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

Deliverable D8.4

Ethical and societal assessment of PROACTIVE outputs

Due date of deliverable: 31/08/2023

Actual submission date: 31/08/2023

Mariano Martín Zamorano[1], Virginia Bertelli[1], Irina Marsh[2]

1: ETICAS 2: CBRNE

© Copyright 2023 PROACTIVE Project (project funded by the European Commission). All rights reserved.

No part of this document may be copied, reproduced, disclosed or distributed by any means whatsoever, including electronic without the express permission of the International Union of Railways (UIC), Coordinator of PROACTIVE Project. The same applies for translation, adaptation or transformation, arrangement or reproduction by any method or procedure whatsoever.

The document reflects only the author's views and the Commission will not be liable of any use that may be made of the information contained therein. The use of the content provided is at the sole risk of the user.

Project details

Project acronym	PROACTIVE
Project full title	**PR**eparedness against CBRNE threats through c**O**mmon **A**pproaches between security pra**CTI**tioners and the **V**ulnerabl**E** civil society
Grant Agreement no.	832981
Call ID and Topic	H2020-SU-SEC-2018, Topic SU-FCT01-2018
Project Timeframe	01/05/2019 – 31/08/2023
Duration	52 Months
Coordinator	UIC – Grigore Havarneanu (havarneanu@uic.org)

Document details

Title	Ethical and societal assessment of PROACTIVE outputs
Work Package	WP8
Date of the document	31/08/2023
Version of the document	08
Responsible Partner	ETICAS
Reviewing Partner(s)	CBRNE, DHPol
Status of the document	Final
Dissemination level	Public

Document history

Revision	Date	Description
01	03/05/2023	Initial index and first section development
02	15/06/2023	Complete version of normative sections and systematisation of data from field exercises
03	27/06/2023	First version of the analysis
04	07/07/2023	All field exercises data integrated and second version of the analysis
05	25/07/2023	First draft shared with partners
06	09/08/2023	Second draft shared with partners for peer review
07	30/08/2023	Final draft after revision
08	31/08/2023	Final Version

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

List of Acronyms

Acronym	Definition
A	Annex
CBRNe	Chemical, Biological, Radiological, Nuclear, and explosive
CCS	Crisis Communication System
CSAB	Civil Society Advisory Board
D	Deliverable
DMP	Data Management Plan
DoA	Description of Action
DOI	Digital Object Identifier
DPIA	Data Protection Impact Assessment
DPO	Data Protection Officer
EEA	European Economic Area
EEAB	External Ethical Advisory Board
EU	European Union
FAIR	Findable, Accessible, Interoperable and Reusable
FR	First Responder
GDPR	General Data Protection Regulation
ICT	Information and Communication Technologies
IPR	Intellectual Property Rights
LEA	Law Enforcement Agency
LEA	Law Enforcement Authority
M	Month
PbD	Privacy by Design
PEO	Project Ethics Officer
PETs	Privacy Enhancement Technologies
PII	Personally Identifiable Information
SAB	Security Advisory Board
SOP	Standard Operating Procedures
SSH	Social Sciences and Humanities
T	Task
WP	Work Package

Executive summary

Deliverable 8.4 is aimed at providing the PROACTIVE consortium with a social impact assessment of the project outcomes, addressing both its technological solution and produced guidelines. Both aspects are examined with the main purpose of analysing compliance with legal requirements and ethical principles defined in WP8. Additionally, Deliverable 8.4 seeks to provide a gap assessment and associated avenues for the future implementation of PROACTIVE and facilitate innovative viewpoints with ethical frameworks for tackling CBRNe incidents.

It is described in the DoA in the following way:

> "Compliance with the legal framework, including **privacy and data protection** regulations needs to be complemented with aspects such as the differential impact of the proposed toolkit on different religious, cultural or vulnerable groups, must also be continuously evaluated to provide guidance to the development team on how to avoid any negative externality. In the context of PROACTIVE it is very important to systematically evaluate the interaction of different social groups with LEAs and CBRNe Practitioners in order to guarantee the efficiency of the communication system, thus ensuring its proportionality, adaptability to disabled persons and avoiding any potential risk of discrimination, gender bias, function creep or misuse. The ethical and societal risk assessment methodology, conceived as a practical risk management tool, will be **applied to both the technical solutions and methodologies of the WPs 4 and 5 and also the outputs of the exercises in WP6**. In this respect PROACTIVE will use best practice developed by project partners in previous EU Projects. For this assessment, to be reflected in D8.4, the scope of the project is expanded to include other potential users apart from EU LEAs and other deployments of the developed solutions not initially considered. For those cases where an identified negative impact would be technically unavoidable, the recommendations derived from the assessment will be focused on non-technical advice (regulations, for instance) to mitigate the likelihood of such cases happening."

Along these lines, supported by validation activities carried out during the three project field exercises, Deliverable 8.4 will present an analysis of the project outcomes and the risks and edges derived from its implementation. This analysis provides the main gaps in existing policies for tackling CBRNe events, an overview of potential social implications of implementing the PROACTIVE toolkit to fill those gaps and a set of avenues for the actual deployment of PROACTIVE policies and technologies while mitigating any adverse externalities in this process.

Table of Contents

List of Tables

List of Figures

1. INTRODUCTION

PROACTIVE is an EU-funded project within the H2020 framework, addressing the topic SU-FCT01-2018-2019-2020: *Human factors, and social, societal, and organisational aspects to solve issues in fighting against crime and terrorism*. It began on the 1st of May 2019 and will finish on the 31st of August 2023.

PROACTIVE aims to **increase practitioner effectiveness in managing large and diverse groups of people** in a Chemical, Biological, Radiological, Nuclear and explosive (CBRNe) environment. The main goal is to enhance preparedness against and response to a CBRNe incident through better harmonising procedures between various categories of practitioners and better articulating the needs of vulnerable citizen groups.

PROACTIVE has resulted in **toolkits for CBRNe Practitioners and civil society organisations**. The toolkit for Practitioners includes a collaborative web platform with database scenarios for communication and exchange of best practices among Law Enforcement Agencies (LEAs), as well as an innovative response tool in the form of a mobile app. The toolkit for civil society includes a mobile App adapted to various vulnerable citizen categories and pre-incident public information material.

PROACTIVE is divided into ten Work Packages (WPs). This document is the fourth deliverable within Work Package 8, titled "*Toolkit for LEAs and security Policy-makers*". It is based on work carried out in Task 8.4, "***Ethical and Societal Impact Assessment of project outputs"*** (M1-36), the aim of which is described as follows:

> "Compliance with the legal framework, including **privacy and data protection regulations** needs to be complemented with aspects such as the differential impact of the proposed toolkit on different religious, cultural or vulnerable groups, must also be continuously evaluated to provide guidance to the development team on how to avoid any negative externality. In the context of PROACTIVE it is very important to systematically evaluate the interaction of different social groups with LEAs and CBRNe Practitioners in order to guarantee the efficiency of the communication system, thus ensuring its proportionality, adaptability to disabled persons and avoiding any potential risk of discrimination, gender bias, function creep or misuse. The **ethical and societal risk** assessment methodology, conceived as a practical risk management tool, will be applied to both the technical solutions and methodologies of the **WPs 4 and 5 and also the outputs of the exercises in WP6**. In this respect PROACTIVE will use best practice developed by project partners in previous EU Projects. For this assessment, to be reflected in D8.4, the scope of the project is expanded to include other potential users apart from EU LEAs and other deployments of the developed solutions not initially considered. For those cases where an identified negative impact would be technically unavoidable, the recommendations derived from the assessment will be focused on non-technical advice (regulations, for instance) to mitigate the likelihood of such cases happening."

As a result of the above activity, **Deliverable 8.4: Ethical and societal assessment of PROACTIVE outputs** (M36), provides a comprehensive mapping of potential social implications of implementing PROACTIVE toolkit, its role regarding risks faced by groups involved in CBRNe events and individuals beyond the primary target audience of the project. In this way, it keeps the general interest into account during the project development as well as includes non-technical solutions when necessary.

1.1. Objectives

In terms of the general function and grounds of Deliverable 8.4 as part of the PROACTIVE project, the document is inscribed in WP8 objectives detailed in the GA as follows:

(a) To point out and frame the ethical and legal aspects of PROACTIVE,
(b) To examine the legal, ethical and societal aspects in PROACTIVE from both Privacy by Design and post assessment approaches,
(c) To provide stakeholders and partners with the appropriate guidance on the above aspects,
(d) To carry out an acceptability study for the proposed toolkit in order to assure its sustainability,
(e) To avoid any negative social impact during the project's execution or in future deployments based on this research.

WP8 runs in parallel with the lapse of the project. The legal, ethical and societal impact assessment is conducted as a cyclical process linked to the overall project strategy, starting at the earliest stages and being revisited at each new project phase. This approach guarantees an early alert on every issue, thus avoiding the risk of having to redesign significant aspects of the proposal for optimisation from the citizen perspective that have already been devised. In order to protect the privacy and integrity rights of the participants in the project, a number of best practices principles will be observed (see Section 5).

The WP8 will also gauge, from a social perspective the emerging socio-technical solutions identified by the project, which should be oriented towards supporting human decision-making. They should also take into account the experiences of citizens, whose problems are the ultimate reason why emergency services exist. Outputs of this WP will be used in all project WPs. WP2, WP3 and WP6 will give inputs to this WP.

In this framework, this Deliverable will:

- Examine PROACTIVE guidelines and technologies (Crisis Communication System) which make up project outputs
- Study compliance of the above project outcomes with legal and ethical standards defined in D8.1 and D8.2, also considering societal goals of the project such as inclusion, and the articulation of the needs of vulnerable citizen groups
- Systematise socio-technical knowledge derived from the project validation at two levels:
    - Establishing an ethical framework for CBRNe policies based on the project research
    - Offering additional avenues for the deployment of PROACTIVE technologies and policies

1.2. Summary of methodology and focus of the analysis

According to the above Task description, the methodology (full description can be found in Section 3) of this Deliverable is based on:

I) **Documentary analysis**: a comprehensive documentary review that included both **scientific papers and all Deliverables** in WPs 4, 5, 6 and 8. Results reflected in these documents, including the technical specifications of the PROACTIVE Crisis Communication System (CCS) and its ongoing privacy impact assessment, provided comprehensive information about its characteristics and deployment conditions.

II) **Fieldwork**: a set of questions regarding using the PROACTIVE solutions have been integrated into **Observers Guides and interviews** with practitioners and technical partners implemented by project partners during three project field exercises. Moreover, specific data collection techniques were directly implemented by ETICAS in each of these scenarios, ranging from questionnaires used by Ethics Observers to focus groups, observations and interaction with organisations such as Save the Children Italy in this context.

The thematic analysis of this large set of data allowed us to classify and contrast findings. The main dimensions assessed through the exploitation of these data and information sources included:

- Ethics in CBRNe policies
- Compliance with data protection requirements
- Acceptability and acceptance of PROACTIVE guidelines & Crisis Communication System
- Social impact of proposed solutions and policies (inclusion, discrimination, bias, etc.)

1.3. Description and structure

After this short Introduction, this deliverable is divided into the following six sections:

- Section 2, on **drivers for social impact**, develops the three main conceptual frameworks shaping the Deliverable analysis: ethics, data protection and acceptability.

- Section 3, on **methodology**, describes the methodological strategy used for the social impact assessment, addressing methods used to address both ethics and social impact, including privacy aspects.

- Section 4, on the **analysis of PROACTIVE guidelines and Crisis Communication System (CCS)**, provides a pre-validation analysis of the PROACTIVE toolkits from the perspectives of its relative embeddedness of core social values and privacy by design.

- Section 5, on the **analysis of PROACTIVE social impact in field exercises**, examines the three field exercises focusing on their contribution to elucidating the expected social impact of PROACTIVE policies implementation.

- Section 6, on the **post-validation assessment of PROACTIVE guidelines and CCS**, wraps up outcomes for the contrasting process conducted in Section 5. It also considers potential avenues for mitigating any adverse risk of PROACTIVE implementation.

- Section 7, including the **conclusions**, provides the final summary analysis of the Deliverable goals, methods and findings.

2. PROACTIVE DRIVERS FOR SOCIAL IMPACT: ETHICS, DATA PROTECTION AND ACCEPTABILITY REQUIREMENTS

The PROACTIVE guidelines and technologies have been analysed throughout the project by focusing on three main normative dimensions to address social impact:

I) The **ethical principles and dilemmas** that should be considered when designing and implementing CBRNE preparedness and response policies.

II) **Data protection requirements and principles, particularly as a core normative framework concerning** the case of the PROACTIVE CCS.

III) The **usability, acceptability and acceptance** of PROACTIVE technologies and policies from end users and targeted social groups' perspectives.

This tripartite framework has been established and contrasted along the WP8 tasks, guiding the project outcomes development. In this section, we will summarise these conceptual layers to offer a framework for addressing compliance later and carry out a prospective analysis to ensure fair, equitable and smooth implementation of PROACTIVE tools.

2.1. Ethical and human rights frameworks in CBRNe policies

This section presents the ethics framework considered in evaluating PROACTIVE guidelines and field exercises. Such conceptualisation serves two purposes. On the one hand, it provides a state of the art concerning ethics of CBRNe policies to problematise PROACTIVE implications in this regard. On the other hand, it sets a project approach to this topic, which was operationalised in the methodology for social impact assessment.

Ethical and legal frameworks provide systematic and **practical approaches to the analysis of ethical issues and questions** (WHO 2015). They aid decision-making by framing the ethical issue at hand (what type of ethical issue is this?), making relevant values and ethical principles explicit (what is at stake, and for whom?), providing a structure for determining how to address or resolve the ethical issue (what actions ought to be taken?), and ensuring consistency in similar situations and across decision-makers. In a disaster, parties are also faced with choices of an ethical nature.

When operationalised, ethical frameworks, integrating core principles and values, consist of a set of procedures to be followed in addressing an ethical issue or a set of criteria to be factored into a decision, or both (WHO 2015: 22). Disaster response, including CBRN emergencies, has the effect of eclipsing existing rights in general and human rights in particular. For instance, when the impact of a disaster is significant and a state of emergency or exception is declared, this may be used as legal justification for setting aside the usual legal rules (Scheinin et al. 2010). In principle, fundamental human rights, because of their universal value, have to be applied at all times and in all places and should be enforced, including in times of disaster. Therefore, a robust **human rights framework** established by official institutions should be used to fill a legal vacuum or to strengthen the basic duties of the various parties involved in a disaster when the usual legal rules have been suspended.

In establishing the PROACTIVE ethical framework, we have adopted the human rights approach to disaster management. The literature review shows the ethical themes and subthemes presented are relevant to all types of disasters, including CBRNe incidents, and involve the preeminence of certain core values. The above human rights approach is manifested in several value configurations and rationale behind CBRNe policies. These **Ethical values** (Rice et al., 2017:119) are: equality, transparency, accountability and empowerment. Specifically, equality refers to ensuring those in need receive the resources they are entitled to. In contrast, transparency ensures those affected by the disaster have full access to information in order to make informed decisions. **Accountability** refers to holding those with power and the ability to distribute those resources responsible for doing so. While distributing resources and rebuilding post-disaster, those affected must be empowered through participation in the recovery in order to ensure sustainable effects.

Additionally, the World Medical Association's Declaration of Lisbon on ethics and emergencies[1] highlights key goals associated with the management of CBRNe events from the first responders (FRs) and medical services point of view. Overall, these have guided PROACTIVE analysis, as follows:

- Preserve autonomy,
- Offer the best health care,
- Avoid negative consequences,
- Preserve equity,
- Prevent doctors from being under pressure.

In a document commissioned by the Council of Europe (EUR-OPA, Resolution 2011-1), ethical principles of the whole disaster cycle are outlined: from prevention to reconstruction via the emergency phase, irrespective of the duration of the disaster (sudden or progressive) or its context (simple or complex emergency). Considering the impact of disasters on human rights during the response phase, in the absence of a specific universal binding legal instrument, and especially where a state of emergency has been declared, it is imperative to formulate the essential ethical principles as part of a minimum set of ethical standards to guide the various parties in action. In this more general framework, **nine ethical principles** are stressed (idem, 27-31) as follows:

- **Humanitarian assistance**: all persons receive immediate assistance, including the benefit of essential health services. Humanitarian assistance is provided fairly, impartially and without discrimination, showing due regard for victims' vulnerability and individuals' and groups' specific needs.

- **Information and communication during disasters**: all persons, local and regional authorities and non-governmental organisations affected by disasters are informed of and are entitled to participate in making decisions in response to disasters. They receive, in their own language, easily understandable information about the nature and extent of the disaster, the emergency measures planned in response to it, the times and places at which food and drink will be distributed, the location of emergency medical facilities, temporary housing

[1] Available at: https://www.wma.net/wp-content/uploads/2005/09/Declaration-of-Lisbon-2005.pdf

arrangements and the arrangements for and destination of any population movements that are planned.

- **Compulsory evacuation of population**: compulsory evacuation can only take place if a clear explanation has been given of the potential risks involved in the case of nonevacuation. Persons who refuse to evacuate do so at their own risk and should not endanger the lives of rescue workers through their conduct.

- **Respect of dignity**: the dignity of all persons who are victims is respected, particularly concerning their security, physical safety, access to food and clean water, hygiene, temporary housing, clothing and if necessary essential emergency medical and psychological care.

- **Respect of persons**: personal rights are respected, particularly the right to one's own image and the right to privacy, so that the presence of the media does not result in abuses.

- **Emergency assistance for the most vulnerable persons**: allowing for local circumstances and without prejudice to the priority, assistance to be given to all who have a chance of survival, priority for humanitarian assistance, first aid and emergency evacuations is aimed at the most vulnerable people, such as pregnant women, children, people with disabilities, elderly people, the ill and the wounded. States train and provide special equipment to members of the emergency services and doctors and nurses so that they are able to search for and provide first aid to the most fragile persons.

- **The importance of rescue workers**: irrespective of their nationality, their status or their function and regardless of the seriousness and nature of the disaster, both civilian and military rescue workers, including any private security forces, behave with dignity, keep their anxiety or fear under control, keep calm and ensure that they never infringe the fundamental rights of the people they are rescuing. States, international organisations and all institutions connected with humanitarian assistance in response to disasters take every possible measure to guarantee rescue workers the necessary conditions for them to carry out their work properly, including the conditions needed to protect their dignity, safety, as well as their physical and psychological integrity. States, regional and local authorities and rescue training establishments provide special training to rescue workers covering human rights and ethical principles in times of disaster and the special arrangements for dealing with persons with disabilities and the most vulnerable persons.

- **Measures to safeguard and rehabilitate the environment**: in view of the importance of the environment to human survival, practical measures are taken to ensure the quickest possible safeguarding and rehabilitation of environmental assets and the re-establishment of environmental quality.

- **Measures to safeguard and restore social ties**: considering the importance of social ties to human survival, practical measures are taken to ensure that social ties are restored as quickly as possible, in particular by facilitating meeting places, place of worship and places for leisure activities.

Yet, the above guiding principles for ethics in CBRNe contexts and policies are challenging in their actual implementation since they may entail ambiguous or even diverging actions, as we will see in the following sections.

2.1.1. Problematising ethics in CBRNe policies[2]

Ethical analysis has been conducted concerning specific CBRNe events management processes and aspects, with the above principles as main normative coordinates. Some aspects addressed by the literature in this domain include how to manage disaster triage (Barilan et al. 2014; Ten Have 2014; Wagner and Dahnke 2015) or the main components of obligations and rights of healthcare professionals working in the sector (Eckenwiler 2004; Grimaldi 2007). Moreover, some authors provided disaster bioethics analysis addressing ethical questions raised by the occurrence of such events, regarding methodologies adopted to tackle the needs of those affected by them (O'Mathúna et al. 2014) as well as **operational issues** emerging from CBRNe security (Carter et al. 2013; Davis and McHenry 2005).

However, the literature has pointed out that there is a lack of a general consensus on how to address the legal and ethical dimensions of CBRNe scenarios and their concrete ethical implications associated with protected groups (O'Mathúna, 2019; Rebera, 2019). Along these lines, it is critical to further study the ethical concerns embedded in CBRNe preparedness and response protocols to **set operational ethical frameworks**, which should also be further adapted to CBRNe scenarios. The need for developing and implementing ethical guidelines, codes of conduct, and training has been underlined in this context (Rebera, 2019).

