benefits in taking part?

By participating in the online survey, participants contribute to improving knowledge about CBRNe experiences, CBRNe preparedness measures and CBRNe response measures in their countries. This knowledge can be used to identify areas where there is potential for improvement or intentional harmonisation.

### What happens to the data provided?

The information you provide during the study is the research data. The data is used only for scientific purposes. If you provide SOPs and guidelines for analysis they will not be shared outside research team of the Population Protection Institute. The data will be used to prepare a report for the European Commission, which will provide an up to date picture of the state of CBRNe preparation and readiness to respond across European countries. Reports will be reviewed by security board of the project for sensitive content which could be reported in special regime. Responsible members of the Project PROACTIVE may be given access to data for monitoring and/or audit of the research.

### Will the research be published?

The research may be published in academic publications and on the PROACTIVE project website.

### Who has reviewed this study?

This study has been received ethics clearance through the Project Ethics Officer of Project PROACTIVE (Reference number: PROACTIVE/PEO/7/11/12/2020).

## Data Protection

No personal data will be collected or used for the research. Although Recital 26 of the GDPR clearly states that the obligations outlined in the GDPR do not apply to anonymous data, all data processed as part of the research will be processed securely.

## Who do I contact if I have a concern about the study or I wish to complain?

If you have a concern about any aspect of this study, please contact Alan Gavel ([alan.gavel@ioolb.izscr.cz](mailto:alan.gavel@ioolb.izscr.cz)) or Tomáš Kroupa ([tomas.kroupa@ioolb.izscr.cz](mailto:tomas.kroupa@ioolb.izscr.cz)) the PROACTIVE PEO: Irina Marsh ([irina.marsh@cbrneltd.com](mailto:irina.marsh@cbrneltd.com)) or the Data Protection Officer of the Population Protection Insititute: Kateřina Nováková ([Katerina.novakova@ioolb.izscr.cz](mailto:Katerina.novakova@ioolb.izscr.cz)), and we will do our best to answer your query. We will acknowledge your concern within 10 working days and give you an indication of how it will be dealt with.

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 832981



## 10. APPENDIX B – QUESTIONNAIRE OF IDENTIFICATION AND ANALYSIS OF SOPS SURVEY

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In which country is your organisation located?

.....

Which of the following sectors do you belong to: Law Enforcement Agency (LEA), Fire Brigade, Health Service, Civil Protection, Military, Other

.....

Please provide your e-mail address if you wish to allow us to contact you for further clarification of answers. The provision of your e-mail address is of course voluntary:

.....

1. Are there any **statutory** documents for response agencies which contain a list of policies and procedures of different organisations involved (interoperability, determination of leadership, specification of the capabilities of the institutions, etc.)?
  - a. Yes but I can't share them
  - b. Yes and I am willing to share them
  - c. No
  - d. I don't know / I prefer to skip this question
  
2. Does each **response agency** have its own documents for dealing with an intervention?
  - a. Yes but I can't share them
  - b. Yes and I am willing to share them
  - c. No
  - d. I don't know / I prefer to skip this question
  
3. Is the safety of all responders entering a hot zone (safety check, protection level, entry/exit registration etc.) the responsibility of an individual (leading) body? In any event please provide details.
  - a. Yes
  - b. No
  - c. I don't know / I prefer to skip this question

4. Is there a precise procedure for dealing with evidence during a CBRN incident?
  - a. It is only generally stated that taking evidence should be taken into account, priority is given to saving lives
  - b. Leading body is responsible for forensic aspects and organises interventions to prevent liquidation and decontamination activities that destroy evidence
  - c. There are additional documents and/or details that I am willing to share later
  - d. Other (please specify): \_\_\_\_\_
  - e. I don't know / I prefer to skip this question
  
5. The triage of affected persons is performed by:
  - a. Responders of a rescue body operating directly in the hot zone (non-medical responders)
  - b. Medical personnel who are specifically trained to enter a hot zone
  - c. Performed by decontamination staff prior decontamination
  - d. Other (please specify): \_\_\_\_\_
  - e. I don't know / I prefer to skip this question
  
