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Deliverable D1.3

Guidelines and recommendations for mitigation and management of CBRNe terrorism

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Project details

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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	RINISOFT	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	PHE	DEPARTMENT OF HEALTH	UK
13	SPL	STATE POLICE OF LATVIA	Latvia
14	AGS	AN GARDA SÍOCHÁNA – NATIONAL POLICE FORCE IRELAND	Ireland
15	FFI	FORSVARETS FORSKNINGSINSTITUTT	Norway
16	NPH	KOMENDA GŁÓWNA POLICJI	Poland

Executive summary

The following deliverable is the third of the three set for the PROACTIVE project for WP1 – Human factors analysis of preparedness and response. In line with the activities of Task 1.3 and the requirements of D1.3, this deliverable collates outcomes from D1.1 and D1.2, specifically concerning both current policy and practice for mitigation and management of CBRNe terrorism, and the current state of the art of peer reviewed literature on this subject.

The outcomes from these deliverables are synthesised using a Realist framework approach, alongside: a) input from subject matter experts (e.g., research specialists, public health practitioners, emergency responders, and representatives from other health and security-related organisations), and; b) findings and outcomes from other relevant research projects (i.e., grey research literature). This synthesis is structured to facilitate greater understanding of the following topics that are of critical importance to the PROACTIVE project: current policy and practice in the mitigation and management of CBRNe terrorism; public perceptions of current mitigation and management strategies for CBRNe terrorism; and factors that affect public willingness to comply with recommended preventative and protective measures for CBRNe terrorism.

Following the presentation of key outcomes from this synthesis, the deliverable also presents a series of recommendations for effective policy and practice in the mitigation and management of CBRNe terrorism. Key recommendations include: guidance documents should seek to be uniform in instruction, particularly when released in the same country; information campaigns and education to build CBRNe public knowledge should be implemented; and multiple platforms should be used to communicate with the public [in the event of a CBRNe incident], showcasing consistent and uniform information. Next steps for the incorporation and operationalisation of these recommendations throughout the PROACTIVE project are also discussed.

List of acronyms

Acronym	Definition
EU	European Union
CBRNe	Chemical, Biological, Radiological, Nuclear, and explosive
T	Task
M	Month
D	Deliverable
WP	Work Package
NHS	National Health Service
SOP	Standard Operating Procedure
PSAB	Professional Society Advice Board
CSAB	Citizen Society Advice Board

Acknowledgements

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1. INTRODUCTION

Work Package 1 of the PROACTIVE project is concerned with conducting a human factors analysis of preparedness and response with regards to CBRNe terrorism in Europe and beyond. In broad terms, this work package aimed to: a) examine the peer-reviewed literature to identify and understand factors associated with effective preparedness (including pre-incident information) and response of such incidents (D1.1), and; b) examine current CBRNe preparedness and response policy and practice across the EU (D1.2). Following the thorough and systematic review of these documents, Work Package 1 has focused on conducting a synthesis of the academic state of the art and current best practice to identify gaps and requirements that will help to develop recommendations for an optimised strategy for CBRNe terrorism preparedness, mitigation and management.

Conclusions and recommendations proposed by both D1.1 and D1.2 are examined within this deliverable to allow for the generation of ultimate recommendations for effective policy and practice in the mitigation and management of CBRNe incidents (including terrorism) which are consistent across academic literature, current policy and practice, findings from previous EU projects, and expert opinion (from consortium discussion and stakeholder review). Additionally, this deliverable also integrates the outcomes of a parallel stakeholder engagement exercise, to outline best case and worst case CBRNe scenarios (in terms of their impact on public behaviour). In this way, D1.3 can ultimately:

(i) establish the current state of the art in regard to the current policy and practice for mitigation and management for CBRNe incidents;

(ii) improve knowledge of current policy and practice in the mitigation and management of CBRNe terrorism, public perceptions of current mitigation and management strategies for CBRNe terrorism, and factors that affect public willingness to comply with recommended preventative and protective measures for CBRNe terrorism;

(iii) reveal the role of human factors and provide insights into behavioural research regarding CBRNe incidents; and

(iv) facilitate identification of the worst possible attack scenarios and generation of recommendations for effective policy and practice in the mitigation and management of CBRNe terrorism.

2. METHOD

This section describes the method and sources used to address the aims of D1.3, to establish both current policy and practice for the mitigation and management of CBRNe incidents and the current state of the art, by collating and reviewing D1.1 and D1.2. Additionally, the process for the extraction of data and how the sources were synthesised is described.

2.1. Sources

2.1.1. D1.1

D1.1 [1] presented the findings from a review of academic literature relating to public perceptions of pre-incident preparedness, and during-incident response (e.g., management strategies), for CBRNe events (including terrorism). Specifically, this review detailed:

(i) the baseline level of knowledge and understanding of CBRNe prevention and management strategies within the general population;

(ii) (ii) factors that are associated with effective pre-incident public information campaigns for CBRNe terrorism;

(iii) (iii) factors that may increase public compliance with both recommended prevention measures (prior to an incident occurring) and recommended protective measures (during an incident); and

(iv) (iv) documented further insights from literature concerning other types of incidents which may be of relevance for CBRNe preparedness.

In order to provide a thorough review of the literature, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework [1] was followed. This resulted in a detailed process (fully reported in D1.1) which consisted of: explaining the process of criteria selection, use of information sources, the search strategy, study selections, data selection, quality assessment and analytical model choice. Once data was extracted from the retained papers, it was categorised by the aims of the review (e.g. identify factors that are associated with effective pre-incident public information campaigns for CBRNe terrorism). Thematic analysis was then used to analyse the categorised information which resulted in the emergence of themes apparent to each aim, which was used to structure the results.

Following the synthesis of results, it became apparent that the general public's current understanding of CBRNe prevention and management strategies is very low. Across literature there was consensus that official protective and preventative recommendations are often misunderstood, complex and confusing to the public. Factors associated with effective pre-incident communication included the use of non-complex language, dissemination across multiple platforms, delivery using a credible source, and incorporation of psychological constructs that aim to reduce threat and anxiety. Factors which have the potential for increasing willingness to engage in pre-incident and preparedness information, included: demographics, prior knowledge and psychosocial factors. Factors which have the potential to increase compliance with official instruction during an incident, included: trust; provision of information; emotional responses; efficacy; and relationships.

From the review carried out in D1.1, recommendations were compiled for both: communicating during an incident (including the identification of factors which are associated with compliance) and delivering effective pre-incident information. These initial recommendations are presented in Appendix 6.1. Due to D1.1 focusing on public perceptions of pre-incident preparedness, and during incident response, for CBRNe events, the derived findings and insights (including proposed

recommendations) are more specifically suited to human and social aspects. Additional details can be found in Tables 1 & 2.

2.1.2. D1.2

D1.2 [2] presented a review of guidance documents relating to CBRNe incident management to facilitate insight into:

(i) current policy and practice in the preparation for and management of CBRNe terrorism in different organisations and across different countries;

(ii) (ii) current guidance and strategies for communicating with members of the public about CBRNe preparation and management; and

(iii) (iii) the impact of current policy and practice in the preparation for and management of CBRNe terrorism on members of vulnerable groups.

Search of open literature (using advanced Google search, target website search, consultation with project partners and grey literature data base search) and the iterative inclusion process resulted in 95 guidance documents from across 18 different countries. Once data was extracted from the documents, it was categorised using a Framework approach, which was chosen due to its ability to identify commonalities and differences in qualitative data and has a focus on identifying relationships between different parts of the data [2]. The process then involved framework identification (i.e. a priori themes derived from current research, e.g. communication strategy), data coding (i.e. applying labels to information to categorise by theme), and data interpretation (i.e. comparing codes within themes to establish commonalities and differences) [2].

Although evidence shows that it is important to be mindful of the psychosocial aspects of CBRNe management, this review of guidance, SOPs and policy documents shows that this is rarely reflected when planning for these kinds of incidents. There is a need for guidance and policy to be updated across Europe to reflect the importance of recognising psychosocial aspects of CBRNe response. In addition, there are worrying discrepancies in advice in guidance documents both within and between countries, therefore highlighting a need for these discrepancies to be reviewed and updated to ensure consistency in response.

From the review carried out in D1.2, recommendations were compiled to optimise and harmonise guidance and policy documents which relate to CBRNe incidents. These initial recommendations are presented in Appendix 6.2. Due to D1.2 focusing on guidance documents to establish current policy and practice relating to CBRNe events, the derived findings and insights (including proposed recommendations) are more specifically suited societal and organisational aspects. Additional details can be found in Tables 1 & 2.

2.2. List of initial factors derived from D1.1 and D1.2

As a result of the thorough analysis (using systematic review methods) carried out as part of D1.1 and D1.2, several human factors and social, societal and organisational aspects which are relevant for the PROACTIVE project have become apparent. Table 1 displays the factors from D1.1 (which

mainly consisted of human factors and social aspects, due to the emphasis on public perception of CBRNe incidents) and D1.2 (which mainly consisted of societal and organisational aspects, due to the emphasis on current guidelines and recommendations). As can be seen from the table, several of these key aspects relate to various different aspects of the PROACTIVE project (for example, the credibility of the source, depending on the source, can be a social consideration but also an organisational and societal one).

Table 1: Key aspects derived from D1.1 and D1.2

Source	Aspect	Categorisation
D1.1	Credibility of source	Social/ organisational/ societal
D1.1	Mode of dissemination	Social/ organisational/ societal
D1.1	Public level of baseline knowledge (i.e. can be increased through education)	Human factor
D1.1	Trust and legitimacy	Human factor/ social
D1.1	Provision of information	Social/ organisational/ societal
D1.1	Emotional responses (e.g. fear or anxiety, sense of hopelessness or dread)	Human factor
D1.1	Efficacy	Human factor
D1.1	Relationships (i.e. ensuring safety of loved ones)	Social

D1.2	Guidance is lacking in current evidence-based advice on public response to CBRNe incidents	Organisational
D1.2	Communication strategies for first responders are highly important	Organisational
D1.2	Strategies for managing vulnerable groups are lacking	Organisational
D1.2	Consistency should, where applicable, be applied across guidance documents	Organisational

2.2.1. Additional Sources

Additional sources were also included within this synthesis to further inform the recommendations for effective policy and practice in the mitigation and management of CBRNe incidents (including terrorism), and to provide robustness to any recommendations made. These included previous related project deliverables and reports from previous related projects, as well as expert opinion (established through Consortium discussion and PSAB focus group teleconference).

The PROACTIVE proposal details key projects (copied into Appendix 6.3) that we were able to draw upon in order to further inform our recommendations. Gaining access to the reports and deliverables presented by the additional projects was carried out using a variety of methods, which included: contacting Consortium members who had previously worked on the projects for either a list of completed deliverables, or to provide signposting to a point of contact who was able to provide this; accessing completed public deliverables online through the project website platforms; and contacting researchers working on the project directly through the website. As a result, we were able to access some of the finalised deliverables and reports completed by these projects. Those whose aims were relevant to the aims of D1.3 are detailed in Appendix 6.4 and were used within the synthesis.

A full Consortium meeting took place on the 14th and 15th of January 2020 in London. As part of this meeting, Consortium partners were asked to provide feedback on the recommendations proposed in D1.1 and D1.2. Feedback was received both verbally, and through annotated handouts, and has subsequently been used to inform this synthesis. A file detailing the information provided by the Consortium, and which was used within the synthesis, can be found in Appendix 6.5.