Moreover, according to Rebera (2019) and O'Mathúna et al. (2014), standard operating procedures (SOPs) are **unlikely to adequately support responders** in non-standard situations when considering the kinds of ethical dilemmas faced by practitioners. The authors see them as aspirational and lacking the flexibility and creativity required to manage these situations. Rather, Alsan and Barilan (2019) suggest having openly prepared research protocols as part of CBRNe preparedness, especially regarding the care of CBRNe-related workers and emergency and health services.

To move forward in the above direction key aspects to consider are **citizen engagement and participation, equality and accessibility** regarding vulnerable groups. Firstly, a broad ethical consideration is the degree to which communities that are at-risk are **engaged in preparedness planning** for CBRNe and immediate response to events. Such engagement must be based on relevant, valid data and information, recognising and addressing the complexity of setting priorities and allocating resources for preventive action, intervention, and post-crisis response. Secondly, the ethics of trade-offs between societal and individual rights and the roles and responsibilities of emergency responders should be addressed (Rebera, 2019).

Regarding technologies supporting CBRNe response, new methods and technologies should be introduced: "*The deployment of technology – decision support tools, for instance – could promote*

[2] Theoretical framework also reflected in WP6 Deliverables.

ethical behaviour if it has been through some process of 'ethical design' aimed at mitigating certain potential ethical problems", addressing issues such as privacy by design (Rebera, 2019:39). Such a process should follow the above participatory approach to ensure smooth integration of ethical design.

Finally, as reported by Bertrand et al. (2019), for any CBRNe event with casualties, there is a requirement to **allocate resources** on a priority basis whenever resources are outweighed by demand. This is based on the sorting of casualties so that the greatest good is provided to the most significant number of casualties with the greatest chance of recovery. **Triage** is thus vital for ensuring the success of disaster management and relies on previous training in applying specific plans. This moment in the CBRNe response is at the core of efforts for ethics compliance and is part of the medical response to the incident, which requires addressing ethical considerations in processes such as cordoning, command and control, communications, assessment and hazard management.

Ethics framework of emergency assistance to vulnerable people

In disaster preparedness, the terms "vulnerable" or "special needs" are used to define groups whose needs are not fully addressed by the traditional service providers (OES California, 2000:2). It also includes groups that may feel they cannot comfortably or safely access and use the standard resources offered in disaster preparedness, response, and recovery. This includes, but is not limited to, those who are physically and/or mentally disabled (blind, cognitive disorders, deaf and hard-of-hearing, mobility limitations), limited or not native speaking, geographically or culturally isolated, medically or chemically dependent, homeless, frail, elderly, and children. The Recommendation 2013 - 1 of the Committee of Permanent Correspondents on the inclusion of people with disabilities in disaster preparedness and response (EUR-OPA Recommendation 2013-1, 2013) promotes that EU Member States integrate specialised measures for people with disabilities into national disaster risk reduction policies, planning processes, training curricula and emergency response practice, favouring, as appropriate, investment in long-term strategies that would reduce the vulnerability and exposure to disaster for people with disabilities. One of the General Principles in the Ethical Principles (EUR-OPA, Ethical Principles on Disaster Risk Reduction and People's Resilience) (idem, 17) is the principle of non-discrimination:

> *"Measures to prevent, reduce and prepare for disasters and to distribute relief and promote recovery, and also the enjoyment of fundamental rights are secured and implemented without distinction on any ground such as gender, sexual orientation, race, colour, language, religion, political or other opinion, ethnic group, and affiliation to a national minority, socioeconomic circumstances, birth, disability, age or other status".*

The main frameworks to discuss the ethics of emergency assistance for vulnerable groups are the European Charter of Human Rights (ECHR) and the Universal Declaration of Human Rights. Of especial relevance in a time of crisis are:

- rights related to physical security and integrity (e.g. protection of the right to life and the right to be free from assault, arbitrary detention, kidnapping, and threats concerning the above);
- rights related to the basic necessities of life (e.g. the rights to food, drinking water, shelter, adequate clothing, adequate health services, and sanitation) (University of Bern, 2008).

Another relevant multinational instrument is the Convention on the Rights of Persons with Disabilities and its Optional Protocol which entered into force in 2008. According to its Article 1: persons with

disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others. In addition, as stated below, Article 11 of the Convention dictates that in situations of risk and humanitarian emergency:

> *"States Parties shall take, in accordance with their obligations under international law, including international humanitarian law and international human rights law, all necessary measures to ensure the protection and* ***safety of persons with disabilities*** *in situations of risk, including situations of armed conflict, humanitarian emergencies and the occurrence of natural disasters".*

However, adapting responses to the needs of certain groups is not a violation of the principle of non-discrimination, since some people might not need as much assistance following an incident as others. In the spirit of the equity principle, **to prioritise is an appropriate safeguard** of victims' human rights and reflects the fact that vulnerable groups have particular needs. In respect to Project PROACTIVE, we recommend this ethical framework for emergency assistance for vulnerable people be considered.

Considering the concept of 'vulnerability', in the white paper for the Center for Disease Control and Prevention (CDCP) (Jennings and Arras, 2008: 81), the authors note that "*vulnerability is not limited to states of special physical or emotional dependency*", but also a **function of social, cultural, racial, linguistic, and geographic disadvantage**. Physically able-bodied and mentally capacitated persons may nonetheless be living in a condition of social vulnerability and precariousness. This vulnerability can be due to factors such as racial discrimination and stigma, poverty and lack of resources, lack of access to functioning and empowering social networks, or living in an area that lacks access to services and resources or transportation. Along these lines, in a study on the "functional needs approach" to emergency management and planning (Kailes et al., 2007), the authors argue that the term 'special needs' or 'vulnerability' is not appropriate as the large number of heterogeneous groups it represents is too large and too diverse for the use of any single designation. The authors recommend using the category of function-based needs, as this approach leads to a common framework that "can relate functional support to functional needs, targeted at improving resource management in any type of incident" (idem, 232). The authors propose a flexible framework built on five function-based needs: communication, medical needs, maintaining functional independence, supervision and transportation (C-MIST).

2.1.2. Introducing dilemmas between ethics principles in CBRNe scenarios

We can examine the above-pointed-out reference values for CBRNe policies and the existing challenges and constraints in their application in preparedness and response from the perspective of **ethical dilemmas entailing competing values**. In this regard, the ethical dilemmas to be addressed are multiple and context dependent. Still, they provide an instrument applicable to several scenarios since such dilemmas are often aligned with social tensions or common interpretations of fundamental rights (Rebera, 2019). According to this, CBRNe incidents raise the genuine possibility of ethical dilemmas such as:

I) Lose-lose situations for responders in which decisions must be taken amid extreme **time-pressure, information gaps, and other stressors to decision-making** (Karadag and Hakan 2012; Rebera and Rafalowski 2014).

II) Ethical challenges such as, for example, administering drugs (Castle et al. 2010), conducting field triage (Ramesh and Kumar 2010), and gathering patient consent (Rebera and Rafalowski 2014) may all be more difficult in CBRNe incidents due to the **use of PPE (personal protective equipment**) such as hazmat suits. Along these lines, we could add individuals personal choices vis a vis accepting medical treatment.

III) The duty of care that healthcare professionals bear to their patients cannot be simply assumed to outweigh personal interest in their own wellbeing, nor the responsibilities **owed to loved ones** (Sokol 2006).

Therefore, when going through pre, in and post-incident scenarios and interactions, practitioners and the public will be subjected to **value principles, tensions and trade-offs**. The following principles and issues illustrate these tensions:

Table 1. Examples of ethics principles dilemmas in CBRNe events

Main principle/ issue	Definition	Dilemma
Restriction of individual liberty	Restrictions to individual liberty will probably be necessary in order to protect the public from serious harm. In these cases, public health should prevail against individual liberty.	However, these restrictions should always apply: • Respect human dignity (individuals should never be considered as mere means); • Be proportional, necessary, and relevant; • Employ the least restrictive means; • Be applied equitably (unjustified exceptions should be carefully avoided).
Proportionality	The principle of proportionality involves a balance between the level of an incident and the measures undertaken as a consequence.	In terms of rights/duties balance, "*Proportionality requires that restrictions to individual liberty and measures taken to protect the public from harm should not exceed what is necessary to address the actual level of risk to or critical needs of the community*" (Mastroianni et al., 2019).
Reciprocity	Reciprocity requires that society support those who face a disproportionate burden in protecting the public good and take steps to minimise burdens as much as possible.	Adopting effective measures to support the FRs, taking care of their families while they accomplish their duties, etc., are good examples of how reciprocity can be implemented.
Clarity, transparency and trust	Decision makers will be challenged to maintain stakeholders' trust while implementing various control measures during a CBRNe incident.	Transparency is essential to maintain trust. Moreover, an adequate communication policy is both a crucial practical tool and a moral imperative that is not always fulfilled. However, transparent communication could be

		challenging to achieve in a major CBRNe crisis. Sometimes hiding information (e.g. about suspects in a criminal investigation) is based on the no-harm principle.
Solidarity	It is important to think about solidarity in terms of humankind's scope, as far as the dimension of a CBRNe major crisis situation often overwhelms the national scope. International cooperation is a critical factor in building an optimal response to these incidents.	However, there are several situations where not fulfilling this principle can be justified in the clash with other principles, for instance, concerning non-discrimination with actors falling outside the scope of solidarity resources, political commitments and means.
Respect for human dignity, non-discrimination and equity	According to the principle of respect for human dignity, we should never use a human being as a means for realising response technical performance indicators, even if this could lead to a better final result in terms of saving human lives. Respecting human dignity also involves the principle of non-discrimination based on victims' race, nationality, religious beliefs, age, etc.	Respecting the principle of equity, however, asking the majority of those affected by the event to apply the discrimination principle in favour of vulnerable sections of the population and those who are especially committed to risking their lives or health to mitigate the consequences of the crisis.

Source: own elaboration considering Mastroianni et al. (2019), Rebera and Rafalowski (2014).

The methodology used to analyze the interactions between first responders and volunteer victims during the PROACTIVE field exercises considers the above ethical dilemmas as part of the data collection and examination processes. Such methodological design and analysis, mainly focused on field exercise outcomes, is reflected in Sections 3 and 5.

2.2. Data protection principles and requirements in PROACTIVE

PROACTIVE outcomes have also been analysed from the **perspective of privacy**, covering both the ongoing integration of privacy by design solutions into its technologies and further developing strategies to protect privacy in CBRNe policies. Along these lines, both guidelines and technologies in PROACTIVE have followed the main data protection requirements detailed in the following documents (identified and systematised in D8.1):

- The Charter of Fundamental Rights of the EU (2000/c 364/01),
- General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679),
- Convention No. 108 of the Council of Europe for the Protection of Individuals about Automatic Processing of Personal Data adopted on 28 January 1997,
- Directive 96/9/EC of the European Parliament and the Council of 11 March 1996 on the legal protection of databases,
- Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (Directive on Electronic Commerce),

When analysing the PROACTIVE CCS, data protection main principles considered in PROACTIVE development have been translated into the following central considerations:

- **Confidentiality**: Sensitive information related to CBRNe events, such as the identity of individuals and vulnerable groups involved, but also the location of hazardous materials, and the status of response efforts, should be protected from unauthorised access or disclosure. In PROACTIVE, this includes an effort to automate the selection and deletion of audio, video and images gathered by LEAs as data controllers.

- **Privacy**: Individuals who are affected by CBRNe events, such as FRs and members of the public, should have their personal information protected. This includes information such as their location, contact information or faces. Exceptions to these principles should be appropriately justified under public interest or another applicable legal basis.

- **Data security**: Following the above, the data collected by victims or authorities in the context of CBRNe events should be protected from unauthorised access or disclosure. This includes measures such as encryption, access controls, and regular security audits.

- **Data accuracy**: As detailed in D8.2, the data collected and processed in the context of CBRNe events must be accurate and up-to-date, particularly in a context where human-made disasters or attacks are based on a combination of physical attacks with misinformation and fake news. This is important to ensure that decisions made based on this data are reliable and effective.

- **Transparency**: The collection, processing, and use of data in the context of CBRNe events should be transparent, with clear rules and procedures in place to ensure that individuals' rights are respected. This should be embedded in PROACTIVE guidelines produced for by FRs and also in the PROACTIVE App privacy policies.

- **Data minimisation and retention**: The PROACTIVE guidelines and technology should aim towards reducing any excess data by also deleting non-relevant data or establishing core tools to minimise the risk of unauthorised access or disclosure. The data collected in the context of CBRNe events should be retained only for as long as necessary to fulfil the purposes for which it was collected. After this time, the data should be securely destroyed or anonymised. Only necessary information should be collected and processed in the context of CBRNe events.

2.2.1. Illustrating data protection requirements operationalisation in PROACTIVE

The project's data protection framework reflected in D8.1, following the above principles, led to the iterative development of privacy impact assessments and privacy by design recommendations in D8.2 and D4.4. As part of this process, the following recommendations were partially or fully embedded in the design of the system:

Table 2. Preliminary data protection requirements for the PROACTIVE technologies

Issue	Relevant article (GDPR)	Applicability in PROACTIVE and recommendations
Roles	Chapter IV (especially Article 28)	Processors must be adequately identified. Also, the relationship between them and the controllers has to be regulated through a contract that includes privacy and data protection clauses. Overall, controllers must ensure that processors are compliant with the GDPR.
Anonymisation	Recital 26	Data subjects cannot be identified, directly or indirectly, in order for a data set to be considered as anonymised. Anonymisation, when applicable, must be carried out as it is established in D10.5.
Special categories of data	Article 9	Special categories of data must be stored following procedures that set-in place additional safeguards. For instance, in PROACTIVE, these data can include reference to victims' health, when they are captured by the project app.
Record keeping	Article 30	Controllers and processors processing sensitive categories of personal data need to keep records of their processing activities. In PROACTIVE, this involves setting protocols or by designing mechanisms to ensure that relevant data can be kept in its systems.
Rights of data subjects	Article 12-22	The rights of the data subjects must be ensured by communicating their existence to the research participants before they consent (when applicable). Also, each organisation's DPO needs to have the necessary resources for ensuring the research participants' rights are respected at all times. ▪ Users of the system will be made aware of the limitations of these services, the extent of data to be collected (including their IP address), their right to remain anonymous and the purposes for which this information will used ▪ Images, voice recordings and video can be classified as personal data and need to be held as securely as other forms of personal data. This is especially the case if the image or voice of an individual who has not consented to using the system is inadvertently captured by a consenting user. In these cases, very careful consideration should be given before these materials are released on the public. ▪ Users should not feel pressured to supply

		personal or sensitive information that they do not wish to share. ▪ Users will have the right to access their personal data from the system and will have the right to rectify or remove it, if needs be.
Informed consent	Article 7	The processing of personal data within the PROACTIVE toolkit may be carried out almost exclusively on the basis of informed consent. ▪ Users shall be required to sign a consent form and disclaimer before accessing the data. Assent, when applicable, will be sought. ▪ Users of the system will be given the ability to opt out of the collection of personal and sensitive data about him or her. ▪ Users will be notified of the parties to whom the data may be transferred, the conditions for transferring the data to third parties, and the rights of the individual (data subject) concerning further processing of their personal data. ▪ Users will have a right to change their mind and withdraw any personal data which is sent.
Purpose limitation	Article 5	Data protection principles must inform the development of the different toolkits in PROACTIVE. ▪ All data collected through the system are only to be used for the stated purposes. This must be enforced organisationally and supported administratively.
Security	Arts 1, f and 4.12	Personal data must be processed in a secure way according to the risks created by them. ▪ Images and videos of children can have particular data protection issues and should be reviewed carefully before being made public (purpose limitation). ▪ Only data which is absolutely necessary for the functioning of the system are to be collected (data minimisation).
Data breach	Article 33, 34	Partners must follow the procedures established in this deliverable and the joint controller's agreement.
Data Protection by Design and by Default[3]	Article 25	▪ The Toolkit Controller has to implement technical, organisational and security measures so as to comply with data-protection principles, respect the rights of the data subjects and meet the requirements of GDPR in an effective manner. This has to be done both at the time of definition

[3] These requirements have already been defined by RINISOFT with the support of ETICAS and the rest of the project consortium.

		of the means for processing and at the time of the processing itself. Besides, this has to take into account the state of the art, cost of implementation and the nature, scope, context and objectives of the data processing. ▪ System should allow for both registered and anonymous users. ▪ All data collected, stored, processed and retrieved by the system will be held and transferred through highly secure systems to prevent loss, damage or unauthorised access. These systems should not be based outside the EU unless absolutely necessary. ▪ When (if) registering, the users' profile shall not demand any personal data. All data requested must be volunteered by the user and not compulsory, except for the email address. ▪ System shall not disseminate personal information of users. ▪ Maps must be designed in such a way make the identification of a particular home or address difficult.

Source: own elaboration based on D8.2.

This iterative analysis of the above basic requirements integration led to different assessments, such as the data breach tabletop exercise conducted with end users as part of D8.2 following the requirement reflected in the above table. The updated analysis of the PROACTIVE CCS in Section 4 provides an understanding of the level and forms of integration of the above and additional data protection requirements into the system's design. It supplements previous privacy impact assessments included in D8.2 and D4.4.

2.3. Acceptability requirements, principles and drivers

Another conceptual framework used to examine PROACTIVE social impact is the acceptability and acceptance of CBRNe policies. Following D8.2, we will start differentiating between the concept of acceptability, which can generally be seen as a form of preceptive collective approval of a particular policy, measure or technology, and acceptance, which concerns this judgment but post-ante or based on experience (Huijts et al., 2012; Poortinga et al., 2004). As discussed along WP8, drivers for acceptability and acceptance have been widely studied, particularly in the technological domain, where acceptability has been framed as "users' willingness to use" (Février, 2001:16). Acceptability drivers are embedded in specific social representations or perceptions of technology in a given social context (Barcenilla and Bastien, 2009; Tricot et al., 2003).

Instead, technological acceptance relates to the actual use of a system, namely the representations derived from this process. Therefore, this concept has often been framed as a post-assessment process derived from human-machine interaction (Février, 2011; Bobillier-Chaumon and Dubois, 2009). In WP8, we have therefore distinguished between acceptance as associated with different drivers surrounding the actual use of technology and acceptability as an aprioristic representation of this use (Tricot et al. 2003).

2.3.1. Social and political acceptability variables in the CBRNe domain

Instruments and policies to prevent and respond to CBRNe events and incidents are very domain and case-specific in terms of the drivers leading to their acceptability. Still, beyond the concrete casuistic of each stage of CBRNe management and the type of incident at hand, some general implications should be considered. On the one hand, they involve addressing risks with many social and political connotations, such as the institutional management of confidential information or the potential stigmatisation of specific ethnic groups. On the other hand, technologies used in this context are often under public scrutiny due to their potential for misuse and other negative externalities concerning surveillance or false positives.

While it is possible to identify key dimensions of acceptability and general methodological considerations, there is no overall approach to this concept in the CBRNe field. The diversity of threats addressed within this research domain and the concrete social conditions where they are tackled, as well as the different purposes of response strategies, do not allow generalisation, as reported in many research documents (e.g. Malich et al., 2016:650).

Based on the WP8 analysis, we will classify the main drivers determining the acceptability of CBRNE policies and technologies. This synthesis, reflected in Table 3, is very relevant for framing best practices and analysing the way PROACTIVE addressed acceptability by design.