6. Who is the personnel that is specially trained in taking care of vulnerable groups (blind persons, deaf persons, persons with mental health conditions, children etc.) during the CBRN response?
  - a. Responders in the hot zone
  - b. Staff at decontamination site
  - c. Psychologist professional or similarly trained personnel in the cold zone
  - d. All responders are trained
  - e. There is no trained personnel
  - f. Other (please specify): \_\_\_\_\_
  - g. I don't know / I prefer to skip this question
  
7. Is communication with the media specified in SOPs?
  - a. Yes but I can't share them
  - b. Yes and I am willing to share them
  - c. No
  - d. I don't know / I prefer to skip this question
  
8. Are procedures in place for securing, decontaminating and returning valuables, documents, weapons and sensitive equipment during and after a CBRN response specified in SOPs?
  - a. Yes but I can't share them
  - b. Yes and I am willing to share them

- c. No
  - d. I don't know / I prefer to skip this question
9. Are there any guidelines in the SOPs for decontamination of vulnerable groups?
- a. Yes but I can't share them
  - b. Yes and I am willing to share them
  - c. No
  - d. I don't know / I prefer to skip this question
10. Are there any guidelines for the registration of all affected persons who are leaving the place of incident?
- a. Yes but I can't share them
  - b. Yes and I am willing to share them
  - c. No
  - d. I don't know / I prefer to skip this question
11. Are there any guidelines for notifying catchment hospitals in adjacent areas in case of a CBRN event?
- a. Yes, but only for possible spontaneous arrival of affected persons
  - b. Yes, for possible spontaneous arrival of persons as well as for presence of vulnerable groups requiring special care
  - c. No
  - d. Other (please specify): \_\_\_\_\_
  - e. I don't know / I prefer to skip this question
12. Are there procedures to effectively evaluate decontamination of individuals from C, B, R&N agents?
- a. Yes but I can't share them
  - b. Yes and I am willing to share them
  - c. No
  - d. I don't know / I prefer to skip this question
13. Are there any national guidelines on how to identify and engage with vulnerable people during an intervention?
- a. Yes but I can't share them
  - b. Yes and I am willing to share them
  - c. No
  - d. I don't know / I prefer to skip this question



14. Are there any educational materials for responders teaching them about communicating with vulnerable people?

- a. Yes but I can't share them
- b. Yes and I am willing to share them
- c. No
- d. I don't know / I prefer to skip this question

15. Are there any specific procedures for direct communication with vulnerable people during CBRN incidents (e.g. pictograms, visual aids, sign language)?

- a. Yes but I can't share them
- b. Yes and I am willing to share them
- c. No
- d. I don't know / I prefer to skip this question

16. For which groups of vulnerable persons are communication resources available? You can select more than one answer below. Please check all that apply.

<input type="checkbox"/> Children	<input type="checkbox"/> People with no or insufficient language skills of the national language
<input type="checkbox"/> Mentally ill people	<input type="checkbox"/> Other (please specify): _____
<input type="checkbox"/> Visually impaired people	<input type="checkbox"/> None
<input type="checkbox"/> Hearing impaired people	<input type="checkbox"/> I don't know / I prefer to skip this question

17. Who communicates (instructions, helpful conversations) with vulnerable people at the place of intervention? You can select more than one answer below. Please check all that apply.

- a. Law Enforcement Agency (LEA)
- b. Fire Brigade
- c. Ambulance
- d. Nonprofit organisations
- e. Other (please specify): \_\_\_\_\_
- f. I don't know / I prefer to skip this question

18. Do first-responders (police, firefighters etc.) train and exercise such type of communication?

- a. Yes (please indicate how often and in what way, e.g. with people with disabilities \_\_\_\_\_ or \_\_\_\_\_ with actors): \_\_\_\_\_
- b. No
- c. I don't know / I prefer to skip this question

19. Is there any information on the presence and needs of vulnerable people within geographic areas (such as numbers, types of disability) available at the Dispatch Operations Centers?