On the 12th of February 2020 a virtual focus group took place with members of the PSAB to establish professional stakeholder opinion (i.e. whether recommendations were fit for purpose, and whether any additional recommendations could be identified) regarding the recommendations proposed by D1.1 and D1.2. The participants consisted of 18 professionals from a range of backgrounds (i.e. CBRNe experts, first responders, rail experts and law enforcement agencies) and countries (UK, USA, Turkey, The Netherlands, Spain, Poland, Israel, Germany and Belgium). Feedback was received verbally from participants that were able to take part in the focus group, and also though

email and instant messages from those who were experiencing technical issues. Additionally, one member of the PSAB provided feedback via email as they were unable to attend the virtual focus group. Where PSAB members provided feedback relating to a particular recommendation, this is reflected alongside information relating to the current guidance. A file detailing the information provided by the PSAB can be found in Appendix 6.6. A parallel stakeholder engagement activity co-ordinated by Frank Long, a PhD student at Imperial College, London, used a one-day workshop with experts from emergency service, health and Government organisations to identify factors that result in the best and worst case CBRNe scenarios (in terms of impact on public behaviour). These scenarios were then reviewed by the PSAB. Outcomes from the stakeholder engagement workshop are presented in Appendix 6.7.

2.3. **Data Synthesis**

Data was synthesised using a Realist framework approach, which is composed by the following steps: 1) clarify the purpose of the review, in this case to provide recommendations for effective policy and practice in the mitigation and management of CBRNe terrorism); 2) gather evidence (i.e. findings from D1.1 and D1.2 and expert stakeholder opinion); 3) extract data and synthesise findings using an iterative process; and 4) develop narrative [3]. This method was chosen for its tailoring towards health education, and its efficacy in informing research examining policy questions in complex contexts [4]. The goal of this approach is to ascertain: what it is that works, for who, in what circumstances, in what respects, and why [4]. Additionally, the use of a framework approach was also used within both D1.1 and D1.2, due to the ability to identify commonalities and differences in qualitative data and has a focus on identifying relationships between different parts of the data [2]. An a priori framework was established by the main reviewer, and data was extracted from multiple sources and synthesised in relation to each point. The framework identified was based on the review of guidance and policy (D1.2), with themes including: preparedness for and response to a CBRNe incident: responder guidance and public understanding; how to communicate with members of the public; likely public behaviour during a CBRNe incident; factors associated with compliance; and guidance on strategies for managing vulnerable populations during a CBRNe incident. Data was extracted relating to each section and themes emerged from the data. The process was iterative, as categories and themes were revised, and new themes were created when necessary to ensure maximum saturation using the available data. The ultimate aim of the synthesis was to ensure that the findings and recommendations from D1.1 and D1.2 were fully incorporated in this deliverable to identify commonalties and points of divergence between best practice (i.e. findings from D1.1 of academic literature) and current practice (i.e. findings from D1.2 of current guidance). Additionally, this deliverable also sought to include additional sources (e.g. previous related EU projects and expert opinion); the framework used to synthesis the information provided the opportunity to do this and allowed for a thorough examination of gaps between best and current practice which are detailed within the subsequent sections.

3. RESULTS AND DISCUSSION

3.1. Preparedness for and Response to a CBRNe Incident: Responder Guidance and Public Understanding

The review of 95 guidance documents from 18 different countries (D1.2) revealed that there are a range of response management strategies considered, consisting of: evacuation, disrobing, wet and dry decontamination, re-robing, lifesaving treatment and shelter in place [2].

Guidance differed widely across documents, and this was apparent for each suggested strategy. For example: recommended evacuation time ranged from immediately [5], to within 15 minutes [6]; disrobing ranged from 'just the outer layers of clothing' [7] or 'all clothing' [8]; wet decontamination ranged from using 'moist wipes or damp towels' [9] to 'taking a shower' [10]; dry decontamination ranged from recommending that 'dry decontamination should always be followed by wet decontamination' [11] and 'dry decontamination is the default method in the UK for non-caustic substances' [12]; re-robing ranged from 'putting on fresh clothes' [12] to 'shake or brush off clothes and put them back on [9]'; lifesaving treatment ranged from 'patients should be decontaminated before treatment, unless their condition is life threatening' [13] to 'decontamination should occur in parallel with triage and the provision of life-saving interventions' [14]; reasons for issuing a shelter in place notice consisted of 'when evacuation is not immediately necessary' [14] to 'if already in a safe location at the time of the incident' [15].

Overall, there were clear inconsistencies between guidance documents in terms of the information provided; this was not only the case between guidance documents from different countries but was also apparent from documents released within the same country (e.g. decontamination duration; [7, 16]. The PSAB highlighted that part of the reason for this may be due to differences in diverse healthcare systems across and within countries, as well as any current laws or obligations.

Within academic literature, however, there was a clear consensus that the public are under educated, in relation to a wide range of incident management strategies (including security signals and shelter in place as a concept [1]). Evidence suggests that there are a range of public misconceptions in relation to CBRNe incidents (e.g. 27, 28), and that the public often view official prevention and management strategies as confusing and unclear (e.g. shelter in place [17-19]), Homeland Security Colour System [20] and potassium iodide campaigns [21, 22] due to complexity and a lack of knowledge [23, 24].

Evidence also suggests that there are a range of factors which may influence the way in which members of the public engage in preventative measures, including: demographics (e.g. there were associations apparent between living in a location more likely to experience CBRNe incidents [25] with a higher knowledge level and concern with future events [19]); psychosocial factors (e.g. such as a sense of dread [26, 27] or increased risk [28] will positively influence public compliance with preventative measures); and current level of knowledge (e.g. if people do not have a certain level of knowledge, communicated messages will not trigger the needed attention to be heard or recalled [29]). Furthermore, academic literature demonstrates that knowledge level can be increased (e.g. by watching television reading newspapers and internet use [30, 31], and engagement with informational resources [32, 33]), which will enable a higher proportion of the public to engage in

preventative measures, and be better prepared should a CBRNe incident occur. However, further research is needed to better understand the variable levels of preparedness reported [21, 34-36].

3.1.1. Revised Guidelines and Recommendations

Recommendation 1: Guidance documents should seek to be uniform in instruction, particularly when released in the same country.

- **What for: Diverged instructions from authorities.** The review of guidance and policy documents demonstrated that despite detailing the same management strategies (i.e. evacuation, disrobing, wet and dry decontamination, re-robing, lifesaving treatment and shelter in place [2]), the guidance and recommendations were not necessarily consistent, even within country (e.g. decontamination duration; [7, 16]).

- **For whom:** First responders, authorities.

- **How:** These discrepancies present an opportunity to improve overall response by the sharing of best practice (i.e. in the form of hypothetical scenarios) to achieve a uniformly high level of preparedness, which was suggested by the PSAB in recent focus groups.

Recommendation 2: Information campaigns and education to build CBRNe public knowledge should be implemented.

- **What for: To build public awareness and knowledge.** Both guidance and literature have concluded that there is a lack of knowledge apparent among members of the public regarding CBRNe incidents [29] (especially towards radiological events; [23, 24]).

- **For whom:** First responders, authorities.

- **How:** There are methods which could be used to increase the level of public understanding including training programs (for example, including how to distinguish real from fake news; PSAB) and practical based education (e.g. drills to demonstrate practicalities associated with CBRNe incidents; PSAB; [37]).

Recommendation 3: Messages should be pitched at an appropriate level (in terms of language and complexity).

- **What for: To maximise public engagement.** It is essential that these are pitched at an appropriate level to ensure the public can ensure maximum engagement with the material.

- **For whom:** First responders, authorities.

- **How:** Adopt layman's terms in regards to language and complexity (e.g., [36, 38, 45].

3.2. How to Communicate with Members of the Public

The review of guidance documents (D1.2) revealed that 53 of the 95 documents provided guidance on how to communicate with the public. Synthesis of current guidance with current academic literature (D1.1) paired with findings from previous related projects (including findings from: CascEff,

IMPACT, PIRATE, TOXI-TRIAGE) and input from the PSAB focus group revealed that there are principles which can be used to enhance official communication strategies with the public. Specifically, in relation to: overall approach, mode of dissemination, and pre-planning.

3.2.1. Overall Approach

Multiple guidance documents suggest that communication should be clear, precise and honest whilst being conveyed in an empathetic and sensitive way [2]. However, the level of detail differs between documents, which provides ambiguity toward the correct way for official sources to communicate with the public in the event of a CBRNe incident. Previous studies have concluded that best practice communication should demonstrate empathy and concern [39, 40], whilst also being both assertive and reliable [40]. Furthermore, honesty is advocated alongside acceptance of the incidents uncertainty and ambiguity ([39] also supported by PSAB input).

3.2.2. Mode of Dissemination

Only a small minority of guidance documents specifically outline the best mode of communicating with members of the public during a CBRNe incident. While some guidance documents suggest multiple different methods of communication (e.g. [41]), the documents differ in their recommended best practice, with some guidance documents recommending use of a public address system or other type of standalone system (e.g. [42]) and other documents recommending physical demonstration of certain instructions (e.g. correct disrobing procedures) to casualties (e.g. [43]).

Academic literature demonstrates that pre-incident information campaigns are more effective when advocated across multiple platforms [22]. Similarly, during a CBRNe incident, it is suggested that a multi-channel dissemination method should be used ([44, 45] also supported by PSAB and Consortium discussion). Additionally, as information is often sought by the public using multiple sources, with the aim of corroborating information [44], it is important that the information is consistent across all used platforms [45].

Literature has established that pre-incident information is often disseminated using written communication (i.e. leaflets and informational texts; [38, 46]), and is positively viewed by the public [19, 46, 47]. Specifically, the preference for written information stems from the ‘concrete’ nature [46], and the inability for retraction from official sources for political reasons, which ultimately provides an air of credibility [44]. Information disseminated using written methods (i.e. print) has also been recommended as one of the most trusted and authoritative sources within the context of an incident [48]. Written text should aim to avoid using complex language - as academic literature has demonstrated that this hinders the ability for the public to engage with such material [36, 38].

3.2.3. Pre-Planning

Pre-planned communication is recommended in two reviewed guidance documents; they suggest that both information provided to the public and communication channels should be pre-agreed ([49, 50]: also supported by [40]). Review of academic literature did not include any recommendations for pre-planning communication with the public. However, additional research has demonstrated that pre-planning can be carried out in the pre-incident phase [39] and has the potential to ensure more cohesion between agencies and work practices (as recommended by [43]).

Input from the Consortium also provided insights into the importance of pre-planning key messages to the public to ensure correct prioritisation of key messages. That is, during-incident communication provided by practitioners should be fully scripted in certain events, especially when process must be strictly followed. However, as described by the consortium, when not fully scripted, practitioners should be provided with a 'full toolkit', so they have the appropriate options to ensure that messages can be efficiently delivered to all populations tactically to enhance public response and engagement. Additionally, the PSAB highlight the possibility of proactively preparing social media campaigns as this will allow people to know where to go for trustworthy and reliable information during an event.

3.2.4. Revised Guidelines and Recommendations

Recommendation 4: Official communication should be honest, empathic, assertive and reliable.

- **What for:** To bolster trust and legitimacy. There was a consensus across academic literature and many guidance documents that communication from official sources during an incident should be honest [39], empathic [39, 40], assertive and reliable [40].
- **For whom:** First responders, authorities.
- **How:** Ensuring communication is honest, empathic, assertive and reliable.

Recommendation 5: Information should be available in writing (i.e. print form), where possible, using non-complex language.

- **What for:** The public prefer written communication [19, 46, 47] due to its concrete nature [46] and the fact that it can't be retracted once provided [44].
- **For whom:** First responders, authorities.
- **How:** Where possible, information should be available in writing using non-complex language.

Recommendation 6: Multiple platforms should be used to communicate with the public, with consistent information being provided across platforms.