Table 3. Summary of acceptability drivers in CBRNe and recommendations

Acceptability driver	Definition	Main recommendations
Public environment and media in CBRNe events	The importance of the environment in determining social understanding of bioterrorism threats and other CBRNe risks has been stressed. Media events surrounding these events are considered a critical driver for acceptability.	The literature presents the **participation of affected groups** as an essential way of addressing possible gaps or distortions between policy to counteract these events and dominant social perceptions. It has also been recommended to involve these actors in exercises and create mechanisms to foster journalism ethics within these scenarios (Matthiessen-Guyader, 2004).
Knowledge transference and training as acceptability factors	Social familiarity with CBRNe events and how to behave when they occur could be increased through systematic preparation (BESECU, 2011). Tactical and planned communication of authorities with communities based on clear and detailed information has been presented as fundamental for increasing both acceptability and resilience to CBRNe events	▪ **Increased public understanding** of CBRNe incidents by conducting targeted training. Training should be based on clear and adapted guidance (see below). ▪ **Conduct and promote risk-based training,** including incident simulations. Potential threats and options for tackling them should be provided. These exercises should take into account the specifics of CBRNe

	(Lucini, 2017).	related risks in a specific context, such as the frequency and characteristics of the incidents. Decision-makers, including politicians in charge of tackling these events, should take part in these activities.
Cultural capital and acceptability to CBRNe policies	A critical element for the successful implementation of response measures is the education of the public regarding how to act during CBRNe events. This concerns aspects such as incident management strategies and a shared understanding of existing guidance (Hall et al., 2019; Heath, 2016; Andrade-Rivas, 2015).	Policies should be aimed at **increasing the level of knowledge of the public** in CBRNe events, which has also been related to the effectiveness of response strategies. Educational methods can include TV campaigns, newspapers or the Internet (Yoshida, 2016, Kanda 2014). Such policies should also engage individuals based on accessibility to educational resources (Andrade Rivas, 2015; Yoshida, 2016).
Perceived efficiency of CBRNe policies and acceptability	Another essential factor around the acceptability of first response policies is the **perceived efficiency of existing policies and regulations** by both citizens and FRs (Heirston, 2010). The cognitive and agential dimensions of acceptability are essential in the field of CBRNe. The literature has addressed people's perception of security and related reactions to risks and fear, which would favour more respect for preventative measures adopted (Heath et al., 2017; Andrade-Rivas, 2015).	Response strategies to threats should take into account **widespread perceptions in order to capture the best ways of framing information and guidance**. Contextual and territorial factors such as the frequency of specific incidents are also essential to determine the adaptability of social groups to response strategies and resilience of different social groups (Hales and Race, 2010; Pinel, 2009; Mustonen, 2018; West 2013). In this context, it is proposed to: ▪ Research the cultural and social understanding of security and CBRNe related threats as part of the preparedness process; ▪ Analyse social and social groups' resilience in this framework to ensure adaptability.
Disinformation as acceptability drivers in CBRNe events	Knowledge and the institutional and public arrangements to transmit it clearly and adequately are crucial for prevention and response strategies	It is recommended to develop: ▪ Tools and strategies for distinguishing fake news and scientifically-based news should be advanced for framing public acceptability of authorities' policies

	concerning CBRNe events. In the field of crisis management, the extensive dissemination of fake news can significantly affect social dynamics, broadening panic and fostering problems in response. As addressed by the literature, intentional and unintentional distortions in disseminating information can significantly affect such aims. Along these lines, the literature has addressed how fake information online can negatively affect response to terrorist attacks (Vosoughi et al., 2018; Starbird, 2013).	(BESECU, 2011). ▪ A protocol for human-machine interaction in the implementation of algorithmic analysis of collected information so disinformation can be rapidly identified and removed. ▪ Informative material on common threats, vulnerabilities and options to tackle them should also be circulated through formal education.
Effort expectancy	It is about the level of convenience and usability that affected individuals perceive when experiencing a specific CBRNe policy or information system in this context. Reducing the effort to adopt CBRNe guidelines is highly dependent on the context of applying a particular action.	From a **communicational standpoint**, the following points are recommended to reduce effort in CBRNe protocols adoption: ▪ Language must be clear, consistent and targeted to specific audiences. ▪ Empathy, reliability and precision should be the ground criteria. ▪ Instructions must distinguish between clear actions to be taken in each stage of the preparedness and response procedures. ▪ Reputed and trustable sources must be used, and reliable spokespersons must be in charge of the communicative actions. ▪ Guidelines must: openly inform about the risks at stake while seeking to avoid creating alarm, adapt to the values and cultural backgrounds of the target audience, and address the vulnerable condition of the target audience by adapting communication methods.

		Information **shared through the CCS** should be meaningful, with large, clear and intelligible sections for each function; ▪ Multiple languages should be available in all produced materials; ▪ Integrate manageable maps with the location of events; ▪ The information must be easily edited and uploaded/downloaded and shared; ▪ Content must be adapted to each user's interests and capabilities, including LEAs, policymakers and the targeted vulnerable populations.

Source: own elaboration based on D8.2.

In brief, the PROACTIVE approach towards acceptability has focused on those critical drivers at agential and social levels. Firstly, **ensuring accessibility** to information through mechanisms for overcoming exclusionary dimensions of existing communication frameworks has been emphasised. These range from linguistic, cultural, and gender conditions to religious aspects (e.g. clothing during the decontamination process). Secondly, the need for **building public knowledge** and awareness regarding CBRNe protocols has been stressed. This should be achieved by considering that security policies depend on ethical grounds, public reputation, and proper communication. Lastly, from a broader social perspective, **facilitating conditions for CBRNe preparedness and response** concerning the availability of public resources or inscription of policies within national legal frameworks have also been detected as core components of acceptability.

2.3.2. Key technological acceptability drivers in the CBRNe technological context

D8.2 has particularly focused on models of technological acceptance to be considered in the development of PROACTIVE CCS. Amongst models for technology acceptability developed to frame different dimensions of users' experience and determine the main factors that influence technological adoption, we followed the so-called Unified Theory of Acceptance and Use of Technology (UTAUT). This approach offers a broader understanding of factors influencing the adoption and use of technologies (Venkatesh and Morris, 2003; Venkatesh et al., 2012) and explains acceptability through four main variables, including:

I) **Performance expectancy** (perceived usefulness): "*degree to which an individual believes that using the system will help him or her to attain gains in job*" (Venkatesh and Morris, 2003:447). This issue was addressed through different activities in PROACTIVE, including a Table-top exercise on data breaches in WP8 and questions integrated into the survey conducted in the Ranst field exercise (D4.3 and D6.5) after testing the web platform.

II) **Effort expectancy** (ease of use): "*degree of ease associated with the use of the system"* (Venkatesh and Morris, 2003:450). Through Observers' guides and post-event participant surveys (WP6), the perception of users and end users was also examined to better understand to what extent PROACTIVE CCS contributes to improving the current conditions in CBRNe preparedness and response.

III) **Social influence**: "*degree to which an individual perceives that important others believe he or she should use the new system*" (Venkatesh and Morris, 2003:451). We have analysed how end users and citizens perceive the CCS adoption under this frame (D6.3, 6.4 and D6.5).

IV) **Facilitating conditions**: "*degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system*" (Venkatesh and Morris, 2003:453).

Therefore, the project has addressed the first three variables (*perceived usefulness, ease of use and social influence*) concerning the App and Web Collaborative Platform ease-of-use perception and contextual grounds. Instead, facilitating conditions have worked as a framework to be considered in analysing the CCS implementation and organisational aspects influencing technological adoption. User behaviour will be conditioned by these contextual factors, which include integration to existing infrastructure and interoperability aspects to be defined by each LEA in charge, as suggested in D4.3.

3. METHODOLOGICAL STRATEGY AND TOOLS

This section will briefly describe the methodological strategy used to collect and analyse data used for the social impact assessment. Firstly, we will develop the framework used to examine the ethical implications of PROACTIVE-related guidelines. Secondly, we will describe the main aspects of Social Impact Assessment (SIA), such as sample, data collection techniques and analysis. Finally, we will explain methods used to collect information about the PROACTIVE CCS to conduct a final privacy impact assessment and introduce the methodological methods and techniques used to gather validation data as part of the field exercises.

3.1. Methodological framework for the ethical examination

In PROACTIVE fieldwork associated with CBRNe ethics (see D6.3, 6.4 and 6.5), we followed the 'modified consequentialist approach' proposed by Rebera and Rafalowski (2014). It is an on-the-spot ethical decision-making perspective which works by setting a central value or principle (i.e., saving lives, for example) and using it as the basis of a "goal-oriented heuristic" (Rebera, 2019: 42). These sets of principles therefore work as axiological poles to build the ethical assessment. Along these lines, "additional core rights and values are factored-in as 'side-constraints" (Nozick 1974; cf. Kinslaw et al. 2009). I.e., minimum standards beyond which any violation is unacceptable" (Rebera, 2019: 42).

The above represents a **flexible basic framework**, but it should also be noted that it implies:

- an ethos must recognise that priorities may change in the event of, or during, an incident (ACP 2012: 37),
- significant and ongoing effort is required to ensure the values given by an ethos can be readily operationalised. I.e., translated into actions and decisions in the field.

The framework, therefore, also works as an awareness raising tool. Such awareness requires openness and the capacity to deal with such situations using creativity and innovation (Mendonca and Fiedrich 2006; Webb 2004), as well as awareness of the impact of stress, cognitive bias and moral framing on judgment and decision-making (Greene et al. 2008; Starcke et al. 2012).

Following our discussion in Section 2, when setting the framework for the building on axiological principles, we considered that an appropriate social response to CBRNe must reflect two fundamental goods: the promotion of the common good and the protection of people from the subjection of anybody's interests to either the interests or will of others, without an appropriate structure of consent (Shapiro 2003). Moreover, cultural diversity as a challenge for CBRNe ethics when trying to achieve international cooperation is firmly established as a principle of disaster bioethics and humanitarianism and regional and country-levels are key. Where agreements on shared approaches to ethical problems can be found, they should be vigorously pursued. Agreed approaches to resolving situations in which the values and principles guiding the responders' decisions clash should be established (Rebera, 2019: 46-47). Recognition of the role of diverse spiritual beliefs and of bioethics is vital. Recently, the West has enriched the discourse on bioethics and enabled a broader understanding of both health ethics generally and its implications for CBRNe. Rights would be considered in the context of the following:

- interpersonal ethics (including freedom of choice),
- public health ethics (including equity and access to emergency response services),
- environmental rights, which pertain to all members of society (Jillson, 2019: 57).

Our goal during the PROACTIVE analysis and field exercises was to present, discuss and contrast several **ethical dilemmas** that work as mechanisms for building a general ethos or code of conduct in similar contexts and which ensure a good balance between generalisation and application and capture most casuistic occurring under unpredictable conditions. Taking the above into account, ethical considerations and principles must be differently addressed in the form of dilemmas over the "key tasks" of the CBRNe process as follows:

Table 4. Type of ethical dilemmas and categories

Task	Overriding goal of the task and main principle	Side ethical constraints and principles	Choices and constraints (standard for violation of main principle)
1.Conducting disaster triage	I.e., mitigate impact on health	Vs relative impact on privacy	Water-curtains in public view

	I.e., avoid negative consequences and preserve equity	Vs decide the order of treatment of (patients or casualties)	Prioritise vulnerable groups (properly pre-established)
2.Conducting decontamination	I.e., save lives	Vs impact on respect for autonomy	Balance individual rights with social good
	I.e., follow consent	Vs when the patient is unconscious	Prioritise health and safety
	I.e., respect privacy	Vs rapid management and physical protection of individuals	To determine the use of water-curtains in public view
3.Evacuations, dealing with the public	I.e., save lives	Vs physical and psychological impact	Help and information points outside targeted area
4.Effective communication while in PPE and at a general level	I.e., prevent risks and complications and to increase public compliance	Vs physical and psychological impact	Factual, trustworthy and timely information to the public
5.Management of volunteers and healthcare workers	I.e., reduce harm	Vs restriction of individual liberty, proportionality, reciprocity, clarity, transparency and trust, solidarity, and respect for human dignity, non-discrimination and equity	Provide timely and comprehensive information on side effects of policy action

Source: own elaboration.

The above was translated into different documents for the field exercise observations and questionnaires shared with relevant stakeholders. Following the European Commission reviewers' recommendations, fieldwork included collecting specific information on FRs' performance regarding predefined ethical concerns, variables and tensions between principles. The latest analysis is based on three main data collection tools:

- Firstly, fieldwork was conducted by ETICAS (two focus groups and observations),
- Secondly, ethical questions were included in the Observer's guide,
- Finally, the reporting of the External Ethics Advisory Board (EEAB) which is also fed by the theoretical-methodological approach built by ETICAS and CBRNE through the provision of an evaluation guideline. The outcomes of this analysis are included in WP6 Deliverables.

In particular, the project ethical team developed *an Ethical Observation and Evaluation Plan* to collect information from FRs, policy-makers and validation activities participants. The questionnaire (Annex 1) was based on the above ethics framework and was used to identify potential ethical issues associated with CBRNe response policies. This ethics tool has been implemented for evaluation purposes in WP6 Joint exercises, evaluation and this deliverable.

3.2. Social impact assessment methodological design

The research design for this social and privacy impact assessment is a mixed-methods approach that combines surveys with experts, participant observations, and focus groups. This approach allows for a comprehensive understanding of the social impact of CBRNE policies from multiple perspectives and levels of analysis, focusing on the guidelines and systems acceptability and usability.

Research sampling

The sampling for this Deliverable was purposive, with a focus on including experts and stakeholders from relevant fields, including emergency management, public health, law enforcement, and the military. Participants were recruited as part of the field exercise process led by WP6, where initial participants are asked to identify additional potential participants who meet the study criteria, including the presence of vulnerable and non-vulnerable groups. This approach ensured a diverse and representative sample of experts and stakeholders.

Data collection

- *Surveys (Observers Guides) with expert observers*

Experts were recruited through email invitations and were asked to complete a survey on-site that included questions about their experience when observing implemented CBRNe policies, their perceptions of the potential social impact of these policies, and their suggestions for improvements. The survey was structured by WP6 partners and included core questions on acceptability, ethics and privacy.

- *Participant observations by ETICAS and ethics observers*

The researcher and experts conducted participant observations to gain a deeper understanding of the social impact of CBRNe policies from the perspective of those who are directly affected by them. For this purpose, these actors attended the field exercises, took notes based on two different observer templates, and conducted informal interviews with participants to gain insights into their experiences and perceptions.

- *Focus groups with volunteers*

Focus groups were conducted with volunteers who went through the simulated scenarios to get more data on the social impact of CBRNe policies from multiple perspectives, in particular from the position of volunteers belonging to protected groups. Focus groups were conducted in-person and moderated by WP6 researchers. The focus groups included a combination of open-ended and closed-ended questions and were audio-recorded and transcribed for analysis. ETICAS attended some sessions and took notes concerning aspects associated with social impact embedded in the focus group interview guide.

- *Data analysis*

We conducted **thematic analysis** using the above combination of sources and focusing on those sections of questionnaires aimed at gathering information on acceptability, privacy and ethics as key registers. The analysis was used to identify the social impacts of CBRNe policies on the affected population and the community at large, and to provide recommendations for improving the policies.

3.3. Methodological notes concerning the Privacy Impact Assessment

A Privacy Impact Assessment (PIA) is a systematic process for identifying and addressing potential privacy risks of a technology or system. When conducting a PIA for the PROACTIVE CBRNe Crisis Communication System (CCS) we used the following methodology.

Data collection
Data collection strategy was twofold:

- On the one hand, in all WP8, using WP4 deliverables and interviews with technical partners from RINISOFT, we gathered information about the App and web collaborative platform, including its architecture, purpose, functionality, data collection methods, storage, and sharing practices. Interviews with developers, as well as a review of the app's technical documentation, were useful with this aim in mind. Also, peer review and interaction concerning the development of D4.2 and D4.3 were used for this purpose.
- On the other hand, results from the App simulated scenarios to evaluate its privacy performance in field exercises, where the App was tested under different conditions to identify any privacy issues or concerns. Surveys and observations by experts were conducted to gather feedback on the app's privacy performance.

Identifying and analysing privacy risks
The examination was focused on identifying potential privacy risks associated with the App and web collaborative platform, such as data breaches, unauthorised access, and data collection beyond what is necessary for the CCS' purpose. This was done by reviewing the CCS privacy policy and any relevant regulations or guidelines. The risk assessment process is also aimed at estimating the potential impact of each risk and evaluating the effectiveness of any mitigation measures that have been implemented.

Developing recommendations
Recommendations are developed for mitigating the identified privacy risks that are beyond the scope of by-design technical integration processes conducted during the project lifespan. These recommendations are based on a risk-based approach, with the most significant risks addressed first. Therefore, recommendations include both implementing non-achieved technical measures such as encryption or access controls, as well as developing policies and procedures to guide the CCS' development and use.

4. EXPLORING THE SOCIAL IMPACT OF THE PROACTIVE TOOLKITS: GUIDELINES AND CCS

With the primary goal of making CBRNe crisis preparedness and response fair, accessible and inclusive, PROACTIVE has built innovative approaches towards CBRNe preparedness and response. This process has been conducted from a participatory approach which included the intervention of more than 100 practitioner organisations and more than 50 civil society organisations

(vulnerable groups among them). This section will briefly introduce the research project's primary outcomes concerning protocols, guidelines, and technologies and analyse them from a social impact perspective.

4.1. Overview of PROACTIVE guidelines and recommendations

Based on documentary and empirical research, PROACTIVE has produced guidelines for relevant stakeholders reflected in WPs 3 to 6. These include recommendations for better SOPs and better cooperation between practitioners and training. Targeted best practices have been developed concerning public awareness and public communication. Also, guidelines for the response and evaluation phases were built considering ethical dilemmas faced by practitioners. These results have been translated into specific materials and outcomes, including:

a) **Pre-Incident Public Information Materials**[4]

b) **Aide Memoire for training exercises involving vulnerable groups**[5]

c) **Policy Making Toolkit, including:**

- **Two policy briefs**
  i. One aimed at integrating vulnerable groups into preparedness and response processes[6]
  ii. The other assembling recommendations and best practices for policy makers so they can facilitate the interaction between FRs and civil before, during and after a CBRNe event[7].
- **One guideline for Civil Society Organisations** aimed at providing a perspective for the intervention of CSOs in the protection of children during CBRNE events[8]
- **Joint publication** with the EU-funded project COVINFORM – highlights what is lacking in good crisis communication and how this can be improved[9].

All the above instruments are based on several testing, risk assessments and consideration of social impact focusing on the differential effects on vulnerable populations. In this regard, Deliverable 8.4 will provide an analysis of guidelines and policies, concentrating on best practices in their actual implementation and potential adverse consequences.

4.1.1. Summary of guidelines and recommendations

The PROACTIVE project main recommendations have been classified and summarised in the project **Final Brochure** as follows:

Recommendations for better SOPs

[4] Available at https://proactive-h2020.eu/wp-content/uploads/2023/06/PROACTIVE_Final-Pre-Incident-Information-Material_.pdf
[5] Available in A4 & 3-fold formats: https://proactive-h2020.eu/wp-content/uploads/2023/06/PROACTIVE_THE-AIDE-MEMOIRE_A4_20230608_12h13.pdf & https://proactive-h2020.eu/wp-content/uploads/2023/06/PROACTIVE-trifold-flyer_20230608_11h45.pdf
[6] Available at: https://proactive-h2020.eu/wp-content/uploads/2023/06/PROACTIVE-Policy-Brief-Digital-20220404_FINAL-ONLINE.pdf
[7] Available at: https://proactive-h2020.eu/wp-content/uploads/2023/06/proactive_-_policy_brief__3_27.06.2023_final.pdf
[8] Available at https://proactive-h2020.eu/wp-content/uploads/2023/06/Proactive-Policy-Brief-2-ERC28-02.pdf
[9] Available at https://proactive-h2020.eu/wp-content/uploads/2021/10/COVINFORM-PROACTIVE-Whitepaper-Communication-in-times-of-crisis.pdf

I. Ensure CBRNe SOPs and guidance documents are uniform in instruction and evidence-based regarding communication, likely public behaviour and how to enhance public compliance

II. Include the needs and expectations of civil society, and especially those of vulnerable groups, as well as plans on how to engage with such groups (e.g., relating to service animals or mobility aids), in CBRNe SOPs

Recommendations for better cooperation

I. Ensure roles and responsibilities of all practitioners are clear both inter and intra organisationally

II. Develop systems of joint cooperation between practitioners

III. Increase cooperation between CSOs and practitioners involved in CBRNe

Recommendations for better trainings, public awareness and public communication

I. CBRNe training should happen more often and should include CSOs and persons with vulnerabilities and their careers, and as such, could be designed to challenge the capabilities and capacities of FRs to manage diverse groups of people

II. Implement information campaigns and education to build CBRNe public knowledge to increase awareness and do so in an accessible way

III. Ensure communication about incidents is done in an inclusive and accessible manner

Recommendations for the response phase

I. During the response phase, keep significant others together and actively involve caregivers in supporting vulnerable persons

II. Attach a photo to practitioner's Personal Protective Equipment (PPE) that shows themselves without protective gear in order to reduce fear levels in the affected population

III. Develop a brief medical triage checklist that may be used to expeditiously identify potential vulnerabilities among those affected by a CBRNe incident straight away

As we can see, the PROACTIVE project covers a diversity of registers in the development of guidelines for stakeholders involved in CBRNe preparedness, response and evaluation. These include a range of aspects from protocols, governance and coordination to experts' training.

The above-synthetised recommendations were built across WPs. In WP1, D1.3 – *Guidelines and recommendations for mitigation and management of CBRNe terrorism*, identified vital aspects to consider Guidance, Counter low Knowledge and Dissemination, Communication with the Public targeted and Vulnerable groups for FRs and authorities. Such recommendations addressed different levels of interaction, such as those related to organisational or human aspects.