- a. Yes (please indicate for whom it is provided; e.g. institutional facilities, sheltered \_\_\_\_\_ housing, individuals): \_\_\_\_\_
- b. No
- c. I don't know / I prefer to skip this question

20. Are there procedures for warning vulnerable groups in a given area during large-scale events?

- a. Yes (please indicate in what way; e.g. television broadcasting in sign language, \_\_\_\_\_ SMS \_\_\_\_\_ for \_\_\_\_\_ the \_\_\_\_\_ hearing impaired) \_\_\_\_\_
- b. No
- c. I don't know / I prefer to skip this question

**Thank you very much for your participation. If you have any questions, please do not hesitate to contact us.**

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To keep on track with our Project outcomes you are more than welcome to join our **Practitioner Stakeholder Advisory Board (PSAB)** or follow us on our social media accounts. For more information, please visit us on:

## 11. APPENDIX C – PSAB WORKSHOP CBRNE SOPS QUIZ

### QUESTIONNAIRE

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1. Please define your role:
  - a. Non specialist first responder
  - b. CBRNe specialist responder
  - c. Initial response scene commander
  - d. Other subject matter expert
2. Do non specialist first responders have training in the initial response to CBRNe incidents?
  - a. All of them (obligatory)
  - b. Some of them
  - c. None of them
3. Is there detection (indication) capability among responders who arrive obviously first in incident for recognition of CBRN hazard?
  - a. Yes.....
  - b. No.....
4. If Yes, please specify group of agent (C, B, R&N, e) they can detect.
  - a. C
  - b. B
  - c. R&N
  - d. e
5. If no, is it available for deployment at the scene?
  - a. Yes.....
  - b. No.....
6. Do you have a field laboratory that can be deployed to the scene for rapid analysis?
  - a. Yes.....
  - b. No.....
7. Which rescue body performs an **initial detection** of unknown substances:
  - a. Fire Brigades
  - b. Medical
  - c. Legal Enforcement Agency
  - d. Military
  - e. Other
8. Which rescue body performs **sampling** of unknown substances:
  - a. Fire Brigades
  - b. Medical
  - c. Legal Enforcement Agency
  - d. Military
  - e. Other
9. Is detection of a CBRN substance in the field and its subsequent analysis in the laboratory provided by the same organisation?
  - a. Yes.....
  - b. No.....
10. Is the detection and sampling of unknown substances carried out by the same organisation in the event of a terrorist attack (generally for forensic purposes) as in the case of an unintentional substance leak or industrial accident?
  - a. Yes.....
  - b. No.....

11. Please specify organisation which perform detection and collection of unknown substances **for forensic purposes**

- a. Fire Brigades
- b. Medical
- c. Legal Enforcement Agency
- d. Military
- e. Other

12. Are there organisations that develop methodological procedures for the correct detection and sampling of substances in CBRN incidents by the first-responders' units? Please specify organisation or just indicate Yes/No.

(free text)

13. Are those methodological procedures (Q12) compulsory for all organisations that are involved in a CBRN incident?

- a. Yes.....
- b. No.....

14. On what level is the response to a CBRN event managed and coordinated within your country:

- a. nationwide
- b. regionally (federal state, region)
- c. locally (district / generally smaller than region)
- d. depends on the type of incident

### Perception of CBRNe SOPs

15. Do you find SOPs relating to CBRN events easy to read and understand?

- a. Yes.....
- b. No.....

16. What would improve the readability of SOPs?

(Free text)

17. Do SOPs give you the information you need to communicate with, and manage, members of the public?

- a. Yes.....
- b. No.....

18. What additional information would you like them to include?

(Free text)

19. Do SOPs include enough information relating to the needs of vulnerable groups?

- a. Yes.....
- b. No.....

20. What additional information would you like them to include?

(Free text)

21. Do SOPs give you the information you need to deal with incidents?

- a. Yes.....
- b. No.....

22. What additional information would you like them to include?

(Free text)

23. Do you find SOPs useful during incidents/ exercises?

- a. Yes.....
- b. No.....

24. How could SOPs be improved so that they promote best practice in incidents/exercises?

(Free text)

25. Would you want greater standardisation of SOPs across countries?

a. Yes..... b. No.....

26. If so, how best could this be achieved? If not, why not?

(Free text)