- **What for:** To maximise engagement. It is important to communicate information via multiple platforms (e.g. [22], [44, 45]), ensuring that information is consistent across platforms; this will promote user engagement and will be beneficial if some information channels are disrupted as a result of the incident (i.e. if WiFi connection is unavailable).
- **For whom:** First responders, authorities.
- **How:** Information should be disseminated over multiple platforms.

Recommendation 7: Information provided by authorities should be pre-planned, where applicable, to ensure prioritisation and consistency, provide uniformity and advocate cohesion.

- **What for:** To ensure prioritisation and consistency between organisations. Evidence suggests that information should be pre-planned in order to ensure prioritisation and consistency between organisations [49, 50], provide uniformity and advocate cohesion between agencies and work practices [43].

- **For whom:** First responders, authorities.

- **How:** Pre-planning between agencies and organisations should take place to ensure consistency.

Recommendation 8: Guidance documents should provide evidence-based advice on communicating with the public which can be followed by authorities in the event of a CBRNe incident.

- **What for:** To provide evidence to aid first responders in CBRNe response. Evidence suggests that the way in which first responders communicate has the ability to drastically impact public response and compliance (see reference [63] outlined in detail in the next section). In order to maximise public compliance and perception of legitimacy, first responders should be provided with evidence-based advice on communication in the event of a CBRNe incident.

- **For whom:** First responders, authorities.

- **How:** Guidance documents should be updated to provide evidence-based advice about desirable communication strategies, including emphasising that public behaviour will be shaped by the way communication is carried out.

3.3. Likely Public Behaviour during a CBRNe Incident

The review of guidance documents (D1.2) showed that only 23 out of 95 documents provided guidance on how the public will behave in the event of a CBRNe incident. These documents varied in their approach to predicting public behaviour in the event of a CBRNe incident. Synthesis of sources reveals that academic literature (D1.1), paired with the findings from a related study (PIRATE) can help to aid in understanding public reactions to CBRNe incidents.

3.3.1. Public Reaction

There was considerable variability between guidance documents in relation to suggested public behaviours, with some documents endorsing a broadly negative view of public behaviour (e.g. disorder, panic), while others endorsed a broadly positive view (e.g. cooperation, orderly behaviour). A common suggestion across many guidance documents was that the public will be both anxious [51] and afraid [52] of CBRNe incidents.

The suggestion that members of the public will be worried and anxious about CBRNe incidents is supported by findings from academic literature, which shows that the public may be worried about potential CBRNe incidents, whether hypothetical in nature [20] or when considering the potential of future incidents [53]. Factors which prime an individual to feel fearful about or anxious towards CBRNe incidences include: previous experience of evacuation [54, 55], having child dependents [54], having a low trust in government [56], being female [53, 57], living in an urban area [53, 57, 58],

and having a low level of education [53]. Suggestions for managing public concern and anxiety include developing communication strategies that emphasise coping ability and self-efficacy [59], to ensure that the public are provided with correct information about the incident, and can make informed decisions about how best to protect themselves and others. Anxiety is also associated with willingness to comply with official instruction [59, 60], and this is explored in more detail in section 3.3.4.

Results from relevant projects suggest that, despite members of the public reporting both concern and fear, the levels were much lower than expected [44]. It was suggested that this was because the frequency of news reports resulted in the public becoming desensitised to terrorism coverage and information, at least in a hypothetical context.

Interestingly, while academic literature and project outcomes support the idea that members of the public may be anxious and fearful during CBRNe incidents [20, 53], there is no evidence that they will panic or behave in a disorderly way. Indeed, evidence suggests that members of the public typically behave in an orderly and cooperative way during mass emergencies (e.g. [61, 62]). A key finding from the literature is that the way in which emergency responders manage an incident will affect the way in which members of the public behave; if responders communicate effectively with members of the public and show respect for public needs, this will foster a positive relationship between emergency responders and members of the public, and hence promote orderly and cooperative behaviour [63].

3.3.2. Revised Guidelines and Recommendations

Recommendation 9: Responders should communicate effectively and demonstrate respect for public needs.

- **What for:** To foster a positive relationship to increase compliance. In the event of a CBRNe incident, evidence suggests a positive relationship between emergency responders and members of the public will promote orderly and cooperative behaviour [63].
- **For whom:** First responders.
- **How:** Responders should effectively manage the public, communicate effectively and demonstrate respect for the public in order to foster a positive relationship.

Recommendation 10: Guidance documents should provide evidence-based advice about likely public behaviour, emphasising that the way in which practitioners manage an incident will affect the way in which members of the public behave.

- **What for:** To provide evidence to aid first responders in CBRNe response. Evidence suggests that panic will be rare during CBRN incidents, and that people will behave in an orderly and cooperative way (e.g., [20, 53, 61, 62]). A key finding is that the way in which practitioners manage an incident will affect the way in which members of the public response [63]. However, few guidance documents describe likely public behaviour during CBRNe incidents, and there is considerable variability among those that do.
- **For whom:** First responders, authorities.

- **How:** Guidance documents should be updated to provide evidence-based advice about likely public behaviour, including emphasising that public behaviour will be shaped by the way an incident is managed.

3.4. Factors Associated with Compliance

During a CBRNe incident, it will be important that members of the public comply with recommended behaviours, in order to ensure safety of the wider population. Through synthesis of D1.1, D1.2, Consortium feedback and insights from additional related projects (PRACTICE, TOXI-TRIAGE, PIRATE and CascEff) four factors arose which are directly linked to the likelihood of an individual displaying compliant behaviour: family; provision of information; trust; and anxiety/fear.

3.4.1. Family

One of the guidance documents suggests that people will wish to trace family members who may have been involved and will want reassurance that family members and friends are accounted for and safe [64]. Academic literature supports this, showing ensuring the safety of loved ones (e.g. family, pets and friends), would have a strong impact on the level of compliance an individual would be willing to show [20, 24, 59, 60, 65].

3.4.2. Provision of Information

It is suggested within some guidance documents that most members of public will need instructions on how to behave in the context of an incident in order to enable them to carry out recommended protective actions [66].

Academic literature supports this, showing that compliance is highly affected by the provision of information. Specifically, a higher rate of compliance has been observed within a mass decontamination field experiment when practitioners provided participants with information including why decontamination was necessary, and what it entailed, in comparison to provision of basic information [67]. Additional research has concluded that in the case of a CBRNe terrorist event, information provided to the public should go beyond basic instructions [68] and should include information to provide an understanding of the basic properties of the agent involved and its medical effects, as well as informing about police or security services efforts to apprehend terrorists and the likelihood of another attack occurring [44]. The information should also be pitched at an appropriate level (i.e. layman's terms) to counter the low level of public knowledge associated with CBRNe incidents [45].

Additionally, academic research indicates that the public may seek additional treatment or health related information post event [69], which suggests that adequate information should be provided on scene to address health related concerns.

3.4.3. Trust

Some guidance documents suggest that a lack of confidence in local authorities in the context of a CBRNe incident results in panic [70]. Whilst there is no evidence in academic literature that members of the public will panic, literature does suggest that public response to information will be influenced by the level of trust associated with both the spokesperson and source [20, 59, 67], and that trust

will be key for promoting public compliance. A particular concern relates to whether spokespersons communicating official information would tell the truth or whether they would just aim to keep the public calm [24]. Literature also suggests that individuals are more willing to engage in tried and tested methods (as they are more likely to be seen as something that can effectively ensure safety) [20] and in information which provides factual evidence [65].

It is important for information to be communicated to the public using a trusted spokesperson and source ([20, 59, 67] also proposed by the PSAB) in order to increase the rate of compliance with the information. Low levels of trust have been associated with public health professionals, television and news reports, and all official sources including the police, the mayor and the federal government [24, 60, 71]. This results in a public final preference for key agencies [39] local resources, hazard groups, and health departments [24, 60].

3.4.4. Anxiety/Fear

Guidance documents often link anxiety and fear around CBRNe incidents and procedures with low levels of public compliance. The academic literature relating to the relationship between anxiety and fear and compliance is mixed. Some studies suggest that increased public anxiety about an incident will result in reduced compliance with official instructions [59, 60]. However, other findings indicate that if the public are fearful towards an event this may result in an increased rate of compliance with official instruction (for example, higher levels of compliance were shown when instructions were paired with fear of sickness, contamination or death [23, 67, 72]). These mixed effects of emotional responses are consistent with psychological theorising concerning the role of fear in the decision to adopt or avoid recommended behaviours. For example, both Protection Motivation Theory and the Extended Parallel Process Model posit a role for fear in influencing an individual's estimate of the threat posed by a particular health-related issue (e.g., an illness, or, in this context, the consequences of a CBRNe attack) [73-75]. To the extent that this fear occurs without commensurate information concerning an effective and easy to engage in recommended behaviour (i.e., high self and response efficacy), individuals may defensively avoid the fear, rather than tackling the threat, by engaging in maladaptive behaviour (e.g. refusing to engage with the issue and so not undertaking recommended behaviour) [75]. Thus, the role of fear in influencing the decision to engage in recommended behaviour should be considered in parallel with the recommendations regarding the importance of having efficacious, easy to follow recommendations and guidance.

3.4.5. Revised Guidance and Recommendations

Recommendation 11: Communication should: 1) inform the public about loved ones' whereabouts in relation to family, friends and pets; 2) provide information about active police and security efforts to apprehend terrorists; 3) provide information on the importance of complying with instruction (including health specific information to address public health concerns; 4) and be delivered by a credible spokesperson (e.g. local resources, hazard groups and health departments).

- **What for: To maximise public compliance with official communication.** A key reason for low compliance was to ensure loved ones' safety [20, 24, 59, 60, 65].
- **For whom:** First responders, authorities.

- **How:** By providing the public with highly requested information (i.e. in relation to loved one's safety and current and ongoing efforts to apprehend terrorists [20, 24, 59, 60, 65]) so the public do not have to search for answers themselves**.** Pairing this information with reasons as to why compliance is important, and it being delivered by a credible spokesperson [20, 59, 67] have potential to bolster rates of compliance.

Recommendation 12: Communication should aim to reduce anxiety, by providing information to enhance self-efficacy.

- **What for: To maximise public compliance with official communication.** Guidance and research state mixed effects of anxiety and fear in relation to avoidance and compliance. Therefore, it is proposed that communication should provide information to enhance self-efficacy to avoid the likelihood of maladaptive behaviour [75].

- **For whom:** First responders, authorities.

- **How:** Communication should ensure that it includes details about *what* to do, with clear details that emphasises why the behaviour is important (i.e., it's response efficacy) and how it can easily be engaged in (i.e., self-efficacy).

Recommendation 13: Official sources should communicate honestly and accurately in detailing risks associated with an incident, as this will allow the public to make an informed decision as to whether they wish to comply with official instruction or recommended behaviour.

- **What for:** Avoid misinformation and facilitate public compliance with official instructions.

- **For whom:** Authorities.

- **How:** Communication should be honest and accurate in detailing risks associated with an incident.

Recommendation 14: Guidance documents should provide evidence-based advice on strategies to increase public compliance in the event of a CBRNe incident.

- **What for:** Drawing on evidence-based strategies/ recommendations (e.g., [63]) for communication (e.g., will help to ensure public engagement and compliance.

- **For whom:** First responders, authorities.

- **How:** by incorporating evidence-based advice into guidance documents.

3.5. Guidance on Strategies for Managing Vulnerable Populations during a CBRNe Incident

The review of guidance documents revealed that only 33 of 95 documents provided any guidance on the management of members of vulnerable groups during CBRNe incidents. Furthermore, even the documents that did mention the need to plan for managing vulnerable groups often provided little to no specific detail about how best to achieve this. Synthesis of sources (relevant projects used are:

IMPACT and MILO) reveals there are principles within academic literature which can be used to enhance planning for management of vulnerable groups. Specifically, guidance should be updated regarding: language; culture and religion; and mobility.