Along these lines, Deliverable 2.4 – "***Recommendations on how to adapt SOPs and tools***", puts together concrete Recommendations for SOPs and Best Practice. In decontamination, the analysis underlines the need for adapting SOPs communication to vulnerable groups to enhance engagement. Moreover, FRs should also be in direct contact with vulnerable persons so vulnerable individuals are not left behind while others flee or are evacuated. Similarly, physiological support is

recommended in training and working with vulnerable individuals. Other aspects concern the existence of specific governance for managing vulnerable groups in CBRN scenarios. The document also provides methodological clues for testing and validation approaches for stretching the capacities of the rescue units in response, including triage or decontamination scenarios.

For instance, concerning the above recommendations for response, specific aspects regarding triage have been addressed from different perspectives and guidelines have included:

I) Get situational awareness, which should provide a global view shared in real time with FRs and the general population via reliable communication means and secured information networks;

II) Safety and security issues which should be provided to the population and FRs equipped with suitable personal protective equipment (PPE);

III) Safe health for the population, including the management of casualties with fast medical triage and appropriate treatment at the scene and in hospitals.

Steaming from all these different sources and perspectives, the project also developed specific policy briefs in D4.4. concerning specific **policy making aspects** of CRBNe processes, these policy briefs and guidelines (annexed to D4.4) can be summarised as follows:

Table 5. Summary of policy briefs and guidelines

Document	CBRNe toolkit for policy makers: integrating vulnerable groups in preparedness and response	CBRNe toolkit for Civil Society Organisations: collaborating with FRs to integrate children into preparedness and response	Improving interaction between FRs and Civil Society in CBRNe incidents: Guidelines for Policymakers
Targeted actors	▪ Policy makers	▪ Civil Society Organisations	▪ Policy makers
Main goal	▪ To identify and tackle gaps in CBRNe policies concerning the management of vulnerable groups in the EU	▪ To provide guidelines to CSO on how to support other stakeholders to ensure the safety of children in a CBRNe scenario in the EU	▪ To provide recommendations for policy makers so they can smooth collaboration between FRs and CSO in case of a CBRNe event

Main issues addressed	▪ Public understanding of CBRNe events preparedness is low ▪ There are discrepancies on CBRNe guidelines between and within EU countries' policies ▪ There is a lack of focus on vulnerable people ▪ A legal and policy framework that effectively defines roles and responsibilities of all CBRNe practitioners is lacking ▪ There is a general lack of post-event evaluation and analysis by official institutions beyond LEAs and practitioners	▪ EU Member States lack a clear and coordinated approach to enhance societal preparedness and response to CBRNe events that integrate the needs of children. ▪ Lack in the inclusion of children's needs in civil protection planning ▪ Limited communication targeted to children unprotecting them in these events ▪ Mental health and psychosocial support for children in CBRNe incidents recovery are lacking	▪ The special needs of vulnerable persons are not always sufficiently taken into account in pre-incident information material. This concerns both the content and the format of the communication ▪ Lack of public compliance and cooperation due to the limited public perception of trust and legitimacy during CBRNe events ▪ Need to handle immediate practical training as awareness-raising measure to demonstrate practicalities associated with CBRNe incidents during the undressing and decontaminated processes
Main recommendations	▪ EU countries should consider adopting standard high-level policy documents and guidelines ▪ These instruments should guide CBRNe stakeholders on how to effectively communicate, act, coordinate themselves and deal with the needs of vulnerable citizens pre, during and post CBRNe events ▪ Policymakers should provide capacity to	▪ Before CBRNe events, CSOs should focus on developing a culture of prevention and response to emergencies that promotes an active role for children and adolescents. ▪ CSOs should help teachers in preparing children for the basic elements of an evacuation process, for example through regularly trained fire alarms at school ▪ CSOs could cooperate with FRs to promote practices and procedures which FRs can implement to	▪ During the preparedness, to deliver pre-incident information based on diversity and inclusion, in an accessible manner and considering the needs of the audience, especially the vulnerable groups ▪ During the response, by protecting public healthy maximising information sharing, transmitting responsibilities with adequate information, clear strategy and practical training ▪ During the recovery, developing systems of

	allow CBRNe public management to be based on up-to-date evidence, integrate cultural and psycho-social factors, identify vulnerable citizens' needs, and build resilience toward the misinformation ▪ A post-event systematic assessment ▪ National governments should establish a forum where civil societies, LEAs, and other practitioners involved in CBRNe events regularly engage with each other on issues and practices	effectively protect children in emergencies; to encourage them to assume communication that is effective and immediate; to undertake measures that mitigate separation anxiety; and to guarantee children's privacy at all times ▪ CSOs should promote mental health and psychosocial support for children as well as raise awareness about the high rates in children of unusual presentation of diseases	cooperation to identify the ever-changing needs and expectations of the civilians, and transforming these lessons learned into lessons implemented in the return to normal activity

Source: own elaboration based on D4.4.

In conclusion, the issues that have been identified through the analyses carried out by ETICAS specifically focused on the integration of vulnerable groups, children and greater interaction with civil society, and which have been summarised in the table above on the three policy briefs and guidelines, can be tackled by applying the recommendations presented. However, policymakers' and CSOs' toolkits should not be conceived separately. According to the project outputs, only clearly defined, transparent and organised work between the different actors will ensure effective responses in CBRNe incidents. Likewise, the interaction between FRs and Civil Society is fundamental to achieving the ultimate goal of protecting victims and mitigating damages in all phases with a holistic approach, from preparedness with education, during the response with coordination to recovery with the evaluation of lessons learned. The participation of all these actors is essential to build trust and, consequently, the effectiveness of CBRNe responses with a robust ethical framework, especially for vulnerable people and children.

4.1.2. Implications of the participatory and iterative approach to knowledge building

Aimed at **examining, identifying and tackling intended and unintended social consequences** of processes, policies and technologies in several domains, Social Impact Assessments (SIA) have historically focused on vulnerable and disadvantaged people (Esteves et al., 2012). Positive and

negative aspects of planned interventions, such as PROACTIVE guidelines and technologies, are also analysed from the perspective of any **social change** processes they invoke.

Best standards for SIA[10] practice have been characterised by their **participatory nature**, which is still more critical concerning people affected by studied policies or phenomena. They should also integrate perceptions and judgments from those authorities or agencies involved in policy making. Finally, this assessment must aim to avoid and mitigate negative impacts and enrich positive contributions across the life cycle of policy developments.

In PROACTIVE, D8.4 SIA is aimed to double check and contrast the **expected contributions of interventions associated with the above recommendations**, SOPs and policies and PROACTIVE technologies. Along these lines, it should be noted that a core component of strategies aimed at avoiding the negative consequences of new security policies have already been embedded into the project research and development. The social science and humanities (SSH) methods followed by the project have combined several data collection techniques (focus groups, Observers Guides, interviews, tabletop exercises, etc.) and have targeted all affected stakeholders. Moreover, the interaction between CBRNe practitioners and citizens has been promoted and used to frame the potential consequences of suggested policies and protocols.

A strategy based on a human-centred approach was the implication of critical stakeholders in the consortium (8 LEAs, 2 Practitioners, and 3 SMEs working in the CBRNe domain) and creating three advisory boards: one for practitioners, one for civil society and one for ethical experts. The composition of such boards was as follows:

- **The Practitioner Stakeholder Advisory Board (PSAB)**: Integrated by an international panel of experts from different areas of knowledge. They have diverse levels of experience in emergency management or CBRNe response. It also covered the key CBRNe practitioner categories.
- **The Civil Society Advisory Board (CSAB)**: The CSAB covers civil society groups representing a wide range of citizens of different ages, backgrounds and abilities.
- **The External Ethics Advisory Board (EEAB)**: Integrated by independent ethics experts.

In this way, **FRs, practitioners and representatives of civil society** worked together with the PROACTIVE consortium in the development of the project outcomes, including best practices and perspectives to improve current protocols. Several discussions and iterations around these project outcomes allowed them to capture existing needs and validate proposals adequately. As part of empirical research work, the following Table summarised fieldwork developments, actors involved in them and their main goals.

[10] Available at: https://www.iaia.org/wiki-details.php?ID=23

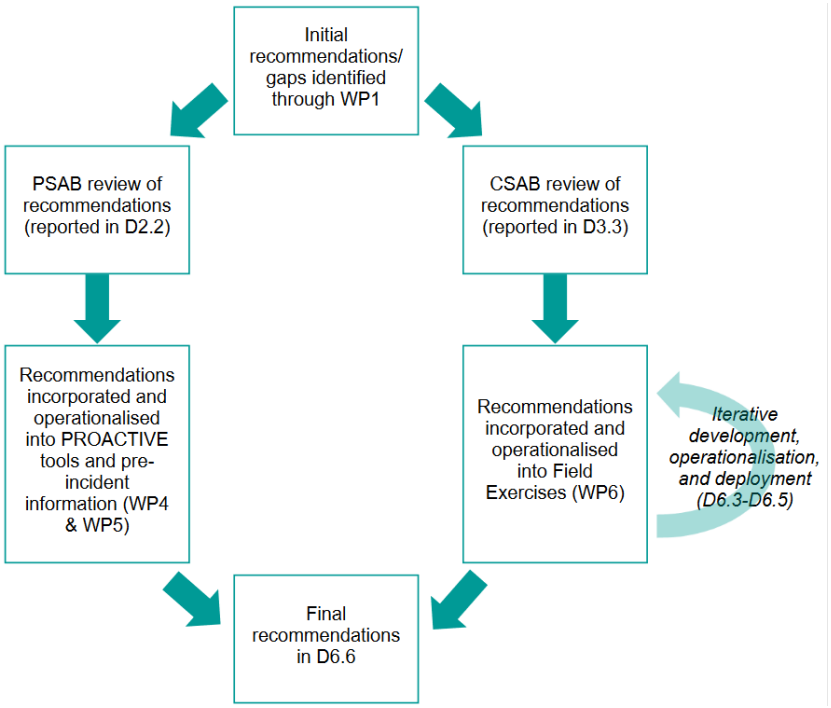
Table 6. Data collection, actors involved and main goals

Activity/Data collection technique	Actors involved	Main goals
a. Tabletop exercise	▪ Practitioners and civil society	▪ Learn about one another's expectations
b. Field training exercises Focus groups, short scale surveys (Observers Guides) and systematic observations with	▪ Together with the EU H2020 project eNOTICE and their training centre partners ▪ Vulnerable groups (took on the role of volunteer victims) ▪ Citizens and experts	▪ Observing and interpreting real interactions, behaviours and perceptions of volunteers/participants
c. Online Survey **d. Online Live Poll during a workshop**	▪ 37 respondents ▪ 32 participants	▪ Analysis of CBRNe and other relevant SOPs ▪ Understand practitioners' views of SOPs
e. Online questionnaire **f. Interviews**	▪ 405 practitioners ▪ 48 FRs	▪ Analyse gaps in dealing with citizens
g. Online questionnaire	▪ 91 civil society organisations	▪ Address citizen expectations regarding CBRNe incidents

Source: own elaboration.

The above processes allowed the development of several materials, including Core Recommendations, the Crisis Communication System (see next section), the Aide Memoire for training exercises involving vulnerable groups, Pre-Incident Public Information Materials[11], and the Policy Making Toolkit. Work done in WPs 1-3 was not only translated into policy briefs and guidelines in WP4 but also further validated by contrasting different outcomes and setting an overall holistic approach synthesised in WP6 as shown in the image below.

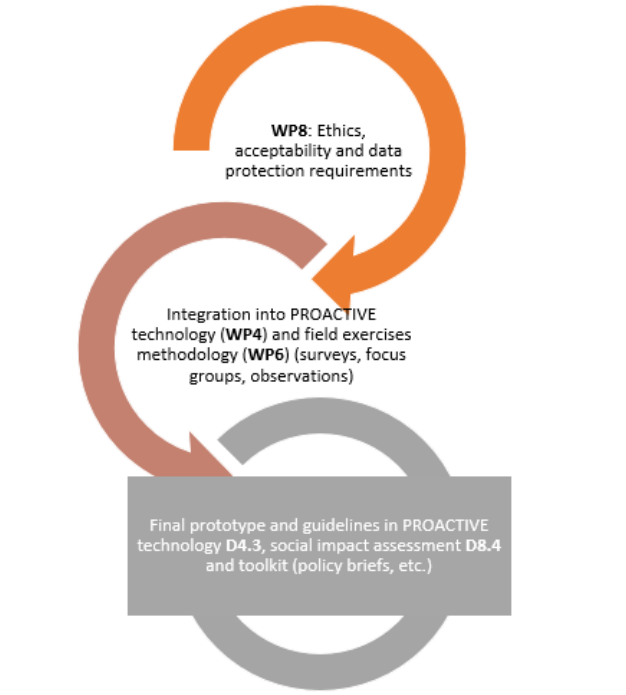
[11] It should be noted that these materials had their own research cycle, including 8 UK focus groups w/vulnerable persons, discussion at each PM with practitioners, focus groups at the EU level and testing at each exercise.



Source: Deliverable 1.3, p.33.

Figure 1. WPs recommendations flow

It should be noted that the above process entailed the development of specific mechanisms to enhance the consideration, awareness and integration of privacy principles, ethical concerns and acceptability findings into the PROACTIVE results. As part of this process, different value tensions and competing courses of action had to be addressed. One example can be found in requirements proposed by the CSAB and PSAB regarding the need for integrating more social media platforms into the CCS and data protection requirements established in WP8. Cases where lessons learned from fieldwork aligned with initial recommendations were also found, as reflected in D4.2, where features for the App concerning better accessibility fitted acceptability requirements identified in D8.2. As we can see in the following image, this process entailed a **transference of knowledge and technical specifications from WP8 to other WPs**, particularly 4 and 6. This process can be illustrated in the privacy recommendations included in the above-summarised policy briefs or the iterative integration of privacy by design into the PROACTIVE App and web platform described in the following section.



Source: own elaboration.

Figure 2. WP ethics, acceptability and data protection flow

In brief, the above process entailed anticipating the ethical and social impact of PROACTIVE outputs through the regular intervention of those involved in their use. This allows for identifying and managing potential impacts, both positive and negative. Therefore, relationships and engagement with partners and the external board taking part in the process, directly or indirectly, were key to ensuring the impact was adequately measured and assumed.

4.2. Summary analysis of PROACTIVE technologies

This section will provide an updated analysis of the PROACTIVE web collaborative platform and two mobile apps[12], namely the **Crisis Communication System (CCS)**, from a data protection perspective. The CCS aims to support LEAs, policymakers and citizens in the case of a CBRNe event by enabling bi-directional communication between them. Moreover, the CCS will also contribute to educating relevant stakeholders by offering up-to-date and comprehensive information and guidelines related to CBRNe events in their pre, during and post-incident stages. Such didactic and informational functionalities will also serve as a basis for preparedness and response standardisation and improvement. It should be noted that one of the key added values of the PROACTIVE CCS is its focus on vulnerable populations. Accordingly, accessibility and adaptability

[12] It should be noted that the two mobile apps are actually integrated into one mobile app with different admin rights/user profiles.

to protected groups' needs are integrated into the system by design and configures one basis for data exchange.

As mentioned above, **privacy by design** has been addressed by an iterative process of requirement definition and testing all over WP6 and WP8 activities. The following sections will describe the final version of the CCS, including the Web platform, the App for practitioners and the App for citizens, to assess the status of the final prototype in this regard.

4.2.1. The Web Platform for LEAs and policymakers

Once in operation in real scenarios, LEAs will use a Collaborative Web Platform, which works as an Online Coordination Portal.

Dimension	Characteristics
Platform data governance	Given the aims and characteristics of the system, it is likely that **LEAs will be data controllers** of the CCS in most operational contexts and scenarios. Accordingly, the platform allows integration with the existing legacy platforms and systems currently used by LEAs. The content and credibility of the information will be up to the LEAs and policymakers.
Access structure and control	Members of **LEAs** managing the platform have restricted access via a registration method. The levels of registration have three security levels, including: I. **Authorised admin**: LEA responsible for the overall platform II. **A restricted user**: Users with the minimum level of access necessary to perform their tasks III. **Low-level user**: User controlled by application-level authorisation. Unauthorised users (not logged in) and members of the public may not view sensitive information or edit publicly accessible information directly.
Main functionalities	The platform: ▪ Reports incidents to the public (i.e., using visualisation methods) ▪ Supports communities monitoring, ▪ Supports risks, threats, vulnerabilities, and incidents assessment, ▪ Works as a CBRNe resources repository, ▪ Allows Bi-Directional Communication between LEAs and Security-based Policymakers via direct messaging and forums. ▪ Provides a map for the LEAs to record incidents, manage/allocate resources and potentially record images and voice messages of the specific incidents - Customisation is available to all users according to the context of a particular scenario (location-map-based), the type of incident and the policies required for specific events. ▪ It includes GIS oriented data storage so LEAs can identify where an incident has occurred and track related information.
Personal data	Personal data collected and shared by LEAs and practitioners includes:

	▪ a valid **email address**, ▪ **geolocalisation data**.
Data management	▪ LEAs are able to upload and download data. ▪ Any information submitted by citizens through the App (such as pictures, audios, etc.), including those datasets that may be from a vulnerable group, would also be processed by the LEA Admin before and after the event. ▪ LEAs can create an FAQ page with useful advice about the website itself or about particular situations in their area. ▪ Moreover, in real operational scenarios, it will enable LEAs to provide/signpost users to other relevant sites/contacts for useful information, for example, accommodation, help lines, charities, etc.
Data security	AWS server, Client-Server communication protected by Transport Layer Security (HTTPS) and End-to-End encryption. The platform uses a GIS-based backend for the geo-located data gathered, enabling GIS-oriented data storage, management and analysis. Once in operation in real scenarios, the web platform will be available via the Police Secure networks. To this aim, the system will need to be certified and tested by Police IT (Information Technology) & Digital teams to meet stability and security standards in line with these specifications.

4.2.2. Mobile Application for Practitioners (LEAs)

The main features of the web platform are replicated in the App used by LEAs and policymakers. In this way, users have remote access to the information they require in real time. Accordingly, LEAs are able to upload, download and remove data from the App, including personal information.

Dimension	Characteristics
Platform data governance	The Mobile Application is **administered by LEAs** and also used by policymakers. It is likely that LEAs will be data controllers of the system in most cases. Depending on the national legal context and framework and specifics of the political domain, FRs, who will be provided with access to some information, will possibly act as data processors on behalf of the police.
Access structure and control	The App will have restricted access via a registration method, replicating the registration method of the web platform, with three types of users.
Main functionalities	The App allows for: ▪ Direct engagement with general public trough dynamic communication, ▪ Direct assistance in monitoring communities through information provision, ▪ Indirect risk assessment via the analysis of reported/gathered data,

	▪ Indirectly assessing threats, vulnerabilities, incidents via the analysis of reported/gathered data, ▪ Indirectly allocating resources Via the analysis of reported/gathered data. Additionally: ▪ The App provides an option for LEAs to **view and validate any content uploaded** to the web platform, and the ability to report and see an incident at a specific location using a map. ▪ The App allows integration with third party apps and social media, such as Twitter or Facebook, which may interact by pushing/pulling information to or from the PROACTIVE system. ▪ It gives end users advice about the website itself or about particular situations in their area via an FAQ page. ▪ It signposts users to other relevant sites/contacts for useful information, for example, accommodation, helplines, or charities. ▪ The LEAs will be reliant on a map to record incidents, manage/allocate resources and potentially record images of specific events on a map. As for the web platform, the language of the static App content is English (to reflect NATO standards). The App also available in German and allows translation into any required European language.
Personal data	To register for the App, end users must share: ▪ a **valid email address,** ▪ **name** ▪ **organisation**; ▪ geolocalisation data. The modular App administers relevant -and sensitive- information about incidents through audio, text, video, images and PDF documents. Personal data managed by end users will include **several identifiers, such as faces, names and others**. Users and stakeholders share this data to dispatch emergency-related information to FRs, providing the capability to access and exchange personal data.
Data management	▪ To share the data with a citizen, LEAs can post an incident directly on the system and send it off for dissemination via the public App. ▪ Using multiple media options, pre-incident, real-time, and post-incident emergency-related information will be uploaded directly by LEAs. This data can be filtered by the data controller. ▪ The App also offers end users the capability to access and exchange emergency-related information with their chains of command and, when useful, directly with citizens.
Data security	AWS server, Client-Server communication protected by Transport Layer Security (HTTPS) and End-to-End encryption.

	As for the platform, to enter into operation, the system will need to be certified and tested by the Police IT & Digital teams to meet stability and security standards.

4.2.3. Mobile App for citizens

This App allows vulnerable citizens to communicate with other citizens, LEAs and security policymakers through selecting, configuring and adapting their preferred tools according to their needs and preferences.

Dimension	Characteristics
Platform data governance	The Mobile Application is **administered by LEAs acting as data controllers.**
Access structure and control	The App has two access levels: ▪ **Registered Users** which enable citizens to report emergencies and view information ▪ **Non-registered users, which enables citizens to view information but not reporting incidents**
Main functionalities	The App provides: ▪ Video (for sign language support), **real-time text, text-to-speech features, and an intuitive user experience environment**, with smart buttons and visual instructions to receive pre, during, and post-incident information on CBRNe incidents. ▪ It provides broad accessibility and the ability to review or report an incident at a specific location using a map. Also Font Size & Type, Colour of Screen to support colour blindness, no flashing images are used to reduce issues with epilepsy, audio options/voice control for the visually impaired/or those with dyslexia, and sign language videos for those with limited hearing. ▪ It uses novelty, including **pictograms and symbols** to reduce the issue of language barriers. Its static content shall be initially in **English** (to reflect NATO standards). ▪ Moreover, it is available for cache data in areas where the internet is not available and, once in operation, should be uploaded automatically when it becomes available. ▪ The App enables the user to select their preferred location when they log in. ▪ Moreover, it provides the citizens with useful advice about the app's functionalities and about particular CBRNe situations in their area via an FAQ page. This page has a section prompting the information to be provided during an incident, such as the route to the event or medical symptoms.

	▪ Lastly, it signposts users to other relevant sites/contacts for useful information, for example, accommodation, helplines, or charities.
Personal data	Users must share: ▪ a valid **email address only**. Data to be processed includes **personal data** shared by authorised users, including vulnerable groups using the application, such as images, video or audio.
Data management	Citizens are **able to download and -with manual filter- upload personal data** (PDF, videos, images, audio files). ▪ Using multiple media options, pre-incident, real-time, and post-incident emergency-related information will be uploaded directly by citizens (push effect). This data can be filtered by the data controller. ▪ They can also receive **automated early warnings** issued by authorities.
Data security	AWS server, Client-Server communication protected by Transport Layer Security (HTTPS) and End-to-End encryption. As for the platform, to enter into operation, the system will need to be certified and tested by the Police IT & Digital teams to meet stability and security standards.

As shown above, PROACTIVE CCS aims to connect different end users (these are FRs, including the police and firefighters, with authorities and partner entities) with technology target users, including vulnerable and non-vulnerable citizens. Means of the system to foster these links, co-developed with users and end users, are reporting mechanisms and communication tools, including text, audio, and video, and information repository facilitating education in CBRNE (Havârneanu et al., 2022). As summarised in the following Table, two of these functionalities are crucial to framing the system governance and setting a policy toolkit for it. On the one hand, the **location capabilities** for end users so they can exploit response factors of this technology. On the other hand, **accessibility features** of the users' App should be broad communication in the case of those with vulnerabilities.

Table 7. PROACTIVE Systems, functionalities, goals and target groups

System	Functionalities	Main goals	Target groups
Web platform	▪ Pre- and post- incident information ▪ Reporting tools and Notification alerts ▪ Data visualisation ▪ Bidirectional communication ▪ GPS identification	▪ Monitor communities ▪ Assess risks, threats and vulnerabilities ▪ Communicate incidents ▪ Allot resources	▪ Police ▪ Firefighters ▪ Other practitioners (i.e., health professional) ▪ Policy makers
App for LEAs and policymakers	▪ Pre- and post- incident information	▪ Monitor communities	▪ Police ▪ Firefighters

	▪ Reporting tools and Notification alerts ▪ Data visualisation ▪ Bidirectional communication ▪ GPS	▪ Assess risks, threats and vulnerabilities ▪ Communicate incidents ▪ Allot resources	▪ Other practitioners (i.e., health professional) ▪ Policy makers
App for citizens/vulnerable population	▪ Pre- and post- incident information ▪ Reporting tools and Notification alerts ▪ Communication tools ▪ Selection, configuration and adapting of preferred tools (needs and preferences)	▪ Communicate with other citizens, LEAs and security policymakers ▪ Obtain information and training	▪ Users (citizens/vulnerable groups)

Source: own elaboration and Havârneanu et al. (2022).

4.2.4. Updated CCS data life cycle and privacy impact assessment

A crucial manner to better understand privacy risks in technological systems is to approach them from the perspective of their ideal data life cycle, namely the different stages personal data undergoes, from initial collection to the moment when it's no longer deemed valid and/or deleted. In real scenarios, after the setting and configuration of the collaborative web platform by the responsible LEAs, including ingestion of data related to initial registration processes conducted by the end users (registered user emails, geolocalisation), the platform manages and coordinates data flow between the stakeholders according to the following stages:

I) **Data collection**: this stage involves gathering information from registered users (their emails) and about CBRNe events. Besides data ingested by the system concerning users and end users, these actors will also feed personal data and contextual information, including indirect personal identifiers, into the system. This may include details about the type of substance or agent involved, the location of the incident, and the number of people affected or their images or voices. This information may come from a variety of sources, including witnesses or victims using the PROACTIVE App and FRs.

II) **Data validation**: once the data has been collected, it will be validated by data controllers (LEAs) to ensure its accuracy and reliability. This involves verifying the information against multiple sources such as intelligence or policing data, news, etc. All incidents reported to the CCS platform will be moved to a holding queue, in which LEAs will have direct access to review and verify the incident. Each of these reported incidents includes detailed descriptions, location coordinates and supporting audio/video data which help LEAs to classify the incident and decide about the next steps for dealing with it.

III) **Data analysis and exchange**: once the data has been validated, it is analyzed to identify patterns, trends, and other important information that can help inform the response to the CBRNe event. A live updated map of incidents, along with a summary of incident status, will be reflected in the CCS. At this stage, and depending on the authorised of data controllers, several data iterations will occur, including three main data flows concerning CBRNe response:

- **From citizens to LEAs**: registered users will have the capability to notify of an incident in their area, which will be associated with the data logged, the status and the type of incident will be required in addition to the location.

- **From LEAs to citizens**: once validated, the LEA can then choose to release an update on the incident utilising the map functionality available in the Mobile Applications. Furthermore, LEAs will have the option to monitor and update the incident using the live notifications functionality once the incident has been investigated.

- **From LEAs to FRs and other LEAs**: LEAs and FRs will share information aimed at preparedness, response and also post-event evaluation of their implemented CBRNe policies. This may include information about events, data on potential threats, or personal data from victims or suspects (following MS regulations and legal basis for the processing).

IV) **Decision-making and response**: based on the results of the data analysis, Law Enforcement officials can make informed decisions about how to respond to the CBRNe event. This may involve deploying specialised teams, using specific equipment and resources, and coordinating with other agencies and organisations, which requires following the above data flows. The outcomes of this process, such as PROACTIVE metadata, may feed LEAs plans and strategies to support those affected.

V) **Data removal:** The LEA in charge of the system should only retain personal data for as long as it's needed. While most stored data is pseudonymised through encryption, each implementer will have to establish data retention policies for personal data (see Section 6).

The CCS collects and processes various personal and sensitive data as part of the above data flows, including but not limited to the user's name, contact information, and location data. Additionally, the apps collect, and process data related to the CBRNe incident, such as incident location, severity, and type. Moreover, the apps use this data to provide FRs with critical information and resources to help them respond effectively to a CBRNe incident. This includes providing information on the type of incident, the location of the incident, and the appropriate response protocols. The App also provides communication tools, such as messaging and location sharing, to facilitate communication and coordination among FRs. It is designed to be used in high-stress, time-critical situations, and as such, the App has been designed with a focus on usability and ease of use.

Due to the variety of personal identifiers managed for these functions and as part of several forms of exchange and their sensitivity, the CCS presents risks associated with data breaches and potential misuse. In this context, the main data protection risks are related to potential **human errors in the**

above validation process or data breaches. Other risks are connected to transparency and informed consent which are mostly addressed through the system privacy policy.

However, three main groups of requirements have been integrated to tackle the above. Firstly, the centralised need for data **filtering and validation** by LEAs. Secondly, the **minimisation** of personal data needed for registering. Thirdly, a set of **security standards** for mitigating risks of unauthorised access. The CCS and its web platform have appropriate security measures in place to protect the data from misuse, disclosure, alteration, or destruction. Its privacy policy explains how the data is collected, used, and shared. The policy also describes the rights of data subjects and how they can exercise those rights.

The following Table summarises the final compliant assessment by introducing an overview of privacy by design and requirements integration into the CCS. We classify each requirement's integration level into the CCS into three classes, **Low, Medium** and **High**. Low represents no compliance with the stated requirement at all. Instead, Medium involves partially integrating it into the system design and High the inclusion and testing of mechanisms to ensure compliance by design further. Of course, most requirements require a diversified approach combining different measures, both technical and human. Still, such classification already represents a risk assessment concerning core data protection requirements useful to open sociotechnical analysis in each deployment context.

Table 8. Main privacy by design requirements, definitions and degree of integration into PROACTIVE prototypes

Requirement /privacy by design recommendation	Definition	Level of integration into the final prototype in the CCS
Roles embedded	Clearly determining responsibilities and establishing accountability mechanisms.	MEDIUM: Authorised access has been designed following different security levels associated with specific credentials for data controllers and standard users or processors. Governance must follow this rationale when the integration of the PROACTIVE CCS into legacy systems, described in D4.3, is conducted.
Informed consent and transparency	Users of the system will be made aware of the limitations of the Toolkit, the extent of data to be collected (including their IP address), their right to remain anonymous and the purposes for which this information will be used. The Privacy Policy mechanism will allow users to consent for each category of personal data, detailing the	MEDIUM: Privacy Policy (PP), cookies policy and Informed consent developed following - GDPR Art 6. This PP has also been adjusted and updated to reflect a scenario of actual use. Still, it must be adapted to specific contexts and national scenarios.

	specific purpose of data collection in each case. Users should not feel pressured to supply personal or sensitive information that they do not wish to share. Information on the Use of Cookies to be provided. Users shall be required to sign a consent form and disclaimer before accessing the data.	
Rights of data subjects	Any personal Data collected is to be made available to the user upon Request and Users will have the right to access, modify, remove or opposed processing concerning their personal data (Articles 15 to 22 GDPR).	**MEDIUM**: General information and mechanisms for exercising these rights are properly reflected in the App and platform Privacy Policy. It offers clear information about how their data will be used. the types of data being collected, how it will be stored, and with whom it will be shared. The amount of personal data to be subjected to ARCO requests (access, rectification, cancellation and objection) will be limited and adequately documented. Lastly, Users can opt-in to provide their personal data.
Purpose limitation	All data collected through the system are only to be used for the stated purposes.	**MEDIUM**: Following the principles of security and purpose limitation, the CCS privacy policy is clear from the outset why personal data is collected and what the data controller intends to do with it. The CCS allows data controllers to comply with documentation obligations to specify its purposes by keeping track of logs and data use. Still, LEAs will have to ensure that if they plan to use or disclose personal data for any purpose that is additional to or different from the initially specified purpose ("compatible purposes"), the new use is fair, lawful and transparent.
Data minimisation	Minimal Data to be Collected/ Stored principle (Article 5,1, C, GDPR). When (if) registering, the users' profile shall not demand the	**HIGH**: Following the principle of data minimisation, the only data to be collected during the registration process is an **active email account**

	least personal data possible for the overall purposes of the CCS. The user must volunteer all data requested and is not compulsory. Only data which is absolutely necessary for the functioning of the system are to be collected. Maps must be designed in such a way that no particular home or address can be identified (granularity of event data)	**and users' first name**. The map used allows only for the general street area to be identified and not a person house to account for this recommendation (pseudo anonymised). However, as the user has the ability to free text an address, the additional measure of pre-approving information before being made public will protect addresses being identified publicly. The toolkit will not use cookies for collecting data or tracking, but will use a cookie for logging in. Collected personal data is the minimum required for achieving the App functionalities.
Data accuracy	Following GDPR Art. 5 1, d, the principle of "accuracy", CCS data must be 'accurate', 'kept up to date' and 'erased or rectified' when inaccurate. According to this, the processing of inaccurate data, understood as incorrect or misleading, should be actively avoided.	**MEDIUM**: Data accuracy in the PROACTIVE CCS will be achieved through the above-described manual verification of data and its sources. This is aimed at ensuring the system only uses credible and reliable data sources, such as government agencies, scientific research, and peer-reviewed publication. This will facilitate the App providing accurate and up-to-date information on CBRNE threats, including information on response issues such as the effects of exposure, symptoms, and treatment options. Still, the system could integrate an algorithmic model to support the filtering of data, which should not perpetuate algorithmic bias, and should be designed to provide unbiased information and recommendations.
Record keeping	The GDPR mandates, as per Art. 30 of the GDPR, that the data controller keeps written documentation and an overview of procedures by which personal data are processed. Use specific tools and protocols for mapping and registering logs to the system to be integrated into the platform. Include a system to catalogue	**MEDIUM:** The CCS has a regular backup schedule in place to ensure that data is not lost in the event of a technical issue or data corruption. It also has a system in place to track and monitor user activity, including login and logout times, data access, and data modifications. Moreover, the App has a clear and easily accessible process in place for users and provides

	received information according to the source.	a copy of the data within a reasonable period of time.
Access control	The CCS must follow the GDPR Art. 32, which requires implementing "*appropriate technical and organisational measures to ensure a level of security appropriate to the risk*" (Article 32), including incorporating access control measures.	**HIGH**: PROACTIVE follows a role-based access control policy and the least privilege principle (see D4.2), users and processes only the minimum level of access necessary to perform their tasks. This can help reduce the risk of unauthorised access and limit the potential damage that can be caused by a compromised account. Secure default settings for all systems and applications have also been implemented. This includes ensuring that all passwords are strong and not easily guessable, and that all default configurations are secure. System access is controlled by application-level authorisation. Unauthorised users (not logged in) and members of the public may not view sensitive information or edit publicly accessible information directly.
Data breaches	A means to provide information about the potential source of the data breach and data subjects involved. The ability to communicate the breach to the supervisory authority based on data regulations and, in some cases, also the data subjects (the citizens).	**MEDIUM:** The CCS has a functionality to preserve the leak's circumstances, as preservation is a key aspect of digital forensics (D4.2 and D4.3) Additionally, the App should develop a human made procedure for reporting and managing data breaches and should notify affected users and regulatory bodies within a reasonable period of time in the event of a data breach.

Data security (integrity and confidentiality) and Data Protection by Design and by Default	Following Art5 GDPR: All data collected, stored, processed and retrieved by the system will be held and transferred through **highly secure systems** to prevent loss, damage or unauthorised access. Integrate security mechanisms of avoiding unauthorised access to pre-incident, real-time and post-incident information (tools and protocols such as automated data pseudonymisation, anonymisation and encryption). These systems should not be based outside the EU unless absolutely necessary. **Special categories of personal data)- Article 9 GDPR:** Images, voice recordings and video can be classified as personal data and need to be held as securely as other forms of personal data. This is especially the case if the image or voice of an individual who has not consented to using the system is inadvertently captured by a consenting user. In these cases, very careful consideration should be given before these materials are released to the public. **Third parties**: Users will be notified of the parties to whom the data may be transferred, the conditions for transferring the data to third parties, and the rights of the individual (data subject) concerning further processing of their personal data. System shall not disseminate personal information to third parties.	**HIGH**: Secure data storage: The Toolkit uses an AWS server which is highly secure and allows for interoperability. It provides security concerning unauthorised access and allows minimising attack surface. Client-Server communication protected by Transport Layer Security (HTTPS). User shares incident details (including optional images). Incident sits in a holding queue for review by the LEAs. Once authorised the LEA will share a separate incident report with the relevant details with the public. This data filtering process will ensure secure data management, minimise risks of discrimination and false positives. The CCS offers the ability to switch off the false data source (D4.2). ▪ In addition, API Key authorisation will be available for external integrations. The privacy policy will be adapted to include explicit information about these third parties and corresponding data exchange purposes. End-to-End Encryption: Implement end-to-end encryption to protect user data, including location information, images from CBRNe events, and communication with authorities. This ensures that only authorised parties can access the data, and even the App developers cannot access it without proper authorised.
Anonymisation / Pseudonymisation / Encryption (D4.2)	Following Article 4(5) GDPR, pseudonymisation should always be applied when allowed by achieving the purposes of data collection and where it is in line	**HIGH**: As stated in D4.2, the CCS was designed with security in mind, with robust authentication and authorised mechanisms, data encryption, and protection against

	with the protocols or technological systems at hand. Pseudonymised data is data that can no longer be attributed to a specific data subject without the use of additional information.	common attack vectors. Moreover, SQL Data is protected by Full Drive Encryption: aes-xts 256. It should be noted that CCS implements hardware encryption/decryption for sector-based storage data. By using AES block cipher complies e with the NIST Advanced Encryption Standard as a subroutine.

Source: own elaboration.

5. ADDRESSING PROACTIVE SOCIAL IMPACT THROUGH THE ANALYSIS OF FIELD EXERCISES

ETICAS has participated in conducting fieldwork and validation activities as part of WP6. This process supplemented work done by project partners on behavioural and sociological analysis of CBRNe events based on the interactions between practitioners, vulnerable populations and end users. WP8 data collection and analysis were specifically aimed to understand better the acceptability (and associated issues such as inclusion or usability), data protection and ethical implications of CBRNe protocols on site.

This was achieved through four main strategies:

I) ETICAS collected observations and notes following a guideline comprising the main ethical and acceptability aspects detailed above.

II) Data was collected as part of the focus groups led by UKHSA, also regarding the dimensions pointed out above.

III) Specific questions on ethics and acceptability issues were included in the Observers Guides, which results provided very useful insights regarding the CRBNe protocols used by FR's performance and its implications.

IV) Together with CBRNe, ETICAS developed an Ethics Observers Guide, addressing the above ethics framework. This document, implemented by External experts, ensured an independent view of ethical dilemmas in action and responses to them.

Before discussing the results of this process, we'll briefly introduce key aspects concerning compliance with ethics in research.

5.1. Responsible research in PROACTIVE fieldwork aimed at addressing ethics and social impact

Ethics requirements were developed as part of Task 8.3, “Ethics briefing”, for project fieldwork and implementation. The implementation of ethics requirements operating in each scenario is also fully described in Deliverables 6.3, 6.4 and 6.5. As reflected in these documents, ethics protocols are based on concrete risk assessments and derived protocols. Therefore, in this section, we’ll only summarise the main aspects considered in this process concerning ETICAS Social Impact Assessment.

During the planning phase of PROACTIVE joint field exercises, the consortium strived to implement the ethical goals designed to inform both the content of preparedness plans and the process by which they are devised, updated, and implemented (Jennings and Arras, 2008). The PROACTIVE Consortium was committed to upholding the highest ethical standards for research, as delineated in the European Code of Conduct for Research Integrity of ALLEA 2023 (All European Academies)[13]. Following the project, Data Management Plan (D7.4) and Ethics Briefing Pack (D8.4), researchers, public and private research organisations, universities and funding organisations were also committed to observing and promoting the principles of integrity in scientific and scholarly research.

5.1.1. Ethics self-assessment and protocols

During the exercises’ preparation phase, the PROACTIVE consortium analysed their potential ethical considerations, and it was identified that the planned research was not going to involve the collection and/or processing of sensitive personal data (e.g., health, ethnicity) and the participation of:

- persons unable to give informed consent,
- vulnerable individuals or groups.
- children or minors.

The project's three exercises involved collecting, handling and storing data from human subjects under the monitoring of the Project Ethics Officer (PEO) and WP8. The consortium enrolled minors[14] in an ethical and legally compliant manner by asking for parental/guardian approval, as well as for assent from the minors. The recruitment was carried out in conjunction with educational institutions and other grassroots organisations and by offering broad information about the field exercise purposes and characteristics, which added further safeguards. Several actions were carried out by ETICAS together with CBRNE, including a specific Data Management Plan for each field exercise, informed consent, ethics risk assessment, preventative measures and briefing taking the framework into account. Emphasis was put on building and ensuring informed consent protocols and establishing robust data management plans for each field exercise.