3.5.1. Language

Some guidance documents recognised that language barriers between patients and responders can result in communication difficulties (e.g. [52]), with others recommending that certain instructions should be demonstrated to the public to aid understanding [16]. Academic literature stresses that material should be available to the public in multiple languages ([20, 40, 71], also proposed by PSAB), and both guidance documents and academic literature highlight the possibility of using pictographic instructions to facilitate universal understanding [30, 76]. Additionally, information should be pitched at an appropriate level (e.g. [45]), to promote both inclusion and engagement with the material.

Furthermore, an additional proposed method of universal communication is sign language. Despite application currently being relatively rare, research has demonstrated there is understanding across cultures of hand signals such as, ‘stop’, ‘follow me’, and ‘help me’ [37].

3.5.2. Diversity

Several guidance documents highlight the importance of recognising cultural and religious diversity when planning for CBRNe incidents (e.g. consideration of modesty needs among different religious groups [76]). Research also corroborates that communication which takes place in a CBRNe incident must meet all of the needs of an intended audience [65, 77], remain culturally appropriate [57] and be respectful of religion [78]. Findings from related projects suggest that addressing individual differences and needs may result in the ability to tailor information to the full audience [40].

3.5.3. Mobility

Few guidance documents recognise that those with mobility issues may require additional support during the decontamination process [16]. Guidance documents suggest that responders should: assist those with mobility issues, use specialised equipment, and take extra care [16, 76]. Furthermore, the guidance documents advocate having a procedure in place following decontamination to allow for prosthetic replacement, which was also a key issue demonstrated within exercise MILO [79]. The importance of developing procedures for managing service animals and essential mobility aids was also stressed [16, 76, 79].

3.5.4. Revised Guidance and Recommendation

Both guidance and literature contained limited information in relation to the management of members of vulnerable groups during CBRNe incidents. However, a synthesis of information from guidance documents and academic literature does highlight some key points that can be used to create recommendations for the management of these groups, particularly in relation to those who may have difficulty in communicating (e.g. language barriers), difficulty in physically undertaking recommended actions during a CBRNe incident, or may experience cultural or religious barriers to taking recommended actions (e.g. modesty concerns during decontamination.

Recommendation 15: Information should be provided in multiple languages, pictographic form, and sign language.

- **What for:** To ensure maximum public engagement with information.
- **For whom:** First responders, authorities.
- **How:** Where possible, information should be fully accessible for all (e.g. in terms of language and format).

Recommendation 16: Policy and procedure for the management of CBRNe incidents should remain culturally appropriate and be respectful of religion and religious values.

- **What for:** To ensure first responders can meet the needs of vulnerable groups in the context of a CBRNe incident.
- **For whom:** First responders, authorities.
- **How:** Where possible, policy and procedure should remain culturally appropriate and be mindful of religion and religious values.

Recommendation 17: More consideration should be given to developing policy and procedures to assist those with mobility issues (e.g. relating to service animals and essential mobility aids) during CBRNe incidents.

- **What for:** To ensure first responders can meet the needs of those with vulnerable groups, specifically, those with mobility issues in the context of CBRNe incident.
- **For whom:** First responders, authorities.
- **How:** By development of policy and procedures to ensure those with mobility issues are assisted correctly during CBRNe incidents.

Recommendation 18: Guidance documents and SOPs should inform responders about the needs of vulnerable groups and include plans for dealing with such groups in the case of a CBRNe incident.

- **What for:** To ensure first responders can meet the needs of vulnerable groups in the context of a CBRNe incident, as both guidance and literature contained limited information in relation to the management of members of vulnerable groups during CBRNe incidents.
- **For whom:** First responders, authorities
- **How:** incorporate information relating to the needs of vulnerable groups and plans for dealing with such groups in the case of a CBRNe incident.

4. CONCLUSION

This synthesis document followed a Realist framework approach [3] and detailed state of the art data from academic literature (D1.1), current guidance documents (D1.2) and conclusion of other additional related projects (i.e. i.e., PRACTICE, PIRATE, TOXI-TRIAGE, CascEff, PROJECT MILO, RE(h)STRAIN, IMPACT & BESECU; shown in Appendix 7.4).

The results of this synthesis have allowed for the generation of recommendations for effective policy and practice in the mitigation and management of CBRNe incidents (final recommendations can be found in Table 2). These recommendations span the range of human, social, organisational and societal factors that are critical for the effective mitigation and management of CBRNe incidents. Specifically, recommendations relate to:

i) guidance on the overall response strategy during a CBRNe incident (e.g. guidance documents should seek to be uniform in instruction, particularly when released in the same country);

ii) guidance on public knowledge and understanding concerning CBRNe incident preparedness and response (e.g. communication should be pitched an appropriately low level (in terms of language and complexity);

iii) how to communicate with members of the public (e.g. dissemination of information should be available in writing using non-complex language);

iv) guidance on how members of the public are likely to behave in a CBRNe incident (e.g. responders should communicate effectively and show respect for the public's needs);

v) factors associated with compliance (e.g. information should seek to inform the public about family, friends and pets);

vi) guidance on strategies for managing vulnerable populations during a CBRNe incident (e.g. more consideration must go into creation of policy and procedure for those with mobility issues).

Recommendations for future research have been identified by apparent gaps in the current literature, as seen in section 4.2.

Additionally, Appendix 6.8 details a breakdown of the proposed recommendations into strategic and operational guides (provided by Consortium member AGS). Furthermore, recommendations from this synthesis have the potential to be made into 'First Responder Cards' (example shown in Appendix 6.9; again, provided by Consortium member AGS), which will allow practitioners to incorporate and implement some of the recommendations into practice at no cost to parent agencies or government departments.

The recommendations presented in this synthesis (D1.3) will next undergo consultation with members of the PSAB (D2.2) and CSAB (D3.3), in order to ensure that they are fit for purpose.

Recommendations will then inform the pre-incident public information materials developed as part of D5.1.

Table 2: Table of Recommendations

Aim (*What for*)	Number	Recommendation (*How*)	For whom	Categorisation
Guidance	1	Guidance documents should seek to be uniform in instruction, particularly when released in the same country.	First responders, authorities	Organisational/Societal
	8	Guidance documents should provide evidence-based advice on communicating with the public which can be followed by authorities in the event of a CBRNe incident.	First responders, authorities	Organisational/Societal
	10	Guidance documents should provide evidence-based advice about likely public behaviour, emphasising that the way in which practitioners manage an incident will affect the way in which members of the public behave.	First responders, authorities	Organisational/Societal
	14	Guidance documents should provide evidence-based advice on strategies to increase public compliance in the event of a CBRNe incident.	First responders, authorities	Organisational/Societal
	18	Guidance documents and SOPs should inform responders about the needs of vulnerable groups and include plans for dealing with such groups in the case of a CBRNe incident.	First responders, authorities	Organisational/Societal
Counter low Knowledge	2	Information campaigns and education to build CBRNe public knowledge should be implemented.	First responders, authorities	Human/Social/ Organisational
	3	Messages should be pitched at an appropriate level (in terms of language and complexity).	First responders, authorities	Human/Social/ Organisational/ Societal

Dissemination	4	Official communication should be honest, empathic, assertive and reliable.	First responders, authorities	Human/ Organisational
	5	Information should be available in writing (i.e. print form), where possible, using non-complex language.	First responders, authorities	Human/ Organisational/ Societal
	6	Multiple platforms should be used to communicate with the public, with consistent information being provided across platforms.	First responders, authorities	Social/ Organisational/ Societal
	7	Information provided by authorities should be pre-planned, where applicable, to ensure prioritisation and consistency, provide uniformity and advocate cohesion.	First responders, authorities	Organisational
Communication with the Public Communication with the Public (continued)	9	Responders should communicate effectively (in-line with recommendations in the communication section, above) and demonstrate respect for public needs.	First responders	Social/ Organisational
	11	Communication should: 1) inform the public about loved ones' whereabouts in relation to family, friends and pets; 2) provide information about active police and security efforts to apprehend terrorists; 3) provide information on the importance of complying with instruction (including health specific information to address public health concerns; 4) and be delivered by a credible spokesperson (e.g. local resources, hazard groups and health departments).	First responders, authorities	Human/Social/ Organisational/ Societal
	12	Communication should aim to reduce anxiety, by providing information to enhance self-efficacy.	First responders, authorities	Human/ Organisational/ Societal
	13	Official sources should communicate honestly and accurately in detailing risks associated with an incident, as this will allow the public to make an informed decision as to whether they wish to comply with official instruction or recommended behaviour.	Authorities	Organisational/ Societal

Vulnerable Populations	15	Information should be provided in multiple languages, pictographic form, and sign language.	First responders, authorities	Human/Organisational/ Societal
	16	Policy and procedure for the management of CBRNe incidents should remain culturally appropriate and be respectful of religion and religious values.	First responders, authorities	Organisational/Societal
	17	More consideration should be given to developing policy and procedures to assist those with mobility issues (e.g. relating to service animals and essential mobility aids) during CBRNe incidents.	First responders, authorities	Organisational/Societal

4.1. Limitations

This review presents a methodically sound synthesis of D1.1, D1.2 and findings from additional research projects. However, there were limitations that should be noted. Firstly, not all of the additional related projects within the PROACTIVE proposal were contactable (detailed in Appendix 7.4), and results from these projects were therefore not included within this synthesis. Furthermore, when contacted, a lot of projects housed confidential deliverables and due to time constraints, these were not retrieved. Resources were used wherever possible and relevant, including project summaries and overviews (e.g. [37]). This ultimately resulted in 8 out of 25 projects being used within this synthesis. Secondly, due to the nature of data collected within D1.1 and D1.2, there were some areas of this synthesis where findings from academic literature could not be applied in context to the guidance documents. Where this was the case additional sources (i.e. the PSAB group, Consortium discussion and additional relevant project outcomes) provided further insights to inform this synthesis.

Furthermore, although the PROACTIVE project focuses on terrorist attacks, and we acknowledge the potentially important differences in response to different types of incidents, lessons from non-attack situations (e.g. pandemics, evacuations and natural disasters) have been incorporated into outputs from WP1. As a result, the initial proposed recommendations, in their broad sense, are relevant to both accidents and attacks. Additionally, the proposal of these recommendations is only the first step in their iterative development process (more details on this process can be found in Section 5 and Figure 1); as the recommendations develop and become further refined and operationalised within WP6 they will take into account the attack vs accident distinction and will be tailored accordingly. Specific tailoring and adapting of SOPs is also covered within the work of T2.4, summarized in D2.4 (“Recommendations on how to adapt SOPs and tools”).

4.2. Recommendations for Future Research

Throughout the synthesis, there were several areas in which the need for further research was identified in order to update recommendations for best practice. It is suggested that research should be invested into the following areas:

- To understand the variable levels of preparedness apparent amongst the population.
- To understand the effectiveness of pre-planning during incident communication with the public.
- To further understand factors that may increase public compliance during CBRNe incidents
- To understand the specific conditions under which anxiety or fear has an adaptive or maladaptive effect.
- To further understand the needs of different vulnerable groups during CBRNe incidents, including (but not limited to):
    - The advantages of incorporation of cultural and religious values into incident communication.

- The needs of those with mobility issues in a CBRNe context.

An invested interest in these areas will further the state of the art in the area of CBRNe preparation and management and will therefore facilitate the development of further recommendations for best practice in the management of CBRNe incidents.