Informed consent

[13] Available at: https://allea.org/code-of-conduct/

[14] According to the European Union Agency for Fundamental Rights, the age of majority is 18 years in all EU Member States except for Scotland, where children are considered to have full legal capacity from the age of 16 years.

In the exercises, participants were included based on direct negotiation and informed in detail about the set-up of the research, about privacy and data management issues, as well as any potential risk of being harmed in any way. Moreover, they consented to participate in the research (Task 8.3) according to the following criteria:

- For adults voluntarily engaged: a detailed consent form was signed.
- For minors voluntarily engaged (Rieti and Campus Vesta): the recruitment process was thoroughly reviewed, adapted and monitored, a detailed and informed consent form by the guardians/parents was signed, and a detailed and informed assent form for the minors was requested.

Consent forms were in language and terms understandable to the participants. In addition, specific protocols were used for members of vulnerable groups. The consent forms included the right of participants to:

- Know that participation is voluntary;
- Ask questions and receive understandable answers before making a decision;
- Know the degree of risk and burden involved in participation;
- Know who will benefit from participation;
- Withdraw themselves and their data from the project at any time;
- Know how their data will be collected, protected during the project and destroyed at the end.

Following the requirements reflected in these consent forms, PROACTIVE is committed to respecting and protecting individuals' personal identifiable data. Any report produced by the consortium will respect the privacy of the participants, and therefore only anonymised names and institutions will be used.

Data management plans for field exercises

According to the project DMP and the Ethics briefing pack, data collection and storage practices, whether paper, recordings or electronic records, had to be adequately secured to safeguard confidentiality. As part of the data management plans built for Dortmund, Rieti and Ranst field exercises, the types of personal data to be collected were generally classified in:

- Data necessary for the organisation and management of PROACTIVE exercises and other project activities such as name, surname, organisation, position, email addresses, signature
- Image, video, and voice (via photos and audio-visual recordings) and location (via the PROACTIVE App)

To ensure data security and proper coordination in the management of this data, a dataset template was developed in each exercise and circulated among all partners that were going to collect personal data on-site. This template provided concrete information about data identification, partner roles in data management, and methodologies and standards applied to the processing. On this basis, specific measures were established for at least the following three different datasets. The overall data life cycle and data management protocols for each of the above datasets (A, B and C) were reflected in diagrams attached to D6.3, 6.4 and 6.5.

According to the stated DMPs, the purposes of the processing included:

- Organisation of PROACTIVE project activities (e.g., information sharing, drafting of minutes, keeping of attendance list). This data will not be released outside the PROACTIVE consortium.
- The **scientific research** purposes of assessing the PROACTIVE toolkit and testing its technical capabilities, as well as its compliance with legal requirements and social impact. All research data will be anonymised before any sharing outside the PROACTIVE consortium or publication.
- **Dissemination** activities (in printed and/or digital form to be published offline and/or online in various channels such as print publications or websites). This data will be released outside the PROACTIVE consortium under volunteers' consent only.

The legal basis for data collecting volunteers and other external participants' data for research, dissemination and communication purposes was their informed consent, following Article 7 GDPR.

Ethics observers' inputs and integration into the methodological approach

Ethics was also addressed through a set of questions provided to members of the EEAB attending the exercises, which allowed us to monitor compliance and improve the responsible research strategy from one field exercise to the following one. Results are reflected in D6.3, 6.4 and 6.5.

5.2. Overview of PROACTIVE exercises results: ethics and social impact analysis

This section contextualises and summarises the key outcomes of the above fieldwork activities. Due to different factors, including the degree of development of the App and Web Collaborative Platform prototype(s), the number of partners intervening in fieldwork and the gradual development of this SIA methodology based on the initial exercise, ETICAS collected data across the three field exercises on an incremental and supplementary basis. Differences in available data for each scenario are also related to the capacity to access the exercise site directly to conduct participant observations. This means that data collection was distributed in the following manner:

Table 9. Field exercises, data collection strategies and main expected outcomes

Field exercise	Data collection strategy	Main outcomes
1.Dortmund	• Acceptability questions integrated into the Observers guide • Reporting of the External Ethics Advisory Board (EEAB) following proposed guidelines	• Initial framing of participants perception regarding CBRNe incidents and their consequences • Observations on compliance with ethics and privacy principles
2.Rieti	• Acceptability questions integrated into the Observers guide • Data collection in focus groups • Observations of the exercise	• Analysis of participants perception associated to acceptability, ethics and privacy

	• Reporting of the External Ethics Advisory Board (EEAB) following proposed guidelines	• Observations on compliance with ethics and privacy principles
3.Ranst	• Acceptability questions integrated into the Observers guide • Usability questions integrated into Observer Guide • Data collection in focus groups • Observations of the exercise • Reporting of the External Ethics Advisory Board (EEAB) following proposed guidelines	• Analysis of participants perception associated to acceptability, ethics and privacy • Observations on compliance with ethics and privacy principles

Source: own elaboration.

This combination of sources provides comprehensive data on the relative alignment of management of participants in each scenario, including its initial response, triage and decontamination procedures. In this regard, the three field exercises are analysed according to the following structure.

Table 10. Field exercises, dimensions and variables examined

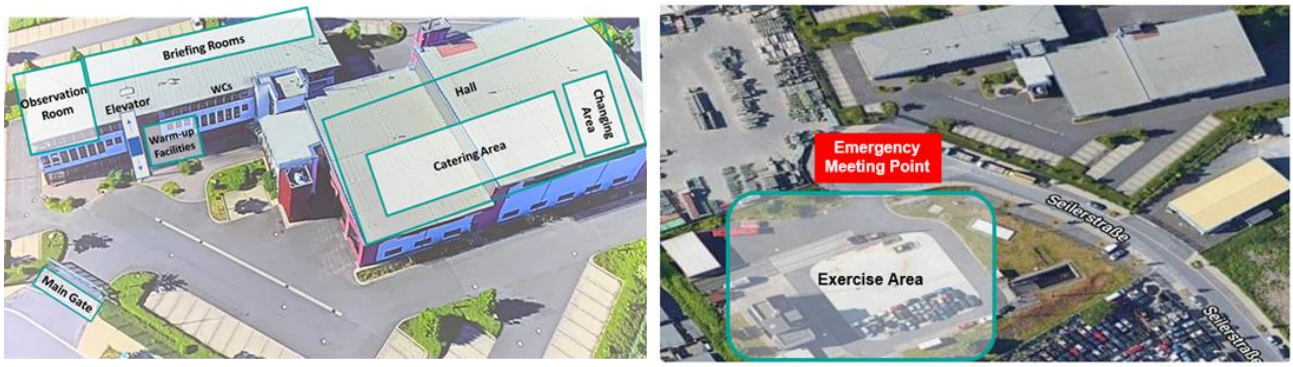
Stage	Dimensions	Main topics and variables
Observation of the simulated CBRNe event	**Ethics** (questionnaires and participant observation)	▪ Contextual factors limiting respect for main ethical principles (beneficence, justice, autonomy) ▪ Choosing between the plausible competing courses of action (tensions between ethics principles) ▪ Taking care of vulnerable groups (cultural, persons with disability, etc.) ▪ Taking care of individuals privacy ▪ Ethics in protocols for first response (technical aspects)
	Social impact (participant observation)	▪ Inclusion, accessibility and communication ▪ Privacy ▪ Triage ▪ End users' governance and coordination
Post CBRNe event examination	**Social impact** (focus groups and Observers Guides)	▪ Inclusion, accessibility and communication ▪ Privacy ▪ Triage ▪ End users' governance and coordination

Source: own elaboration.

5.2.1. Field exercise Nº1: Dortmund

On 7th May 2022, the first PROACTIVE field exercise took place at the Dortmund Fire Department (FDDO) Training Centre in Dortmund (ABZ), Germany in conjunction with Project eNOTICE. The exercise examined how emergency services manage a simulated chemical accident. In particular, the scenario replicated a chemical release from a railway tanker that contaminated a group of citizens at a nearby station. The Decontamination Unit was set up prior to the field exercise and the citizens were decontaminated in line with FDDO's Standard Operating Practices (SOP).

The exercise focused on how the emergency services deal with the needs of particularly vulnerable groups (persons with mobility impairments, etc.) during such an emergency. In this respect, the research addressed the extent to which the emergency practitioners considered the special needs of vulnerable groups during such an emergency. Besides observing the interaction between FRs



and these groups during the incident simulation,
the exercise participants were interviewed about their experiences in the post-event phase.

Figure 3. Dortmund exercise site

Several data were collected to assess Strategic Objectives, KPIs and PROACTIVE tools during the exercise through a mixed-method design. As part of the PROACTIVE strategic and tactical objectives, it was expected to test **compliance with ethical and privacy requirements during preparedness and response emergency** scenarios. To address these objectives, ETICAS provided references on ethics for D6.3. Additionally, the role of ETICAS in this field exercise focused on analysing acceptability, privacy and ethics in participants' interactions.

Participants:
The **18 participants** were distributed as follows:

Vulnerability	Age group	Gender	
		Male	Female
None known	18-30	3	5
None known	31-50	0	4
None known	51-65	2	3
Age	65+	0	1
Tourist			
Blind		0	2
Other visual impairment		0	2
Deaf		0	2
Wheelchair user		0	1
Other vulnerabilities		0	2
TOTAL		5 men	13 women
		18 participants	

Source: D6.3.

No children were involved.

Observation of the Dortmund event

A) Ethics examination

This sub-section presents an analysis of the results of the EEAB observations with a specific focus on ethics. It also includes Observer Guide questions, designed with the objective of receiving feedback and possible recommendations for each of the following five axes.

- **Contextual factors limiting respect for main ethical principles** (beneficence, justice, autonomy)

Generally, the main aspects conditioning the realisation of ethics principles relate to the actual general character of the exercise, its capacity to represent real scenarios and, in this context, how FRs managed participants. According to the EEAB observers, insufficient attention was paid by FRs to the conditions where volunteers were supposed to be involved in the field exercise. Such an approach to victim management led to potential risks to participants' safety. Observers provided two examples, including the presence of shredded glass on the floor of the exit of the Decontamination Tents and the lack of supervision for a visually impaired person who was in danger of falling from the access ramp.

- **Taking care of vulnerable groups** (cultural, persons with disability, etc.)

As suggested above, there was no specific attention paid to vulnerable groups, which also entailed a lack of consideration of the impact of this condition on participants' behaviours or perceptions, such as increased stress or lack of information about how to act. In this regard, examples include the above volunteer with visual impairment who was about to fall from the ramp and, more generally, no first responder attention to the “victims”. A general sense of the affected individuals is essential, especially for identifying the victims with special needs. This lack of awareness also led to what seemed a lack of prioritisation of the “victims”. In this regard, another example concerns the person in the wheelchair user who was pushed through the decontamination tent without being decontaminated and who insisted on being properly treated. She was seen having her wheelchair pushed back to the entrance of the decontamination tent so she could be adequately processed.

- **Taking care of individuals’ privacy**

According to the EEAB, the FRs failed to consider privacy as part of the exercise properly during the exercise. For example, some of the volunteers dressed outside the specially designated tents. A female volunteer had to walk down the Exercise Area and outside near a bus to get dressed, but without realising that the protocol was broken and her clothes were elsewhere.

- **Choosing between the plausible competing courses of action** (tensions between ethics principles)

Both ETICAS and the EEAB observers pointed out how FRs allowed significant autonomy to individuals playing victims. They seem to have followed a non-intervention approach based on general instructions and establishing physical barriers and indications. This contrasted with their capacity to ensure other fundamental principles, such as lifesaving, due to a lack of efficient management of “victims” or respect for integrity.

- **Ethics in protocols for first response** (technical aspects)

Generally, protocols were considered standard and correct. Some specific issues were pointed out concerning technical dimensions of implemented response protocols that may affect victims' rights, such as a lack of coordination that led to bottlenecks at the entrance and exit from the decontamination area. For instance, in the first part of the exercise, there were ill-equipped FRs on the main scene where they were supposed to be wearing masks.

Post-Dortmund event examination

A) Social impact examination

This subsection provides some references for core social impact registers based on the volunteers' survey outcomes and the analysis of focus groups results in D6.3.

- **Inclusion, accessibility and communication**

As pointed out above, inclusion factors are conditioned by the level of awareness and knowledge of individuals participating in field exercises. This was reflected in the results of the post-event survey with participants, where the contribution of the event to raise awareness was recognised. Moreover, according to the post-event survey, most participants managed to understand the information provided by the FRs, but it is also important to note that 6 participants actually found it difficult to understand it and 11 out of 18 people affirmed they had to ask emergency responders to repeat the information they provided, which may be an indication of protected groups exclusion.

Focus groups (D6.3) also provided information on the lack of differential treatment regarding vulnerable groups and the subsequent negative assessment of participants. Different participants pointed out the lack of preparedness of FRs to manage vulnerable people.

- **Privacy**

As part of the post-event survey, it was identified that of the 18 surveyed, 17 participants answered. Of these, 7 people indicated they generally disagreed that they had had sufficient privacy during the decontamination process, while 7 others generally agreed with it. The remaining 3 participants found themselves in the middle of the agreement/disagreement scale.

- **Triage protocol and decontamination**

According to D6.3, individuals manifested different exclusionary factors limiting accessibility that impacted their ability to undergo a decontamination shower, including deafness or decreased vision. In focus groups, it was also underlined that communication in Decontamination Tents was limited in some cases. This was due to physical constraints that mainly affected vulnerable groups. For instance, a deaf individual stressed that he/she couldn't understand the people behind their masks. These issues were also reported during the focus groups.

- **End users' governance and coordination**

Generally, post-event surveys and focus groups show a need for improving communication to better articulate the work of the different first responders.

5.2.2. Field exercise Nº2: Rieti

On Wednesday, 16th November 2022, the second PROACTIVE field exercise was hosted by the NBC School training centre in Rieti, Italy. The exercise was a joint activity with Horizon 2020 Project eNOTICE, in which the NBC School (similarly to FDDO in Dortmund) acted as a consortium partner. As detailed in D6.4, one of the purposes of the field exercise was "*To evaluate the extent to which ethical principles, dilemmas, operational factors, and assessment, as well as societal dimensions, are considered by FRs and researchers in dealing with CBRNe incidents*."

Figure 4. Rieti exercise image

The Rieti exercise aimed to involve a more significant number of civilians in general and additional vulnerable groups in particular. Thereby the project envisaged a greater range of vulnerabilities within the volunteer sample and, at the same time, addressed recent political themes. The project included children between the legal ages of 14 and 18 as the ideal sample of volunteers.

Participants:

*The **32 participants** were distributed as follows:*

Age group	Gender	
	Men	Women
<18		1
18-30	3	4
31-50	1	8
51-65	5	3
65+	4	3
TOTAL	13	19
	32	

Source: D6.4.

This sample included 15 vulnerable volunteers representing nearly half the total and included 7 older persons (65+) and one person under 18 (accompanied by her mother during the exercise) were included. In addition, persons with a visual impairment (2 persons), hearing impairment (1 person) and one person in a wheelchair participated in the exercise.

Observations of the Rieti event

A) Ethics examination

This sub-section presents an analysis of the EEAB observations with a specific focus on ethics. It also includes Observer Guide questions, designed with the objective of receiving feedback and possible recommendations for each of the following five issues:

- **Contextual factors limiting respect for main ethical principles** (beneficence, justice, autonomy)

The EEAB experts underlined bad weather conditions created pressure on the participants from the perspective of beneficence principle and could have affected the quality of FRs response. The EEAB observers also pointed out the necessity to restrict the freedom of movement, autonomy and communication of the involved persons. The balance between these expected effects of CBRNe, these restrictions, and other aspects, such as the stress inoculated to “victims” due to their treatment by FRs, was not adequately achieved.

- **Taking care of vulnerable groups** (cultural, persons with disability, etc.)

The EEAB experts and outcomes of ETICAS observations coincide in underlining that no specific protocols were in place to target vulnerable groups. The lack of communication between the FRs and the volunteers represented "*an element of supplemental stress for the participants affecting, in particular, those belonging to vulnerable groups*" (D6.4:111). Another example provided by Ethics experts is that the decontamination tent was designed for autonomous people, not for those with movement or visual impairments. Experts state this would directly affect “victims” from vulnerable groups in a real scenario. Moreover, FRs did not pay specific attention to cultural aspects that may have been reflected in communication protocols. According to Experts, “the incident command was aware of the problem, but the only provision were the separation of cabins in the decontamination shower”.

Gender aspects were addressed through separation in the decontamination tent. The Observers also stressed the lack of attention to vulnerable groups. For instance, during the triage process, it is said (D6.4) that "*Not even for selection to their duty towards the children present on the scene*". It is concluded vulnerable groups were not properly managed in the decontamination tent.

- **Taking care of individuals’ privacy**

The EEAB experts found privacy protection in the general structure of the decontamination tent, including showers separated with curtains and "victims" being introduced in these spaces one by one. Moreover, when taken away from this area, participants were led to special rooms where they could change their clothes. However, this separate space and FRs protocols for managing people during the post-decontamination process did not correctly tackle vulnerable groups' needs, affecting their autonomy.

- **Choosing between the plausible competing courses of action** (tensions between ethics principles)

When discussing the tension between ethical principles and competing courses of action, the EEAB experts underlined there might be tension between standard procedures to evacuate the affected population and the need for respecting the times needed by the elderly or ambulatory challenged populations. Another ethical consideration in this regard concerns the prioritisation of individuals during the triage and decontamination process and the criteria used to organise them, which necessarily requires selecting and designating groups. A third pointed out tensions related to the need for setting areas for contaminated and decontaminated victims, which should be marked out appropriately and treated accordingly. Finally, certain tensions between the efficiency of the decontamination process and individuals' right to privacy and autonomy were observed (D6.4:112).

Moreover, EEAB observers pointed that that the waiting phase for the decontamination had very limited communication for the involved citizens, resulting in “spread of resentment and unnecessary fear”, among other adverse effects.

- **Ethics in protocols for first response** (technical aspects)

Observers underlined the lack of attention on participants left "on their own". The long time taken to manage the group after the incident on the train is emphasised. Moreover, the lack of coordination and communication among FRs was considered a factor affecting the beneficence principle. Problems with operational aspects were also linked to potential threats to the integrity of "victims", such as instances where participants exited the decontamination tent just to get "contaminated" again since water from the showers was leaking outside the tent, in the spot where participants were receiving, towels, thermal blankets and shoes.

B) Social impact examination

This subsection provides an analysis of core social impact dimensions based on ETICAS observations during the field exercise.

- **Inclusion, accessibility and communication**

At the beginning of the exercise, Carabinieri "released" supposed sarin gas (actually “disco gas”) and guided passengers one by one from the train. Based on ETICAS' observations, just after the simulated accident, it should be highlighted that FRs did not guide participants while waiting for triage. The participants exchanged opinions and helped each other. People were self-managing and moving under the shelter to protect themselves from the rain. This created an environment for group cohesion, in particular for those speaking Italian. For instance, a girl supporting a blind person during the whole process or a man acting as a "civilian expert" explained the FRs' general instructions to the entire group and detailed each step of the decontamination process to the rest. As part of community support, women joked about not putting the baby Alf (Bambini – actually a fluffy toy bear) in the tent because "he is all contaminated", according to them.

At the same time, this situation favoured a certain alienation (disconnect) concerning the incident simulation, which made most participants take a research approach to the event. The scenario seemed to appear too unrealistic for people to take it seriously, for instance, joking inside the train just after the explosion. They were also playing with "Alf" as a baby during the post-event phase. The long wait to start the decontamination process, which also fostered this perception. Another example was an older man using his phone while end users were handling substances, putting barriers, etc.

Still, specific moments created the scenario for participants to react and perceive the context more realistically. Some of them, for instance, seemed expectant and worried about the arrival of cars from firefighters and the police.

Regarding inclusion and accessibility of communications, there were no clear instructions or systematic use of gestures for those with impairments (vulnerabilities) outside the tent. There was no differential treatment for a blind person and no identification of vulnerability (both blind and deaf) in general. In this context, some participants were having issues with understanding guidance from the FR; for instance, one woman could not hear and was using her hands to explain it without an apparent reaction from FRs.

Regarding cultural differences, immigrants, who did not speak Italian, were isolated and needed to receive targeted advice.

- **Privacy**

It should be noted that post decontamination, to complete the process, half naked individuals had to dress outside the tent which does beg the question as to whether these FR protocols are fit for purpose in relation to privacy.