5. NEXT STEPS

The recommendations reported within Table 2 have been derived as the result of the thorough synthesis of academic literature, current guidance documents, additional insights from partnering EU funded projects and expert opinion across two sources (PSAB and Consortium). These initial recommendations and outputs presented in this deliverable reflect the work carried out during WP1 which aimed to identify gaps and opportunities for PROACTIVE to contribute to the state of the art regarding CBRNe response.

It is, however, important to note that these recommendations and identified gaps are just the first step for the PROACTIVE project in enhancing preparedness against CBRNe security risks. Indeed, this deliverable represents a statement of intent; having synthesised the best academic practice (D1.1) and current practice (D2.2) to arrive at a series of recommendations for enhancing CBRNe preparedness and response (Table 2), the next step is to operationalise and test several of these recommendations through the activities in Work Packages 2 – 6. Specifically, as per the PROACTIVE workplan, these recommendations are subsequently subjected to an iterative process of refinement through engagement with the PSAB and CSAB (reported in D2.2 and D3.3, with some initial information presented below) before being used to inform the development the PROACTIVE tools (WP4 and WP5) with a particularly influence on the pre-incident public information materials (detailed in D5.1) that will be tested and refined as part of the field exercises (WP6).

Considering WP6 in more detail, each field exercise will build iteratively on the last, and will incorporate the best practice recommendations outlined here (where relevant to the specific context/ scenario). Operationalisation of these recommendations will be tailored specifically to the SOPs and guidance protocols used by the relevant first responder and law enforcement agencies within the exercise host country. This is particularly important as issues around standardisation of guidance were raised in the PSAB workshop detailed within D2.2. In this way, PROACTIVE will be able to ensure that the diverging regulatory frameworks and policies are taken into account when formulating recommendations. Learning from each exercise will be evaluated and incorporated into the deliverable relevant to each exercise (D6.3-D6.6) before being synthesised and fully reported within D6.7. In this way, the recommendations presented here will be further operationalised, developed and validated iteratively with external stakeholders, throughout the project (where relevant to individual exercises), before final and formal presentation within D6.6. Figure 1 presents an overview of this process, and Table 3 includes initial, potential operationalisation of some recommendations as an example.

Figure 1: Plan for operationalisation and finalisation of recommendations throughout PROACTIVE

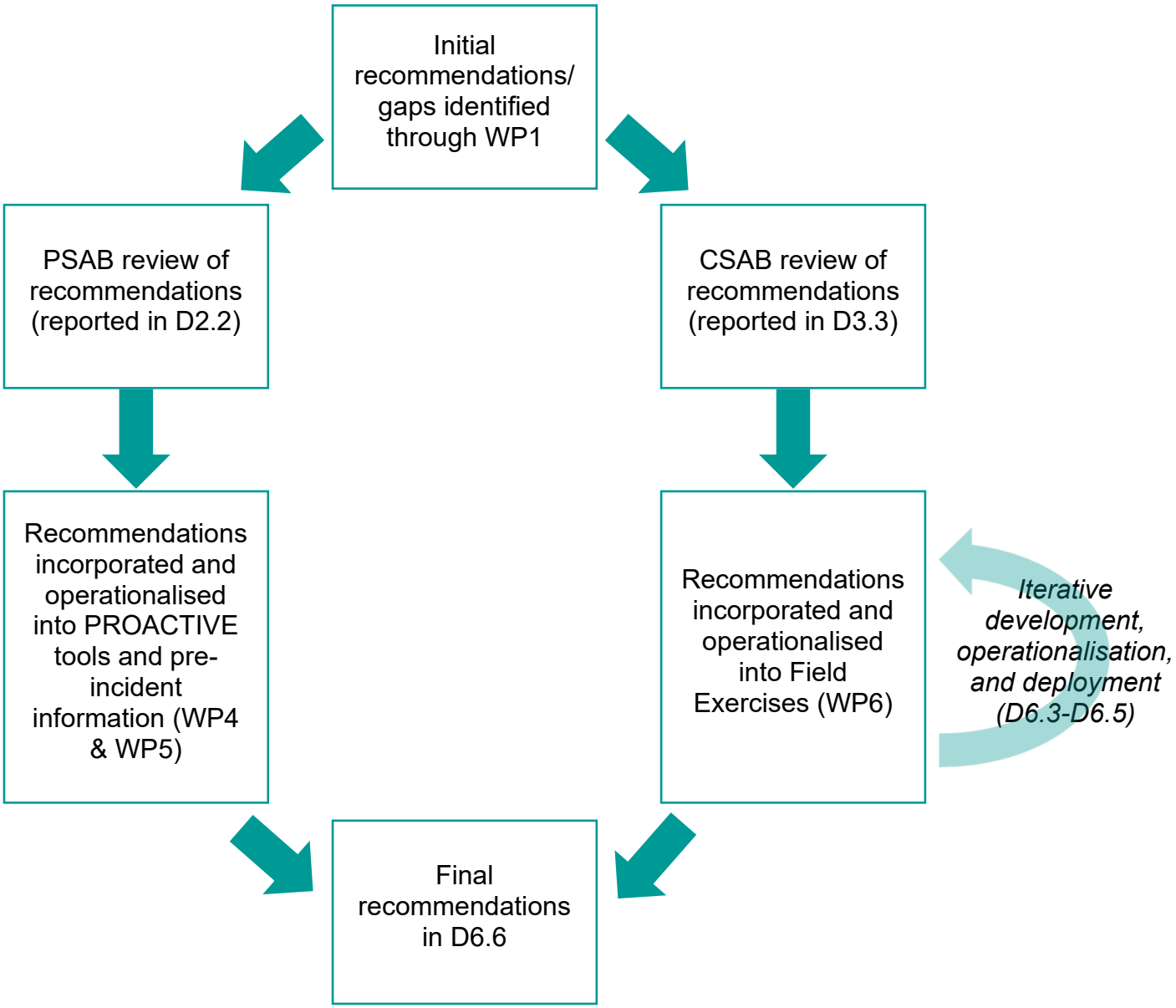

Table 3: Potential operationalisation of recommendations based on outputs from WP1

Recommendation (*What*)	Supporting information	Potential Operationalisation (*How and for whom*)
Responders should communicate effectively and demonstrate respect for public needs.	• Effective communication is to communicate openly and honestly to increase trust [D1.1]. • Responders' having respect for the public increases legitimacy [D1.1].	During an incident, responders should communicate openly and honestly with the public whilst being respectful of public needs in order to enhance trust and legitimacy.
Communication should aim to reduce anxiety, by providing information to enhance self-efficacy	• Anxiety can be reduced by including information relating to health implications and practical information [D1.1]. • Self-efficacy can be enhanced by providing practical information to enable protective actions to be taken [D1.1].	During-incident communication by responders/ law enforcement agencies/ government departments (as appropriate) should aim to reduce anxiety by providing information relating to health benefits of taking recommended protective actions alongside provide sufficient practical information to enable members of the public to take appropriate actions and enhance self-efficacy.
Information should be available in writing (i.e. print form), where possible, using non-complex language.	• Information should be available in written format due to preference for 'concrete' materials [D1.1]. • Noncomplex language should be used to ensure accessibility for those who are non-	Pre incident communication distributed by trusted response organisations to the public should aim to be available in written format using non-complex language and a clear font to ensure maximum accessibility.

	native speakers or have a low reading age [D1.1]. • A clear font should be used to aid those with visual impairment [D1.3].	
Multiple platforms should be used to communicate with the public, with consistent information being provided across platforms.	• Consistent truthful information should be provided about an incident to increase truth and legitimacy, even when a lack of information is known [D1.1].	During-incident communication with the public (from responders, law enforcement agencies, and/or government departments, as appropriate) should provide consistent and truthful information across multiple platforms. If no information is known about the incident, this should also be communicated to improve trust.

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7. APPENDIX

7.1. D1.1 Recommendations

Pre-incident Information

Recommendation 1: Pre-incident information should be delivered to the public using multiple sources.

Recommendation 2: Pre-incident information should be culturally appropriate, easy to understand, and noncomplex, thereby allowing the information to be accessible for all.

Recommendation 3: Pre-incident information should meet the needs of the intended audience, incorporate factual proof and use a credible spokesperson (e.g. a specialist) to account for the preference for information received via higher sources.

Recommendation 4: Novelty (e.g. using a cartoon character) may be effective in disseminating pre-incident information.

Recommendation 5: Effective educational programs and public information campaigns can be used to reduce anxiety, improve knowledge, and to allow members of the public to effectively attend to, and remember, information.

Recommendation 6: When circulating pre-incident information regarding CBRNe incidents, policy makers should be mindful that there is a possibility of provoking worry in members of the public.

Recommendation 7: Remember that pre-incident information is not a substitute or replacement for real-time information for an ongoing incident

During Incident Communication

Recommendation 1: communication should focus on ensuring the protection of the public's health and should aim to influence the perceived efficacy of recommended behaviours.

Recommendation 2: effective communication with the public in the event of a CBRNe incident, officials should utilise a trusted spokesperson, whilst tailoring the spokesperson to what is preferred by the population at hand (e.g. local sources).

Recommendation 3: Accompany information with facts or proof to provide robustness (e.g. mechanisms through which someone could be affected by radiation and the known geographical spread of any risk).

Recommendation 4: Communication should meet the needs of the intended audience (e.g. publish information in multiple languages to aid vulnerable groups).

Recommendation 5: Information should incorporate answers to popular questions regarding CBRNe incidents, for example: what to do when driving in a car, and [if applicable] what the incident or contaminant was.

7.2. D1.2 Recommendations

Recommendation 1: Incorporate up-do-date evidence-based advice in guidance and policy on how members of the public are likely to respond in a CBRNe incident.

Recommendation 2: Update guidance and policy to incorporate a detailed communication strategy for how emergency responders should communicate with casualties and members of the public during a CBRNe incident.

Recommendation 3: Ensure guidance and policy have a clear strategy on how to manage vulnerable groups in a CBRNe incident.

Recommendation 4: Review any discrepancies in documents both within and between countries to ensure consistency in recommendations on how emergency response organisations should respond to a CBRNe incident.

7.3. **PROACTIVE Related Project Table**

Table 3. Existing research and innovation activities

Project	Project characteristic	Relevance to PROACTIVE and progress Beyond State-of-the Art
CBRNe-related		
PRACTICE – Preparedness and Resilience Against CBRN Terrorism using Integrated Concepts and Equipment https://www.practice-fp7-security.eu/	PRACTICE toolbox is a web-based database with a catalogue of existing and innovative components provided and developed during the PRACTICE project by the partners and the members of the Supplier Platform, validated by the Users.	PROACTIVE will use the PRACTICE knowledge (results from the PRACTICE demonstrations) and validate tools in the existing toolbox by the citizens including persons with disabilities, who can be regarded as the 'Ultimate End Users'.
PIRATE – Public Information and Responses After Terrorist Events www.pirateproject.eu	The PIRATE project is an EU-funded initiative that has sought to gain a better understanding of how the EU public would respond during a CBRN terrorist attack	The project established a framework for developing communication strategies for emergency scenarios.
EDEN – End-user driven DEmo for cbrNe https://eden-security-fp7.eu/	EDEN demonstration knowledge EDEN toolbox. EDEN gaps leading to ENCIRCLE technology needs	PROACTIVE will capitalise on the EDEN knowledge and resource repository and address the gaps which are within its scope
ENCIRCLE – European CBRN Innovation for the Market Cluster http://encircle-cbrn.eu/	Provide integration with platforms (systems, tools, services, products) by proposing standardized interfaces and future EU standards to integrate CBRN technologies and innovations developed from the Part b projects of the H2020-SEC-05-DRS CBRN Cluster call	PROACTIVE will complement project ENCIRCLE by providing human-centred recommendations for the EU standards concerning the integration of CBRNe technologies and innovations
CATO – CBRN crisis management: Architecture, Technologies and Operational Procedures http://cordis.europa.eu/project/rcn/102095_en.html	CATO developed a comprehensive Open Toolbox for dealing with CBRN crises due to terrorist attacks using non-conventional weapons or on facilities with CBRN material. CATO also includes the multiple facets of CBRN preparedness and resilience such as medical response, societal and psychological issues, organisational and operational approaches as well as multiple-use equipment.	PROACTIVE will use the CBRN incident management recommendations and tools from CATO, especially on the diversity of organisational set-ups and of legacy systems for emergency preparedness and management (ICT, equipment, sensors, etc.).
TOXI-TRIAGE – Tools for detection, traceability, triage and individual monitoring of victims http://toxi-triage.eu/	The main goal for TOXI-TRIAGE is to develop and field/trial a new level of medical care and site management during triage within rescue efforts in a CBRN incident.	PROACTIVE will use the accelerated delivery of Situational Awareness and the comprehensive field toolbox of CBRN threats for end-users developed in TOXI-TRIAGE.
Human processes; communication-centred		
CascEff – Modelling of dependencies and cascading effects for emergency management in crisis	One important point covered by the project was the Practitioner tactics, human activities, interaction and behaviour. It also highlighted the role of communication and information flows.	These aspects of the CascEff project are particularly relevant for the PROACTIVE scope and will be exploited in WP3 and WP6.

situations http://casceff.eu/		
POP-ALERT http://www.pop-alert.eu/	POP-ALERT undertook thorough behavioural research and take traditional Crisis Management research a step further by carrying out a series of empirical studies, considering new issues such as cultural differences, language barriers, etc., to create a toolkit to help prepare and alert EU populations in case of a crisis.	PROACTIVE proposes to include the issue of language being a potential issue for the interaction between the Practitioner and the Citizen.
BESECU – Human BEhaviour in crisis situations: A cross cultural investigation in order to tailor SECUrity-related communication http://cordis.europa.eu/result/rcn/56077_en.html	The project produced two types of research findings: (1) An evidence base that will enable designers of buildings to develop culturally appropriate emergency operating procedures. (2) An evidence base of inter-individual differences that will be employed to develop a culture sensitive communication training to improve emergency interventions.	PROACTIVE will use the identified similarities and differences between cultures and ethnic groups as well as a range of socioeconomic factors and on the recommendations for Practitioners, building designers and those involved in the development of emergency operating procedures for buildings.
TACTIC – Tools, methods And training for CommuniTIes and society to better prepare for a Crisis https://www.tacticproject.eu/	TACTIC analysed risk perceptions and behaviour to identify pathways from risk perception to preparedness, and developed a preparedness self-assessment that communities can use to assess how prepared they are for different types of crises. Additionally, TACTIC focused on identifying and categorising good practices of communication and education practices for preparedness. All of TACTIC's outputs are presented in a web-based platform.	PROACTIVE will review and use the transferrable good practices of communication and education practices for preparedness during terrorism and epidemics.
Exercise MILO (UK)	Evaluated preparedness of health services in London for a large casualty incident involving disabled groups centred at a large international disabled sporting event.	The identified difficulties in decontaminating and communicating with citizens with these sorts of challenges will be further studied in PROACTIVE with the goal to improve triage systems, guidance on decontamination of prosthetics etc.
Human processes during crises; transferrable lessons for CBRN		
DRIVER+ – Driving Innovation in Crisis Management for European Resilience http://driver-project.eu/	DRIVER+ established a distributed European test-bed for crisis management capability development with proven evaluation methodologies. DRIVER+ assessed and validated innovative, yet practical, crisis management solutions that work, that have been tried and tested, and above all are used for, and by, emergency Practitioners.	PROACTIVE will identify those crisis management solutions that are more likely to be effective in the interaction between emergency Practitioners and citizens.
SNOWBALL http://snowball-project.eu/	One core aspect of this project was the Human Behaviour in Crises and crisis communication. The project proposed good practices and guidelines to be successful and prevent inadequate actions of the population including different groups of citizens (e.g. ethnic groups) and considering sociodemographic factors (e.g. gender, age) and environmental (e.g. physical cues) and social factors (e.g. group dynamics). Other aspect taken into account were language, visual design and acoustic design.	The vignette study conducted in SNOWBALL, the interviews with professionals, the literature research, the virtual reality study to explore human behaviour during cascading events, and all the recommendations concerning communication will be used in the PROACTIVE project.
SECTOR – Secure	The SECTOR supported different Practitioner	PROACTIVE will review and build

European Common Information Space for the Interoperability of First Responders and Police Authorities http://www.fp7-sector.eu/	organisations within and across borders to share information and resources, while respecting both the autonomy of these agencies, local predefined procedures and the local legal requirements (e.g. related to privacy of victim's information).	upon the interoperable SOPs of European Practitioners
DARWIN https://h2020darwin.eu/	DARWIN is an EU funded research project focussed on improving responses to expected and unexpected crises affecting critical societal structures during natural disasters (e.g. flooding, earthquakes) and man-made disasters (e.g. terrorism, cyber-attacks). Infrastructure operators will have up-to-date and effective guidelines at their disposal to facilitate faster, more effective and highly adaptive responses to crises.	PROACTIVE will consider this work under development and will evaluate to what extent the DARWIN guidelines can be applied to CBRNe crises.
CARISMAND – Culture And RISk management in Man-made And Natural Disasters http://www.carismand.eu/	Cultural factors play an important role in determining the way people respond to stress, engage in crisis management and accept disaster relief in an emergency. The project addresses risks as non-objective but socially and culturally constructed.	PROACTIVE will apply the work of CARISMAND in the CBRNe area. CARISMAND results will facilitate the PROACTIVE approach which is highly cantered on the needs of the citizens and on their subjective perceptions.
Explosive-related; transferrable lessons for CBRNe		
SUBCOP – SUicide Bomber COunteraction and Prevention http://www.subcop.eu/	Developed technologies and procedures that can be applied by the Police Security Forces when responding to a suspected PBIED (Person Borne Improvised Explosive Device)	Some results of the project can represent transferrable lessons learned in PROACTIVE.
ENTRAP – Enhanced Neutralisation of explosive Threats Reaching Across the Plot	ENTRAP is identifying Operational Research methods for assessing and identifying counter-measures for use in intercepting a terrorist plot along the time line between inception and fulfilment of the plot. Historical attacks, and potential future scenarios defined in FP7 projects, the EU Matrix group and European Network on the Detection of Explosives (NDE) will be used as the basis.	PROACTIVE threat scenarios will consider the lessons leant in ENRTAP along with the presence of citizens which is a pre-determined parameter to be used in any assessment of, for instance, the process of triage.
Railway-related; transferrable lessons for CBRNe		
REHSTRAIN – REsilience of the Franco-German High Speed TRAIn Network http://rehstrain.w3.rz.unibw-muenchen.de/	This project is analyzing the vulnerability of the rail-bound GE-FR high-speed train system as a part of critical infrastructure "Transport" in view of threats including dirty bombs.	The recommendations concerning CBRNe attacks on the railways can be used in the PROACTIVE exercise.
IMPACT – Impact of cultural aspects in the management of emergencies in public transport http://www.impact-csa.eu	This project produced a cultural risk assessment methodology and the associated mitigation actions (in terms of response to identified cultural behaviours) for the public transport hub sector. It also developed agent-based computational models to simulate and validate cultural behaviours models and cultural-specific communication solutions. It identified innovative solutions that can support public transport operators in improving the communication with passengers through dedicated messages to the	The results of IMPACT will support PROACTIVE consortium in developing the simulation models and recommending the best communications solutions during CBRNe crises. The findings concerning cultural behaviours will also be used in PROACTIVE.

	different cultural groups (via mobile phones and social networks).	
HAMLeT – https://www.h-brs.de/de/anna/projekt-hamlet https://avires.dimi.uniud.it/projects/hamlet/	HAMLeT demonstrated core functions of an in-door security assistance system for real-time decision support by using advanced sensors and multiple sensor fusion techniques. It showed new capabilities for early detection, localization, and continuous tracking of individuals or groups carrying hazardous material within a multiple person flow.	These results can be transferred to a CBRNe scenario in PROACTIVE to improve for example the awareness of the security staff, but also of the less trained non-security staff or lay citizens in crowded places such as railway station.
Health-related; transferrable lessons for CBRNe		
EU Healthy Gateways Joint Action – Preparedness and action at points of entry (ports, airports, ground crossings)	This Joint Action funded by DG SANTE supports coordination between MS in order to improve their capacities at Points of Entry, in preventing and combating cross-border health threats affecting or inherently coming from the transport sector, and therefore contributing to a high level of public health protection in the EU.	Since this Joint Action has started mid-2018, it represents one good clustering opportunity for PROACTIVE. Synergies will be developed with this project, expscially concenring chemical and biological risks and threats.
Tools-related		
UNITY https://www.unity-project.eu/	Combining new technologies with traditional Community Policing (CP) activities aids in strengthening the cooperation between LEAs and citizens. The Unity IT Toolkit reinforced this connection by providing a suite of features that cover best practices used to support and assist CP methods across all CP stakeholders. The architectural design of the toolkit ensured a modular, flexible, extensible, scalable, robust, and secure system that is structured in a web portal and in a mobile application.	The results of UNITY can be used to provide insight for best practices when relaying information to citizens and stakeholders after a potential CBRNe event. The features developed for the toolkits are also transferable for PROACTIVE.
NEXES http://nexes.eu/	NEXES aimed to research, test and validate the promising integration of IP-based communication technologies and interoperability within the next generation emergency services, so that they attain increased effectiveness and performance. The primary purpose of the First Responder App was to convey the assignments to the responders quickly and efficiently, giving the maximum amount of human readable information regarding the situation via the app.	NEXES focused, in part of vulnerable communication, in particular the deaf community. The learning from this can be applied to PROACTIVE in addition to the key technical skills leaned during the development.
International (non-EU) projects		
Exercise Green Cloud (Canada) https://simtec.jibc.ca/sites/default/files/Hazards%20Workshop%20Report%20Final%20March%2027.pdf	Focused on a chemical contamination incident at a community centre and included a terrorist element. The research aimed to prompt a more considered approach of the psychosocial dimensions of CBRN and other hazard events by senior decision makers from a variety of response and government organizations	The lessons learnt in the Canadian exercise will be used in the assessment of the psychosocial dimensions of a CBRNe attack in PROACTIVE

7.4. Related Projects and Deliverables: Method

Project	Point of contact	Available?	Materials Used
PRACTICE	PHE	Public deliverables available online	D8.15
PIRATE	PHE	Public deliverables available online	Short summary
EDEN	PHE	Public deliverables available online	N/A
ENCIRCLE	Contacted via webpage	Public deliverables available online	N/A
CATO	None identified	Inaccessable online	N/A
TOXI-TRIAGE	Contacted via webpage	Public deliverables available online	8.5
CascEff	None identified	Public deliverables available online	3.3 3.4
POP-ALERT	Contacted via webpage	Public deliverables inaccessible online	N/A
BESECU	None identified	Summaries accessable on webpage	Summary used.
TACTIC	CBNRe Ltd	No deliverables available online	N/A
MILO	PHE	Sent by POC	Final documentation of exercise used.
DRIVER+	Contacted via webpage	Public deliverables available online	N/A
SNOWBALL	None identified	Inaccessable online	N/A
SECTOR	None identified	Public deliverables available online	N/A
DARWIN	None identified	Public deliverables available online	N/A
SUBCOP	CBRNe Ltd	Confidential	N/A
ENTRAP	CBRNe Ltd	Confidential	N/A
REHSTRAIN	UIC	Confidential	One publication available
IMPACT	CBRNe Ltd	Call	6.2
HAMLeT	None identified	Public deliverables available online	N/A
EU Healthy Gateways Joint Action	PHE	Not completed	N/A
UNITY	Rinisoft	Sent by POC	N/A
NEXES	Rinisoft	Sent by POC	N/A
Exercise Green Cloud	PHE	Available online	N/A

7.5. Consortium Discussion Feedback

Feedback in relation to each recommendation.