- **Triage protocol and decontamination**

FRs were mixing people inside the tent, but people were still participating in the process and obeying instructions. During the decontamination process, participants were undressed separately, women and men. During this process, some older adults had problems getting undressed. Participants were barefoot when entering the tent and wet due to the rain. They also wore underwear outside the tent at the end of the decontamination process. This was conceived as a standard protocol for this scenario by FRs.

- **End users' governance and coordination**

Regarding the involvement of FRs, the police, firefighters and other practitioners did not talk to each other confidently or with assurance. As a result there was a certain lack of guidance, communication and interaction between the FR and volunteers. In some instances, for example, in the triage process, participants could not hear the voices of those FRs wearing masks, and ended up using mediators. In this scenario, some researchers took part in the management of volunteers.

Post-Rieti event examination

ETICAS collected information as part of the Rieti focus groups. This, together with information provided by other sources, allowed us to compare post-event volunteers' perceptions concerning the above processes and procedures.

- **Inclusion, accessibility and communication**

According to volunteers involved in focus groups, there was an absence of care for people, nor making people relaxed or feel protected. Some participants interpreted this as “not being treated as human beings but as objects”. Concerning individual treatment, volunteers stressed there was no attention to blind people nor identification of vulnerable groups, with statements such as "She was not helped at all" or "I felt abandoned". A blind person recommended using a megaphone to give instructions so they can also understand them.

Some participants claimed that facilitators from PROACTIVE (staff) were taking the place of FRs and were telling volunteers what to do. Instructions, when given by the FRs, were not clear according to focus groups informants. To address these issues, volunteers underlined the need for training in this domain and fostering FRs' campaigns about CBRNe policies. Moreover, they asked for more communication and more control over groups as well as "shorter and concise instructions" (deaf person). Along these lines, volunteers suggested that end users should receive more information and training on vulnerable groups. At the same time, mirroring the above observations, they advised there was a lot of communication (gossiping) among the participants.

- **Privacy**

Concerning the above issues, the lack of privacy of individuals outside the shower tent. Many volunteers pointed out that they were aware of their surroundings and that they were wearing swimming suits but were not concerned about this.

- **Triage protocol**

Based on ETICAS' analysis of focus groups, volunteers said that there was not enough information during the decontamination procedure. This is confirmed in D6.4, where it was pointed out the lack of regular and clear communication during the period between evacuation and triage/decontamination, and secondly, during the decontamination shower and at the point of re-robbing. Along these lines, volunteers indicated that, inside the tent, they did not see anything due to the smoke and limited light, and particularly so by a deaf person. Also, there was a poor presence of FRs inside the decontamination tent.

Still, others considered that the decontamination was "easy to understand". They also revealed that wearing underwear is "normal" and mixed gender is "fine".

- **End users' governance and coordination**

Based on participants' feedback, it seems protocols were focused on their own technical performance (end users) and not considering people. Moreover, as mentioned in D6.4, the artificiality of exercises may relate to the actual behaviour of FRs during the exercise.

5.2.3. Field exercise Nº3: Ranst

On Wednesday, 13th May 2023, the third PROACTIVE field exercise took place at Campus Vesta, located in Ranst, Belgium. The location was formerly a British military base and is now a training centre for FRs. As detailed in D6.5, one of the purposes of the Campus Vesta field exercise was to test disaster management students, to help decide to which units and where they were to be deployed, as well as on the passing of information to the participants. Indeed, the exercise was the third and final joint activity, concluding the partnership between the two Horizon 2020 projects; PROACTIVE and eNOTICE. eNOTICE partner Campus Vesta was the host and also the organisation responsible for the planning and execution of the exercise.

As for the FRs, they were required to act as if it were a real CBRNe event. In this sense, as stated in D6.5: "*A stark difference between this third, and the previous two PROACTIVE exercises was the exercise constraint on the PROACTIVE team to influence aspects of the exercise such as the scenario, handling of volunteers, and various other logistical arrangements*".

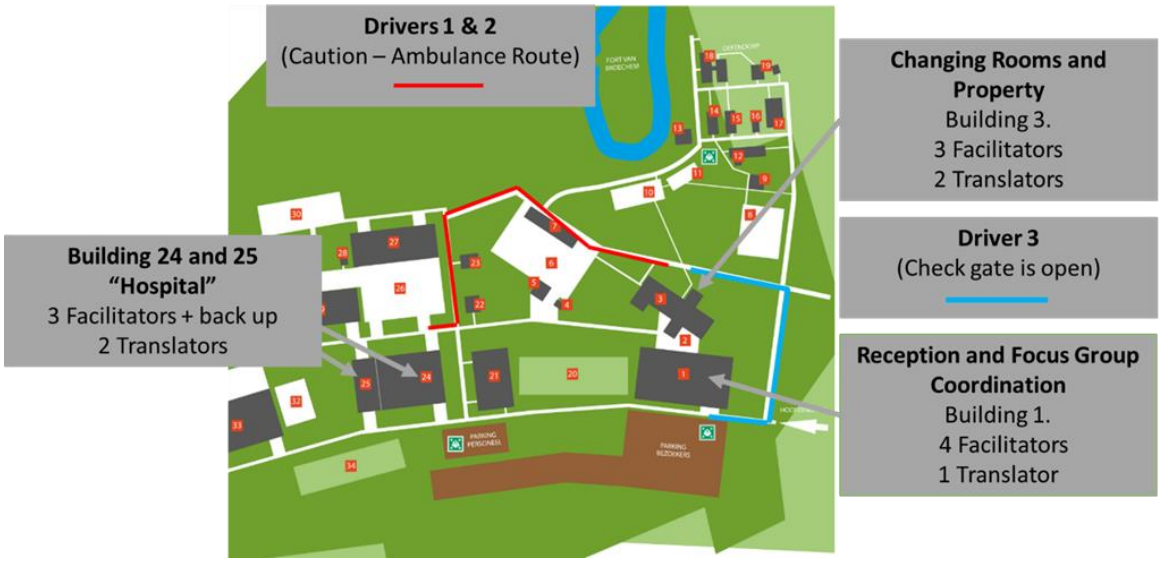


Figure 5. Exercise and post-exercise phase plans for facilitating volunteers

In contrast, the PROACTIVE objective was to be able to rely on members of civil society, including vulnerable citizens and untrained personnel, to apply evolving tools and procedures for responding to a CBRNe incident. The specific objectives were to understand citizens' perceptions of these tools and evaluate their usefulness in terms of participants' use and assess their effectiveness. Moreover, the exercise was aimed at evaluation "*the extent to which ethical principles, dilemmas, operational factors, and assessment as well as societal dimensions are considered by first responders and researchers in dealing with CBRNe incidents*" (D6.5).

Participants:

The **55 volunteers and 4 actors** were distributed as follows:

Participants			Gender		Vulnerability	
			Men	Women	Vulnerable (% of total)	Non-vulnerable
Volunteers	Minors	7	4	3	7 (12%)	–
	Adults <65	39	14	25	24 (44%)	25
	Adults >65	9	7	2	9 (16%)	–
Total		55	25	30	40 (73%)	25
Actors*		4	1	3	–	–
Total		59	26	33	40	25

Source: D6.5.

While vulnerable and non-vulnerable people were instructed to act as they thought they would in such an incident, the professional actors simulated having health symptoms due to the CBRNe event. As for the FRs, the organisers of the Campus Vesta recruited them from five Belgian disciplines: fire brigade, medical services, police, civil protection and communications. However, in the end, only four out of five attended (civil protection).

Observations of the Ranst event

A) Ethics examination

This sub-section presents an analysis of the results of the EEAB with specific focus on ethics. It also includes Observer Guide questions, designed with the objective of receiving feedback and possible recommendations for each of the following five issues:

- **Contextual factors limiting respect for main ethical principles** (beneficence, justice, autonomy)

According to the EEAB experts, some contextual factors identified may have limited the respect of the main ethical principles as follows. Firstly, the lack of awareness of the FRs as it is an exercise and not a real CBRNe event. Since it is a simulation, there is no time factor, nor excess pressure. Secondly, the quality of the simulation. Some of the participants were calmer than they should have been and apparently did not even take their roles with due responsibility. Thirdly, by involving actors, an attempt is made to represent some of the emotional response patterns of the victims that may be more common. However, these reactions are never completely predictable as it is a simulation, and is dependent on the type of CBRNe event, public awareness, location, among other factors.

- **Taking care of vulnerable groups** (cultural, persons with disability, etc.)

Regarding the taking care of vulnerable people, it is interesting to see how a volunteer without a vulnerability admits the integrity and adaptability of the volunteers was respected. This is confirmed by some EEAB, for instance concerning wheelchair users and some persons with sticks who appeared to be given a prioritisation and taken directly to the tent. It is however unclear however how they were decontaminated, i.e., whether this was a research ethics decision or a genuine part of the CBRNE event response.

However, the perceptions of people with a vulnerability diverge from this stance. The main feedback received from the volunteers is that the FRs are not used to working with vulnerable groups. An example of this is that deaf people were isolated and alone.

To improve the ethical dimension of the response regarding vulnerable groups, EEAB observers propose more exercises to carry out ethical response actions towards these people: such as grouping the different people together so that they are not alone and having interpretation services to respect their right to be informed by appropriate means. If communication is not effective, deaf people may become nervous due to unknowing exposure to risk and, therefore, be more vulnerable. Thus, it is important to share the same language and to be able to convey messages bilaterally in a fluent manner. During the exercise, a policeman tried unsuccessfully. That is why using other languages or having different sign languages available is vital. In addition, they claim they need more time dedicated to them, and more explanations, occupying a specific space in the decontamination place. In fact, they criticise that decontamination was not tested with a person in a wheelchair.

However, vulnerability is only one factor, and the degree of damage must also be prioritised. In short, work on developing empathy, especially towards vulnerable people, through more basic education. In this sense, the EEAB experts emphasise basic education because of the seriousness of the situation in terms of ethical treatment. Still, some EEAB pointed out that, from what they observed, all participants were treated fairly, with due care and diligence.

- **Taking care of individuals' privacy**

Privacy was one of the main challenges most negatively assessed by EEAB observers. As seen above, Observers also noted that people walked half-naked from the triage area to the

decontamination area and there were no areas set up to maintain privacy. Likewise, privacy was not fully respected by the narrators, who took pictures of the participants during the exercise until the observers themselves called their attention to their behaviour. In short, it is noted that this lack of privacy can translate into a total loss of privacy during a real CBRNe event. Specifically, during decontamination, EEAB experts emphasised that measures must be put in place to protect the victims of a CBRNe event from so-called 'disaster tourists', people who are curious to observe what is happening in the area of the accident. Above all, dignity must be protected, and the worst cases must be prioritised.

- **Choosing between the plausible competing courses of action** (tensions between ethics principles)

Regarding the management of duty of care and personal well-being, the assumption among the EEAB observers is that it represents a challenging balance since the work must be performed while also considering the needs and privacy of the individuals. However, most of the EEAB observers admit there was no real balance between these courses of action, as welfare was either neglected or minimised. For instance, one Expert observed FRs in close proximity to contaminated victims posing a risk to their own health and others they interacted with. The same unattended cross-contamination issues were identified concerning many victims who had a support person or guardian. To some extent, they acknowledge that some participants did not take the responsibility of care seriously. However, in some cases, there are those who value the implementation of FRs management positively.

In addition, EEAB observers claimed different people were left unattended and alone, including people walking through the area without any supervision, a man alone, a child and an elderly woman alone for a long time, or people being evacuated through the area close to the red danger zone. The Observers also stressed how the tasks were not carried out properly, that there were FRs without using PPE, and some participants even took 2 hours to have a mask. In addition, there was a lack of communication between the FRs and the trainer and with the rest of the staff. This resulted in some of the volunteers changing roles in the middle of the exercise.

In sum, not only do we see a lack of consideration for ethical principles, but some of the courses of action created even more infringements of ethical principles specifically designed for the exercise.

- **Ethics in protocols for first response** (technical aspects)

While three EEAB observers did not feel they could provide recommendations on technical aspects to improve ethics in protocols for first response, the main elements raised by the rest are highlighted below.

As for the SOPs, in one case, it was identified during the exercise that they were not applied. Similarly, there are other EEAB observers who advocate a code of conduct during FR training, pointing out that their ethical behaviour is vital to response to a CBRNe event. In this sense, it was claimed that although it is positive that the ethical dimension is becoming a topic of interest, such training or ethical evaluation must be adaptable to change since ethical dimensions are fluid and involve constant change, just as social relations do. In any case, there is unanimous agreement that while ethics can play a critical role in situations of response to a CBRNe event, it needs to be increasingly present in technical aspects embodied in protocols that can be translated into concrete response procedures.

First of all, more transparency. That is, the roles of each person should be defined, including a lead person. Trust is key to coordinated action and this is achieved through a fair, respectful and prudent approach. In addition, the need to set a clear procedure separated by gender or religious groups is stressed. These principles connect us to the second concrete response.

Secondly, more understanding of vulnerabilities must be reflected in SOPs. When people feel respected and included, engagement is generated both before and after a CBRNe event. Therefore, responses to the vulnerabilities of victims must be enabled effectively.

Finally, intertwined with the previous two points, there is the relevance of fluid communication tailored to the needs of vulnerable people. If there were already communication deficiencies in the exercise, it is predicted that they could worsen in a real CBRNe event, being more chaotic. To reverse this potential scenario, oral, visual and written means must be provided to include all people.

B) Social impact examination

ETICAS collected information as part of the Ranst observations. This, together with information provided by other sources, including the EEAB and Observers, allowed us to contrast post-event volunteers' perceptions concerning the processes and variables described below.

- **Inclusion, accessibility and communication**

EEAB observers emphasised that the main problem was communication, especially for vulnerable people, as there were organisational issues at the level of information transmission. Thus, some of these vulnerable people claim that if someone cannot understand the information, this person does not know how to proceed and feels unprotected. Consequently, rights are not being respected. For instance, there was an interpreter for sign language but not written or visual communication.

As for the Observers, although some claim that the roles of the responsible persons were clearly defined during the pre-exercise briefing, the ethics observers did not. Other problems the clear lack of access to information that other volunteers pointed out for the observers, as even the narrator, with the role of explaining what was happening, did not know what was going on, nor did they know where to go. To some extent, during the exercises, narrators were taking pictures, which suggests that they were not properly briefed by the Ranst team.

- **Privacy**

This dimension is the one that has generated the most controversy unanimously, as the FRs partially stripped the volunteers in the open air and in front of the rest of the exercise participants, without proper consideration for their privacy. In short, after decontamination the volunteers walked nearly naked to the Red Cross tent. Only in a few cases did the FRs have PPE which gave the wrong impression. In short, the autonomy of older people was respected, e.g., by allowing them to walk alone, but not their privacy. To correct this problem, the volunteers propose a tent exclusively for decontamination tasks, such as showering.

- **Triage**

Although the triage phase has received less negative criticism than the decontamination phase, the lack of prioritisation of vulnerable groups is an exception. In this regard, it was noted vulnerable people were mixed between contaminated and non-contaminated people. In other words, triage was

not based on vulnerability but on symptomatic and transport factors. In this sense, the order of moving patients from higher to lower severity (red, yellow and green labels) was not respected: green patients were moved first, then red and finally yellow. There were even some volunteers who returned to the incident area after triage.

- **End users' governance and coordination**

Some issues were emphasised in this regard. The first is the time FRs took in perimeter the area, while some volunteers were waiting walking barefoot. The second is the lack of space between people and even the lack of medical care for prolonged periods.

Post-Rant event examination

Once again, ETICAS collected information from the post exercise focus groups run by PROACTIVE which included people with disabilities. This allowed us to contrast the volunteers' perceptions post-exercise, which is one of the specific objectives of the exercise, in relation to the processes mentioned above.

- **Inclusion, accessibility and communication**

The evaluation in terms of communication is generally negative as identified during the focus group meetings because the guidelines were not adapted to their needs, either orally because the deaf people did not perceive the instructions of the FRs, nor in the guidelines and questionnaires which contained complex language, with specialised terms and dense and long sentences. The result, therefore, was labelled a failure because it did not fulfil the communicative function of conveying the message and the volunteers ended up not knowing what to do during the exercise. In some cases, there was no communication with the FRs, no interaction with those manning the decontamination shower, and the medical service did not know how to act.

These deficiencies must therefore be overcome; otherwise, in a real case of a CBRNe event, there would be serious consequences. At the communication level, they propose to diversify the media with different sign languages, using aide memoire or simple language, large size and pictograms to facilitate the transmission of the message.

Finally, although overall feedback was positive, observers responding to the App testing questionnaire pointed out that the system presented some limitations in terms of accessibility and usability, in particular regarding vulnerable groups.

- **Triage protocols**

In general, Red Cross triage is evaluated positively, the problems are more in terms of privacy after triage.

- **Privacy**

Based on Observers feedback, privacy needed to be improved as people were exposed to the view of other participants.

- **End users' governance and coordination**

At the end-user's governance and coordination level, the evaluation is negative regarding several aspects. Firstly, there was a lack of transparency and justification of the actions carried out by the FRs towards the volunteers. In addition, the time factor and the panic involved in a CBRNe event

were not taken into account, nor was the necessary psychological support provided. In short, the exercise was considered a mere simulation and the FRs were too relaxed, with no communication between them and no feedback from the participants. Furthermore, the Observers were interfering in the actions of the FRs.

5.2.4. Summary analysis of field exercises results

The above results from the field exercises provide an overview of both operational and agential aspects of CBRNe response focusing on two central registers, social impact, and ethics. Such results present several similarities across the three exercises, in particular concerning ethical challenges raised by FRs' policies. Also concerning potential and perceived efficiency and impact of CBRNe policies in registers such as social inclusion and privacy. The following Table summarises these aspects.

Table 11. Summary of the results by exercise

Validation case	Outcomes for Ethics	Outcomes for the SIA
Dortmund	General lack of representation of ethical principles concerning inclusion and differential treatment. Participants autonomy was prioritised over other principles associated with their privacy or integrity.	Lack of FRs specific management of vulnerable groups. This included communication with persons with disabilities. This was particularly obvious in the decontamination process. Additionally, many of the 18 participants did not consider their privacy properly protected in this process.
Rieti	As for Dortmund, but in a context also conditioned by bad weather conditions, FRs did not follow ethical principles concerning different treatment of protected groups (including the minor present) or targeted communication, thereby, relegating principles such as equity, inclusion, or integrity. This was seen as a tension between autonomy and protocols standarisation on the one hand and integrity of vulnerable people, privacy or integrity on the other.	The exercise was characterised by its limited capacity to simulate reality, which created certain specifics regarding participants' judgment of CBRNe response. Overall, the unaware lack of coordinated management of the participant group by FRs led to exclusionary dynamics and practices concerning vulnerable groups, including both the disabled and the child. They were reflected in both communication and physical control over the scene. Concrete exclusionary factors were identified concerning the tested version of the app.
Ranst	The field exercise, although with specific constraints (such as the behaviour of some FRs), manifested better contextual conditions concerning the quality of the simulation and the behaviour of FRs. Still, the perception of the	The main issue identified is primarily at the communication level. To reverse this, transparency in a communication policy is essential to maintain trust. Likewise, a correct transmission of information through different media fosters respect for human dignity, non-discrimination and

	management of vulnerable people by FRs is nuanced. The strategic approach to managing vulnerable populations, more present in this exercise, does not reflect targeted communication or treatment. Overall, welfare was minimised while other values, such as privacy, were also affected. Along these lines, more transparency and communication are seen as forms of mitigating such gaps.	equity. To this end, priority should be given to actions specifically designed to mitigate the consequences of CBRNe on victims, especially the vulnerable groups. The second issue is privacy, which can undermine the values mentioned above, such as human dignity. In this sense, FRs must balance public health against individual liberty, although proportionality must be considered in any incident. Furthermore, reciprocity and solidarity are also fundamental, although there have been shortcomings and lack of accountability in this regard during the exercise.

Source: own elaboration.

6. EXPLORING THE ETHICAL AND SOCIAL IMPACT OF PROACTIVE RESULTS: POST VALIDATION REASSESSMENT AND WAY FORWARD

This section will provide an overview of the post-validation assessment of the PROACTIVE guidelines and technologies and their potential impact on CBRNe preparedness and response. ETICAS intervention in the validation process, in this sense, was twofold. On the one hand, it entailed analysing the current scenario regarding how FRs manage or may manage victims in a CBRNe process in terms of ethics, social inclusion and privacy. On the other hand, it sought to build hypotheses regarding the potential consequences of further aligning existing protocols for CRBNe with PROACTIVE lessons learned, best practices and guidelines.