• Pre-incident information should be delivered to the public using multiple sources.

- *Identified as a key point by multiple consortium members, with comments including: 'good to push information' as long as it is 'appropriate to audience'. Specific examples are also be desirable.*

• Pre-incident information should be culturally appropriate, easy to understand and noncomplex, thereby allowing the information to be accessible for all.

- *Listed constantly as a medium to high priority key point.*

• Pre-incident information should meet the needs of the intended audience, incorporate factual proof and use a credible spokesperson (e.g. a specialist) to account for the preference for information received from higher sources.

- *Differing opinion, some perceive trust to be an important factor where others do not, it is also questioned as to whether factual proof is needed.*

• Novelty (e.g. using a cartoon character) may be effective in disseminating pre-incident information.

- *Non-priority point for much of the feedback. Also, comments were made in relation to hijacking of the character through social media.*

• Effective educational programmes and public information campaigns can be used to reduce anxiety, improve knowledge, and to allow members of the public to effectively attend to, and remember, information.

- *Varying opinion, some lowly rank educational problems, but some ranked the recommendation highly. Cost was called into question, but it was also reported to be key for the uptake of technology and must be refreshed and more common during threat periods.*

• When circulating pre-incident information regarding CBRNe incidents, policy makers should be mindful that there is a possibility of provoking worry in members of the public.

- *Non-important point but marked as a high priority by two. Comments suggest that as long as risk of addressed and people can see why this is beneficial to them, they should find it beneficial.*

• Remember that pre-incident information is not a substitute or replacement for real-time information for an ongoing event.

- *High priority for some. One member ranked this very lowly.*

• Communication should focus on ensuring the protection of the public's health and should aim to influence the perceived efficacy of recommended behaviours.

- *Middle ground priority, which links to who owns the system as well as being culture dependent.*

• Effective communication with the public in the event of a CBRNe incident should utilise a trusted spokesperson, whilst tailoring the spokesperson to what is preferred by the population at hand.

- *Conflict of priority, majority marked it as a key priority, whereas some ranked it lowly. This recommendation received the most comments. Comments consisted of ensuring that a spokesperson was decided prior to incidents, as tailoring this during an incident will be very difficult. The use of multi spokespersons were also addressed, as was the use of the local radio to disseminate information.*

• Accompany information with facts or proof to provide robustness (e.g. mechanisms through which someone could be affected by radiation and the known geographical spread of any risk).

- *Consensus as at least a medium priority recommendation. Comments were concerned with the overloading of information and that it shouldn't be needed if a trusted spokesperson is used.*

• Communication should meet the needs of the intended audience (e.g. publish information in multiple languages to aid vulnerable groups).

- *High priority point, and communication should be accessible (i.e. in forms which are accessible to all).*

• Information should incorporate answers to popular questions regarding CBRNe incidents, for example: what to do when driving a car, and (if applicable) what the incident or contaminant was.

- *Middle to high priority. FAQs are an excellent way to reduce authority stress. Trusted sources should be first found on google due to the likelihood of the public googling answers to popular questions.*

• Incorporate up-to-date evidence-based advice in guidance and policy on how members of the public are likely to response on a CBRNe incident.

- *Middle to high priority.*

• Update guidance and policy to incorporate a detailed communication strategy for how emergency responders should communicate with causalities and members of the public during a CBRNe incident.

- *Varying opinion, some deem low priority whereas some deem high priority. Detailed accounts are important but if not over lengthy to prevent engagement, should be non-specific and prescriptive.*

• Ensure guidance and policy have a clear strategy on how to manage vulnerable groups in a CBRNe incident.

- *Low priority for many but should be specific with a uniform approach*.

• Review any discrepancies in documents both within and between countries to ensure consistency in recommendations on how emergency response organisations should respond to a CBRNe incident.

- *Some high, some low. Comments suggest that cultural differences may cause this, that they should be consistent and how to harmonise these documents is important. Perhaps agreement at policy making level is required.*

7.6. **PSAB Virtual Focus Group Feedback**

Feedback on 1.1 (pre-incident) Proposed Recommendations:

- *It would be beneficial to note who the recommendation is addressed to in terms of stakeholders. In Germany there are many stakeholders (e.g. public and private organisations and societies), who would it be addressed to?*

- *I agree that education is a key point in this matter as when there is an outbreak (e.g. Ebola, it was brought to Spain and was passed onto one of the nurses caring for a patient in quarantine. She had a dog and it was a real nightmare public decision about whether the dog had to be sacrificed or not, and the people were not aware of the risk that they were managing. If it had spread and there had been more cases, it would have been out of control and people were not aware). Politicians cannot aim to just try to make people calm and quiet but instead should be taking decisions to minimise the risk. Officials will need risk managing tools [to deal with events] as they cannot make the decisions as a one off, they must minimise the risk in the overall scenario and the overall problem.*

- *I agree that it is indeed good to provide as much information as possible before an incident. In relation to Recommendation 6, it is not always bad to be worried, worry comes when people are not informed enough - but when they are informed they just know what to do. Therefore, education plays a very important part here, and what kinds of risks could be there, e.g. Ebola, where a town or city is located where there is a chemical facility or nuclear reactor. People can receive in advance what to do, which will reduce anxiety and worry.*

- *One general remark, who is going to inform the public about CBRNe events. For example, with railways, some say frequently that it is not our task to inform people about this, our basic task is to carry out transport for people. So, who should be mainly responsible in communicating this information to the public?*

- *Pre-incident information is important, but we are personally struggling to engage clinicians with the material as they are so busy and not interested. Results from studies have indicated that when you talk to clinicians they are interested, but it is not high up on their priority list. They also need to know who to talk to. How helpful is it to disseminate all information to all parties if they do not have the time to consider it?*

- *By instant message: participant agreed with the recommendations.*

- *There are so many other issues (e.g. NCov-2019), that everyone is struggling to manage the time.*

- *Information on self-help and helping others would be beneficial. We had some practical trials recently to do with decontamination where there is different information you must give if a person is looking after a child, in comparison to those just looking after themselves (i.e. you need to keep yourselves safe while doing so).*

Feedback on 1.1 (during incident communication) Proposed Recommendations

- *We need to come up with a sample scenario, so all countries can present their own procedures for CBRNe events so that we can compare them. With the result, we can achieve a more usable and generalisable recommendation. We also think that the study only focuses on the public, but I think staff should also be considered, especially from the railway sector.*

- *We are unsure that provided information will provide a sense of fear amongst the public. Maybe information should be provided that is easy to understand, and we should also provide this information, so to not provide a sense of fear.*

- *I would like to add one recommendation for during incident communication. It would be helpful to provide information on how to distinguish fake news, i.e. which sources are correct, and which are not.*

Feedback on 1.2 Proposed Recommendations:

- *Recommendations are very general, and now it is more of a question of how this can be implemented, e.g. maybe a checklist of guidelines, or a concrete procedure. It may also be good to categorise them, e.g. human factors, or strategic planning.*

- *It is idealistic to wish to have harmonised recommendations, as they still have to rely on national policy as recommendations depend from one state to another. A way forward may be to implement generalised procedures (instead of harmonised recommendations) compared across different countries (e.g. timing of decontamination). Ultimately, it should be generalised, and points should be established, as points would be too hard to harmonise.*

- *It is recommended in 1.2 that there should be respect paid to cultural differences, but it is also necessary to be mindful of differences in health care systems, and different responsibilities for other counties (especially across the same country). If we want to have specific guidance, it is quite tricky to strike a balance between this and establishing harmonisation across countries.*

- *All procedures mentioned in the review, regardless of country, are essentially starting with the expectation that you will have casualties, survivors and deaths. We are missing the first part of the whole episode by missing elements of preparedness. We should all be prepared to quickly respond to any incidents we have. I would suggest that all countries should aim to be proactive and should not have to have casualties present to create action. We need to protect people before the incidents occur (e.g. though the findings of project COUNTERFOG which details 'washing the air' of contamination).*

Feedback on 1.2 Missing or Additional Recommendations:

- *Normally in the case of a terrorist attack procedures such as evacuation will not start immediately (as, e.g. Police will check if the terrorist is still near the victims) and procedures will be delayed (e.g. until decontamination is ready and available). Nothing can be ready immediately. Maybe it makes sense to educate the public on the sense that procedures may be delayed. Secondly, first responders are also essentially the population, they are just better prepared. Regardless of preparation they are also very stressed, afraid to be contaminated*

and concerned about making mistakes. They are also under pressure due to a position of responsibility and they will still worry about their families. Maybe opposing responders from the general population is not necessary.

Feedback was also received from the PSAB via email:

Recommendations from D1.1

- Research we have done confirms a lot of those points, especially the need for target group specific communication, accessible (FAQs etc.), practice-oriented, timely information via various information pathways and credible.

- One point to consider: Will there be discussion rounds like the one today in other languages but English (German, French?), especially to capture views from civil society representatives?

Pre-Incident information

- Difficulty of getting (even interested and motivated) people to engage pre-incident and likely to be quite unspecific guidance at least for bioterrorism since required protection behaviours etc. are context / scenario and agent dependent.

Recommendation 1: Pre-incident information should be delivered to the public using multiple sources

- *Agree, for multiple reasons. It is true as discussed in D1.1 that multiple sources (hearing a message multiple times) will increase the chance the message is heard and understood. Also, multiple sources can increase trust, and be more likely to use a person's favoured medium. Two points identified in the ASSET EU program on public health communication during pandemics: (1) a robust social media campaign is critical, because so many people depend on social media, and because authorities need to become aware of and combat misinformation; (2) identify who people trust, and get them involved in the messaging – for example in the case of vaccinations, information from family physicians was most trusted*

Recommendation 2: Pre-incident information should be culturally appropriate, easy to understand, and noncomplex, thereby allowing the information to be accessible for all.

- *yes, this is clear from the literature, and also reinforced by experience in, for example, the Ebola outbreak (which might be more representative of EU subcommunities), where there was mistrust of authorities and the need to violate cultural norms. Enlisting trusted community members was essential, and messaging incorporating local content was more effective than centrally produced messages from authorities. During hurricane Katrina in New Orleans, evacuation was hindered because some communities were not fluent in English.*

Recommendation 3: Pre-incident information should meet the needs of the intended audience, incorporate factual proof and use a credible spokesperson (e.g. a specialist) to account for the preference for information received via higher sources.

- *I have described this as paying attention to three dimensions of disaster communication: Strategic, Contextual, and Personal (see Appendix 1).*

Recommendation 4: Novelty (e.g. using a cartoon character) may be effective in disseminating pre-incident information.

- *An extension would be the use of displays, simulations, and online games to engage the public (see Appendix 2).*

Recommendation 5: Effective educational programs and public information campaigns can be used to reduce anxiety, improve knowledge, and to allow members of the public to effectively attend to, and remember, information.

- Not only factual knowledge of relevant procedures is important but also who to turn to for support / further information.

- *Some lessons learned from other types of disasters the public wants full transparency Uncertainty needs to be prominently discussed with the public Risk communication cannot assume a scientifically ignorant public Institutions should not exaggerate the superiority of their knowledge and judgment*

Recommendation 6: When circulating pre-incident information regarding CBRNe incidents, policy makers should be mindful that there is a possibility of provoking worry in members of the public.

- *Withholding information to prevent worry can erode trust. However, it is easy to provoke disproportionate worry for novel threats, e.g., the current corona virus outbreak, which in the US will almost certainly be less deadly than seasonal flu*

- *Maybe more specific guidance on how this can be addressed would be useful?*

Recommendation 7: Remember that pre-incident information is not a substitute or replacement for real-time information for an ongoing incident.

- *Another good to prepare pro-active social media campaigns and get people to know where to go for good information during events. Whether the authorities are on social media or not, there will be online real-time updates from the general public's cell phones, etc.*

<u>During Incident Communication</u>

Recommendation 1: Communication should focus on ensuring the protection of the public's health and should aim to influence the perceived efficacy of recommended behaviours.

- *Recommended behaviours are more likely to be followed if the public is convinced that the authorities are knowledgeable and genuinely have the public interest at heart, e.g., perceived spokesperson empathy. "We are the authorities and know what's best for you" does not go very far these days.*

Recommendation 2: Effective communication with the public in the event of a CBRNe incident should utilise a trusted spokesperson, whilst tailoring the spokesperson to what is preferred by the population at hand (e.g. local sources).

- *See earlier comments about the importance of involving locally trusted people. These could be a community volunteer/leader, who points to the spokesperson and says, "I trust this person".*

Recommendation 3: Accompany information with facts or proof to provide robustness (e.g. mechanisms through which someone could be affected by radiation and the known geographical spread of any risk).

- *Of course, it is a challenge to communicate sometimes complex science and uncertainty in a way the general public will understand with the desired perspective.*

Recommendation 4: Communication should meet the needs of the intended audience (e.g. publish information in multiple languages to aid vulnerable groups).

- *See previous comments Recommendations 2 and 3 above.*

Recommendation 5: Information should incorporate answers to popular questions regarding CBRNe incidents, for example: what to do when driving in a car, and [if applicable] what the incident or contaminant was.

- *This is reinforced by research performed by T.E. Drabec ("Human System Responses to Disaster: An Inventory of Sociological Findings" (1986) and "The Human Side of Disaster" (2013)) – warnings must include both threat information and directions for action, specificity = believability.*

Recommendations from D1.2:

Recommendation 1: Incorporate up-do-date evidence-based advice in guidance and policy on how members of the public are likely to respond in a CBRNe incident.

- *Yes, it is clear from the deliverable that current guidance and policy is based on false assumptions, e.g., about public panic. T.E. Drabec on how individuals respond during disasters: Victims react immediately, do not wait for officials After a brief restructuring period, a majority of victims begin rescuing and helping Victim responses vary – may be briefly dazed, but hyperactivity and a stoic calm are more common Most of the injured will be transported by unofficial means People will try to converge to a disaster scene.*

Recommendation 2: Update guidance and policy to incorporate a detailed communication strategy for how emergency responders should communicate with casualties and members of the public during a CBRNe incident.

- *From the deliverable, there appears to be a great opportunity to share best practices across EU, and incorporate, with local adaptation, to achieve more uniformity in detail.*

Recommendation 3: Ensure guidance and policy have a clear strategy on how to manage vulnerable groups in a CBRNe incident.

- *Vulnerability can stem from lack of understanding (language, education), physical impairment (elderly, sick, injured), and mistrust (socially isolated communities, male versus female).*

Recommendation 4: Review any discrepancies in documents both within and between countries to ensure consistency in recommendations on how emergency response organisations should respond to a CBRNe incident.

- *As mentioned before, this is a great opportunity to improve overall response by sharing best practices, adapting locally, and achieving a more uniformly high level of preparedness.*

- How does consistency between countries account for cultural differences / recommendation 2 D1.1.? Also, not only cultural but differences in:

    - health care systems (roles / responsibilities of key players responsible for prevention and management etc.)

    - legal regulations (quarantine etc.)

        i. Important to strike balance between consistency between countries and accounting for differences when drafting detailed communication strategies as suggested / easy to stay too unspecific / top level when trying to fit every context.

        ii. Important to speak with one voice / no discrepancies in communication within one country but possibly necessary to allow differences between countries? Maybe stress this and give examples of different best practice strategies that fit different contexts?

General comments:

When I think about the recommendations on incidents, it is essential that the person transmitting knows the situation of the "problem" and what conditions specifically affect that problem? An example: On Friday, in the meetings about the crisis that was triggered by the asbestos incident at the Zaldibar dump, there were demands for overly proactive actions (always with the perspective of concern for the performers) and discussions with a view to a "coronavirus" scenario... I explain: When we find ourselves in an environment of contamination (silicates in micropowder), cleaning (not decontamination) is governed by three basic principles. a) What is necessary. b) As soon as possible. c) As centralised as possible. I always had the impression that aspects such as contagion, transmission were being taking into consideration. This incident is solved with cleanliness, cleanliness as soon as possible and with NRBQ criteria. It is from that moment on that the measures a priori, have to be preventive but adequate (airways, ingestion and eyes mainly) at reasonable distances and always considering the affected population, the winds and the needs to be overcome. But in no case does a "contamination" by dust resemble the evolution of a "viral" infection that would require other types of measures. Each procedure and each NRBQ action has a criterion and they are not shared nor can we globalise them because an excess in prevention establishes unbearable limits if in the future a different incident calls for other measures. This only required cleanliness and the mentioned protection and safety distances (100% verifiable) not more than 50 meters depending on wind direction and speed. That is why I add that the information must be treated in the right measure so as not to convey an excessive impression (even assuming good faith, of course) or deficient one due to irresponsibility or compared to other types of pollutants.

The example I have talked about happened last Friday and many police officers from different police stations worked in the landslide where two workers remained undertaken. A lot of asbestos appeared at the dump and lot of dust with that substance was breathed by all the workers due to the helicopter landing there and due to all the machines moving the land. Many of the workers there did not know what to do when they realised the substance they have found. We have to remember that asbestos can cause lung cancer and many other diseases if breathed continuously. Obviously without the proper info everybody started talking and making affirmations of the things that could happen or the things that should be done. Obviously without info many stupid comments were added and anxiety and nervousness appeared.

For me it is a clear example of all your recommendations. Need for information, experts informing pre and during the incident, easy language easy to understand, not technical, vulnerable groups taken into account, countries trying to work on the protocols and stating similar ones, considering special situations in places where the risk is higher, for instance where a nuclear power station is.

7.7. Worst Case Scenario Table

The table represents the outcomes of the parallel stakeholder workshop led by Frank Long, PhD student at Imperial College London, and demonstrates the best and worst-case context for a range of variables, including: location, agent affect and dependents. For example, the best-case scenario associated with communication by responders relates to clear and consistent information which is understood by the casualties. Whereas the worst-case context is associated with no communication from the responders.

Variable	Best Case	Worst Case
Location	No Consensus	Enclosed and Unfamiliar
Communication by Responders	Good clear and consistent with casualties understanding the situation	No communication
Public Awareness and Knowledge	Good awareness and Knowledge	No Awareness or Knowledge
Agent Affect	No-Effect or Severe Reaction	Mild Painful Reaction
Weather Conditions	Dry and warm	Wet and cold
Dependents	None involved	Dependants involved
Confidence in Responders	High	Low
Crowd and other casualties actions	Remain	Leave

Scenarios were created to demonstrate a practical context for best to worst case scenarios in the context of a mass decontamination:

Scenario 1 – Worst Case

- On a cold, wet late evening, you are travelling alone to meet a family member. As you are stood alone on the platform of an unfamiliar train station, an explosion occurs.

- Ears ringing, you look down to find that you are covered in a white powder. Quickly you feel your eyes start to sting and a cough rises in your throat. It is feeling increasingly difficult to breathe and your skin has started to burn.
- All around you, you can see your fellow passengers starting to suffer. Some have collapsed. Many have started to head for the exits to leave the station.
- As you're standing there, the first emergency responders begin to arrive. They're not really saying anything. They're just moving people around.

Scenario 2 – Very Bad

- It's lunch time on a frosty day and you're on your way to meet a family member for lunch.
- As you're walking through a shopping centre that you've never been to before, an explosion occurs.
- Looking down you find you are covered in white powder. You don't feel any different. The powder doesn't seem to be affecting you or the people around you. But many of them have started to leave the shopping centre.
- As you're watching, you see that the emergency services have started to arrive. They don't seem to be saying much to you or the others about what is going on. The emergency responders aren't helping you understand what's happening or what will happen next.

Scenario 3 – Middle

- It's early afternoon on a cloudy autumn day and you and a friend are walking into the centre of a town you've been to a few times before.
- As you're walking, there's a loud bang/explosion and you look down to find yourself covered in a White powder. Very quickly your eyes start to sting slightly.
- Looking around you can see other people who are covered in the powder and are starting to rub their eyes. Some of them are hurrying away from the area, but others are staying put as the emergency responders arrive.
- Their communication doesn't really seem to be either good or bad.

Scenario 4 – Not Worst

- It's 9am on a warm and dry summer day and you are wandering alone down your local high street where you often shop. You're in no hurry and are enjoying the walk.
- Suddenly there is a loud explosion. Looking down you see you are covered in a white powder. The air around you smells and tastes slightly strange. But you feel fine.
- The people around you all seem to have stopped and are staying put as the emergency services start to arrive.
- As you stand there with the others who have been part of the incident, the emergency responders begin to communicate with you all, explaining what is going on and helping you understand what will happen next as they help you.

Scenario 5 – Best Case

- It's midday on a sunny July day and you are doing your weekly food shop with your family at your local supermarket.
- Suddenly, there is a loud crash and you find yourself covered in a white powder. As you look around you, your eyes start to sting slightly, and you realise there is a strange taste and smell in the air. A few people around you seem to have started rubbing their eyes. But like you, they are standing still. No one is leaving the area.

- As you stand there, the emergency responders begin to arrive. They are quick to come and talk to you and the other people, giving you clear instructions and explanations.

7.8. Recommendations Categorised into Strategic/Operational

Pre-Incident: Strategic

Recommendation	Summary	Importance
1	Document Uniformity	Preparedness/Public Understanding
2	Information and Education	Preparedness/Public Understanding
8	Guidance on Communication	Preparedness
10	Guidance on Public Behaviour	Preparedness
14	Guidance on Increasing Compliance	Preparedness
18	Guidance on Vulnerable Groups	Preparedness
5	Printed Material	Communication with the Public
7	Pre-planned Information	Communication with the Public
15	Multiple Languages	Manage Vulnerable Populations
16	Culturally Appropiate	Manage Vulnerable Populations
17	Mobility Issue Focus	Manage Vulnerable Populations

During Incident: Operational

Recommendation	Summary	Importance
3	Message Pitch	Preparedness/ Public Understanding
4	Honest and Empathic	Communicate with Public
6	Multiple Platforms	Communicate with Public
9	Respect for Public	Likely Behaviour of Public
11a	Loved Ones	Compliance
11b	Police Operations	Compliance
11c	Specific Information	Compliance
11d	Credible Spokesperson	Compliance
12	Promote Self-Efficacy	Compliance
13	Informed Decision	Compliance

7.9. First Responder Card

First Responders

MITIGATION OF A CBRNE TERRORISM INCIDENT.

1: Messages should be **pitched** at an appropriate low level
2: Multiple **platforms**-used to communicate with the public.
3: Responders should demonstrate **respect** for public needs
4: Outline risks to allow public to make an **informed** choice.
5: Enhance **self-efficacy** by providing relevant information.
6: Communication should be by a **credible** spokesperson.
7: Official communication - honest, empathic, assertive and reliable.