6.1. Ethics in CBRNE preparedness and response

In the PROACTIVE project, one of the objectives was to evaluate the toolbox and the instruments developed during the project implementation from an ethical point of view. In that respect, the following table shows the results obtained in the Dortmund, Rieti and Ranst exercises for the five dilemmas previously identified in Section 3.1, entitled "Methodological framework for the ethical examination".

Table 12. CBRNe operational ethical dilemmas and findings from PROACTIVE exercises

Task	Overriding goal of the task and main principle	Side ethical constraints and principles	Main finding
Effective communication while in PPE and at a general level	Prevent risks and complications and to increase public compliance	Vs physical and psychological impact	Ineffective communication between FRs and the public, as well as not being inclusive, was found. According to fieldwork results (WP6), this also has a negative impact on the psychological status of individuals.
Management of volunteers and healthcare workers	Reduce harm on victims/citizens	Vs restriction of individual liberty, proportionality, reciprocity, clarity, transparency and trust, solidarity, and respect for human dignity, non-discrimination and equity	Generally, there was a lack of awareness from FRs and also participants in the field exercises, and a limited involvement in terms of reactions because it was a simulation. In this context, protocols implemented were standard and focused on reducing the physical impact of substances. As mentioned above, this leads us to think that standard protocols for reducing harm are prioritised over any other right or ethics principle.
Conducting disaster triage	Mitigate impact on health	Vs relative impact on privacy	Despite concrete shortcomings in terms of privacy (particularly inside tents and the post decontamination phase), the field exercises' validation reveals an FRs' tendency towards prioritising health and safety.
	Avoid negative consequences and preserve equity	Vs decide the order of treatment of (patients or casualties)	Vulnerable groups were not prioritised and mixed among all participants. Decision-making is not based on vulnerability or casualties' status, which has been revealed to be distinguished in an emergency situation with a view to identifying groups.
Conducting decontamination	Save lives	Impact on respect for autonomy	Excessive autonomy has turned into a lack of care for the participants. In a real scenario, a lack of control over victims could lead to increased threat to life.
	Follow consent	Vs when the patient is unconscious	Although no information was collected in this regard in the simulated scenario, results suggest that informed consent would not be prioritised, which has been associated with language barriers and practitioners' training. This is not only

			because of the specific conditions of contaminated but because of the poor communication with participants managed during the decontamination process, which included a lack of communication skills with deaf or blind people.
	Respect privacy	Vs rapid management and physical protection of individuals	Privacy is undermined with half naked participants exposed in the post decontamination.
Evacuations, dealing with the public	Save lives	Vs physical and psychological impact	Findings show limited management of the victims. The subsequent stress this generated leads us to think that implementing standard protocols to protect life is prioritised.

Source: own elaboration.

Thus, operationalising these ethical dilemmas in practice, through the three exercises in Dortmund, Rieti and Ranst, makes it possible to identify the challenges of the human-centred approach and their potential shortcomings if the PROACTIVE guidelines are not properly followed. As can be seen in the above table, overall, the life value functions as an axiological point for all tensions found several other ethical principles. Moreover, limited consideration of social differences and groups' needs points to the need for a solution of the ethical dilemma for all studied response stages and processes. The prioritisation of standardised response protocol would focus on the value of safety and life over specific needs related to communication, privacy or consent. This means the prioritisation principle concerning vulnerable groups or people with special needs described in Section 2 seems not to have been considered by FRs.

After confronting the dilemmas raised in the ethical review with the results, although the outcomes in terms of ethical balance are primarily adverse (except for triage), the subsequent evaluation of the social impact in terms of ethics during the preparation and response to CBRNe is vital. Thus, the results of these evaluations confirm the need to apply the PROACTIVE guidelines elaborated during the project. In short, although it is necessary to emphasise that this kind of simulation poses complicated ethical situations because field exercises lack realism, it serves to ratify the need for the PROACTIVE guidelines to resolve ethical dilemmas, but also to predict how the results extracted in the previous table could be aggravated if the PROACTIVE guidelines are not applied.

6.1.1. Avenues for First Responders on the ethical management of vulnerable groups

Ethics in CBRNe response should manifest in the prioritisation of the physical but also physiological well-being of all individuals involved to address the need for an operational ethics framework, as pointed out in Section 2. This includes the victims, their families, the first responders, and the communities affected. To achieve this, first responders should be trained to prioritise the well-being

of all individuals rather than just focusing on the task at hand. Still, such an approach will be dependent on other variables, such as the zone a victim is located. For instance, in the hot (danger) zone, the main priority is to remove the person from it immediately, given the life and death stages. However, other principles are possible as practitioners move to the so-called cold zones.

As we have seen above, effective and transparent communication is crucial to integrating such an ethical approach into CBRNe protocols. First responders should also be trained to communicate clearly and transparently with all stakeholders, including the public and other responders. This helps to build trust, prevent misinformation, and ensure a coordinated response. Specific senior management or media liaison officers could also activate relationships with the media.

And following a human rights perspective, they should treat victims with respect and dignity and ensure their rights are protected throughout the response process. Moreover, FRs' awareness of the importance of victims' privacy in this process should be fostered.

- Based on the above analysis, this section provides some avenues for further integrating the ethics framework in CBRNe preparedness and responses. This includes both aspects to be considered for further research addressing these issues and ways of considering ethics in FR's operations:

For research

- The integration of representatives of social organisations and different FRs in fieldwork and validation preparation and implementation, as achieved by PROACTIVE.

- Mechanisms for ensuring that volunteers' safety is protected under simulated scenarios that seek to produce reality.

- Strategies aimed at ensuring the realistic character of simulated scenarios (such as including actors, etc.) while preserving their ethical character and scientific quality should be further explored and developed. This includes, for instance, having the observers away from the field exercise activities and participants but with a good view of the exercise process.

For real scenarios

- Training for FRs on the ethical implications of targeted communication and its associated forms of social inclusion. These recommendations may be impacted by incident zone location.

- Training for FRs regarding technical aspects of proper care and attention to vulnerable victims focusing on specific differential factors for exclusion (disability, culture, etc.)

- Involvement of organisations representing the local community and vulnerable populations in CBRNe policies, training processes, preparedness strategies and testing

6.2. Post validation analysis of social impact

The study of potential social impact fostered by PROACTIVE is based on the prescriptive analysis of deploying the different instruments in its toolkit. In this regard, the project outcomes described in

Section 3 already fill several gaps identified in the validation process described in Section 5 and their corresponding ethical considerations. Issues concerning the exclusionary effects of managing vulnerable individuals in CBRNe events or communication with persons with specific disabilities are at the core of developed tools and materials. Moreover, the PROACTIVE results discussed above address such issues by integrating the voices of different stakeholders while considering their expected interactions in the project guidelines, technologies and recommendations.

Along these lines, field exercises confirmed key aspects associated with social impact in the interaction between first responders and individuals affected by a CBRNe event that are addressed by the project materials, including:

- **Communication barriers**: First responders face challenges in communicating effectively with individuals who speak different languages or have hearing or speech impairments.
- **Information void**: First responders may not build and share enough information during a CBRNe event, which can make it difficult to prioritise and provide appropriate support. In this regard, supervisors would have specific roles such as media engagement and decision-making.
- **Lack of training**: First responders may not have received adequate training to address the specific needs of individuals affected by a CBRNe event.
- **Cultural differences**: First responders may encounter cultural or religious differences that can impact their ability to provide appropriate support and care. This can connect to stigma and discrimination, which can impact their ability to access support and care.

It should also be noted that, besides the often-unavoidable lack of realism of some stages of field exercises, the above findings need to be contextualised in the framework of scenarios containing trauma and stress. First responders and individuals impacted by a CBRNe event need the ability to communicate effectively. Along these lines, in real scenarios, first responders often face other challenges, such as limitations in accessing appropriate resources (medical supplies, equipment, and information) which can hinder their ability to provide effective support. And also, individuals affected by a CBRNe event may have limited access to healthcare services, which can exacerbate their vulnerability.

This social impact assessment, therefore, confirms the need for a **better alignment of FRs' protocols and strategies with citizens' needs** when dealing with diverse groups of people before, during and after CBRNe events. As pointed out in recommendations in WPs 4, 6 and 8, such an alignment process has several dimensions and adoption levels, which range from FRs training and awareness practices to the actual techniques used by FRs to interact with vulnerable groups, their supervisors or with policy makers during a disaster.

Achieving the above alignment and using PROACTIVE tools can also be seen as a way to ensure better acceptability of CBRNe protocols by both victims, end users and the public. As reflected in D8.2, perceived efficiency and trustable communication are key drivers for gaining technological acceptance and policy acceptability. WP6 results confirm several acceptability theses in this regard, including:

- **Improved cooperation**: When citizens are more accepting of CBRNe policies, they are more likely to cooperate with first responders during an incident. This can lead to more effective response efforts, better outcomes for the community and may reduce demands on emergency responders.

- **Increased trust**: When citizens trust the policies and procedures of first responders, they are more likely to feel confident in their ability to protect them from harm and to heed advice or warnings from FR's.

- **Enhanced public safety**: By increasing citizens' acceptability of CBRNe policies, first responders could more effectively implement measures to prevent and respond to CBRNe incidents, leading to a safer and more secure community for everyone.

- **Reduced fear and anxiety**: When citizens are more accepting of CBRNe policies, they may feel less fear and anxiety about the potential risks associated with such incidents. This can lead to a more stable and resilient affected groups.

- **Improved communication**: Increased citizen acceptability of CBRNe policies can lead to improved communication between first responders and the community. This includes media outlets which can assist FR's by broadcasting credible information.This can help to address concerns and misinformation and can lead to a more coordinated and effective response to CBRNe incidents.

- **Increased preparedness**: When citizens are more aware of and accepting of CBRNe policies, they may be more likely to prepare for potential incidents, leading to a more resilient and prepared community.

Lastly, results confirm the literature by showing that FRs relegate privacy as a secondary element in cases of CBRNe events. At the same time, it shows certain technological optimism from the users' perspective by understanding their informational privacy has been generally respected in the research and simulation process. Instead, the perception of physical privacy is assessed as less respected by FRs in this process.

6.3. Data management and protection

Based on the analysis done in Section 3 and limited feedback from users regarding their perception of privacy when interacting with the PROACTIVE app during field exercises, we have addressed the privacy-related risks and activities associated with the system. After integrating core requirements by design into the system, the main remaining risks derived from the privacy impact assessment can be grouped into two registers, one technical and the other sociotechnical.

Main technical gaps:

- Data filtering: Need for automating data validation as a way of enhancing manual information screening to be implemented by end users. AI and Machine Learning can be used for this purpose, since algorithms can be trained to identify patterns and anomalies in the data and can flag potentially relevant information for human review. In this way the CCS can automate the information screening process. For instance, Natural Language Processing (NLP) can be

used to analyze text-based data, such as incident reports, and identify key information, such as locations, times, and types of incidents. NLP can also be used to identify and flag potentially relevant information, such as suspicious activity reports. Moreover, data fusion could be implemented to combine data from multiple sources, such as sensors, cameras, and other devices, which can provide a more comprehensive view of the situation. This data can be fed into the App, which can then use machine learning algorithms to identify patterns and anomalies, and flag potentially relevant information for human review. Still, a human-in-the-loop must be considered where AI and machine learning algorithms are used to identify potentially relevant information, and human analysts review and verify the information before it is further disseminated. However, if automation is used for the CCS data filtering, safeguards and ongoing algorithmic audits to ensure data quality, explainability, and AI fairness must also be incorporated.

Main socio-technological gaps:

- Mapping validation: There is a need for human made validation of data maps. Granularity and the potential use of sensitive data needs to be regularly tested. Information on location provided by users should also be examined in this regard to ensure it is managed as personal data.

- Data retention policy: Another key aspect to be considered in the CCS management is the lack of automated data deletion crucial to the development and implementation of a data retention policy.

The following sociotechnical guidelines are suggested to address the above sociotechnical gaps in the context of a comprehensive overview of the CCS deployment conditions.

6.3.1. Sociotechnical guidelines for LEAs management of the CCS

Governance

- Responsibilities: LEAs will most likely act as data controllers and managers of the CCS, which entails ensuring a comprehensive set of technical and organisational protocols before the system is operational. Tasks to be conducted by LEAs involve ensuring secure data management, establishing protocols for implementation and ensuring proper personnel training.

- Communication: It is critical for the system's correct functioning that LEAs acting as data controllers ensure prompt and secure communication with corresponding authorities, including public institutions integrated into the system governance and data protection supervisory authorities. This will help to increase the situational awareness of all actors involved. As part of these tasks. Moreover, LEAs will also be responsible for establishing links in three directions:

    - Firstly, with public authorities regarding awareness and coordinated strategies for using the PROACTIVE CCS during a CBRNe event.

  - Secondly, collaboration with civil society organisations to ensure clear guidelines and skills in the use of the system.

  - Thirdly, with the media to coordinate communication and response strategies.

- Crisis planning: The controllers should promote the development of a data management crisis plan, with a focus on information sharing. During the entire CBRNe preparedness process, communication, cooperation, and the multi-agency approach need to be harmonised for the plan to remain consistent and coordinated.

- Data Protection Training: The App should provide training to its development team and any third-party vendors on data protection best practices and regulations.

Data management

- Data validation: LEAs effort should focus on securing data exchanges during the event by applying contingency plans. This includes implementing received guidelines and materials for filtering images and videos of individuals, particularly concerning vulnerable groups such as children. Contingency plans should be in place for data filtering and mechanisms for preventing biases and discrimination in this process. These plans should be in line with protocols for data filtering to be used by officers in charge of the system. The step-by-step process should call for triangulating sources to receive alerts from citizens and develop specific mechanisms for avoiding intentional disinformation before and after events.

- Users' information and requests: How to provide targeted information about data subjects' privacy rights (both FRs and users) to involved groups and a detailed explanation of the personal data to be shared with the App for registration. This includes:

  - A valid email address in the case of registered users,

  - Details of the organisation’s, name, and address to use the system

  - Geolocalisation in the case of registered FRs.

  - Information about managing user’s ARCO requests.

  - This includes the systematisation of users' data, and mechanisms for supporting rectification, portability or removal in applicable cases.

- Transparency: Be transparent about the data being collected, how it will be used, and with whom it will be shared. This includes providing clear and concise privacy policies and terms of service that users must agree to before using the App. LEAs should provide guidance about the App's use, clarifying that the App is not to be used for reporting emergencies and fostering the use of 112 for this purpose.

Data privacy

- Data minimisation: A template with the minimum personal data needed for achieving the PROACTIVE recommended protocols for prevention, preparedness, response and recovery activities, together with a recommendation to ensure data minimisation.

- Data security: Instructions to secure personal data integrity and confidentiality, stressing the importance of protecting special categories of personal data. This includes encryption and (pseudo) anonymisation policies and access control systems. Communication plans concerning how to prepare and respond to different scenarios should be created. Mechanisms for producing and disseminating pre-incident materials should be defined in this context, also ensuring data privacy. The information and the security systems to provide access control should be disseminated by the controller among the corresponding institutions and data subjects with access credentials.

- Data breaches policy: A data breaches response methodology addressing relevant definitions of anonymised or properly pseudonymised records of personal data management. This should comprise information about how to track the source of the leak, make statements to counter the false information, communicate with the media to respond or release public information and protect the people who may be falsely identified.

- Data Retention Policies: Establish clear data retention policies that outline how long user data will be stored and under what circumstances it will be deleted. This helps to ensure user data is not stored indefinitely and that it is disposed of properly. Such policies must define:

    - Under a concrete data classification structure, what data needs to be retained and what can be automatically deleted following the principle of data minimisation.

    - The different format in which it should be kept, which should also entail a data security standard.

    - Time frame: For how long should it be stored.

    - The option for future deletion, establishing if it should eventually be archived or deleted.

    - Who has the authority and who is responsible to remove it.

    - What process to follow in the circumstance of a policy violation.

CCS data protection monitoring

- Independent Audits: Regularly subject the App's data handling practices to independent audits to ensure compliance with privacy regulations and industry standards. This helps to identify any potential vulnerabilities and ensure the App is following best practices for data privacy and security.

- Data Protection Impact Assessment: The App should conduct a data protection impact assessment (DPIA) to identify and mitigate any potential data protection risks before implementing any new features or processes.

7. CONCLUSION

Within the scope of Task 8.4, we have examined the ethical and social implications of PROACTIVE research project guidelines and materials and its CCS. The task has been conducted as part of a WP aimed at mitigating any negative social impact derived from the design of the project outputs and facilitating a constant dialogue between legal and ethical requirements to be followed and avenues for their integration into both policies and technologies. Therefore, this deliverable reflects different stages of interaction between both dimensions.

To analyse the above process from the perspective of social impact, besides the literature analysis and the study of relevant Deliverables in WPs 4 to 6, we worked from three primary methodologies: (i) an ethical analysis based on observations, questionnaires and focus groups, (II) a privacy impact assessment based mainly on the study of final CCS prototype technical specifications and (iii) a social impact assessment based on questionnaires and observations addressing core social aims of the project, such as CBRN policies inclusion, accessibility, equitable treatment and acceptability.

In this way, this examination of PROACTIVE outcomes in light of their capacity to align CBRNe preparedness and response policies with the existing needs of vulnerable citizens and FRs provided several elements organised in three dimensions, ethics, social impact and privacy. According to this analytical structure, findings can be summarised as follows:

I) We found that CBRNe policies present several ethics value tensions, where those standards and protocols aimed at protecting safety of “victims” from a physical standpoint are at the core of axiological tensions with other principles to be considered in these contexts, including physiological integrity, no discrimination and privacy.

II) Along the same lines, we identified PROACTIVE recommendations could contribute to enhancing FR's action concerning the inclusion of vulnerable populations through new communication means (between FRs and from FRs towards citizens) and adopting protocols for ensuring their accessibility, which appears as the main social gaps.

III) We found that both response protocols and PROACTIVE CCS aimed at filling the above gaps require the implementation of socioecological measures to supplement privacy by design achieved through SOPs. Both informational and physical privacy need to be repositioned as part of CBRNe preparedness and response strategies through the systematic intervention of FRs in the management of individuals (particularly during triage and decontamination) and personal data when using supporting techniques.

In brief, besides suggesting avenues for using PROACTIVE outcomes to fill the above gaps, this Deliverable confirms the relevancy of the project outcomes concerning the potential social impact of current policies to tackle the consequences of these events in the EU.

8. REFERENCES

Andrade-Rivas, F. and Rother, H. A. (2015). "Chemical exposure reduction: Factors impacting on South African herbicide sprayers' personal protective equipment compliance and high risk work practices", *Environmental research*,142: 34-45.

Ash, J. (1997). Factors for Information Technology Innovation Diffusion and Infusion in Health Sciences Organizations: A Systems Approach. PhD Thesis, Portland State University.

Barcenilla, J., Bastien, J.M.C. (2009). L'acceptabilité des nouvelles technologies: Quelles relations avec l'ergonomie, l'utilisabilité et l'expérience utilisateur? *Trav Humain* 72(4):311–331.

Barilan, Y. Michael, Margherita Brusa, and Pinchas Halperin. (2014). Triage in disaster medicine: Ethical strategies in various scenarios. In Disaster bioethics: Normative issues when nothing is normal, ed. Dónal P. O'Mathúna et al., 49–64. Dordrecht: Springer.

Bertrand, G., Flaatten, H., Leaver S.K, (2019). Age is just a number: how should we triage old patients in the coronavirus disease 2019 pandemic, European Journal of Emergency Medicine 2021, 28:92-94

BESECU Project. (2011). *Final Report Summary. Human behaviour in crisis situations: A cross cultural investigation to tailor security-related communication*. Available at: https://cordis.europa.eu/project/id/218324/es

Bobillier-Chaumon, M.É., and Dubois, M. (2009). L'adoption des technologies en situation professionnelle: Quelles articulations possible entre acceptabilité et accceptation? *Trav Humain*, 72(4):355–382.

California Governor's Office of Emergency Services (Cal OES). (2000) Hazard Mitigation Planning.

Carter, Holly, John Drury, G. James Rubin, Richard Williams, and Richard Amlôt. (2013). The effect of communication during mass decontamination. Disaster Prevention and Management: An International Journal 22 (2): 132–147.

Castle Craig Hospital (2010) Outcomes for Dutch patients at Castle Craig Hospital, Independent analysis of outcome data Christo Research System, available at https://www.castlecraig.co.uk/wp-content/uploads/2023/08/Outcomes-for-Dutch-patients-at-Castle-Craig-Hospital.pdf, accessed August 2023

Council of Europe, 2014/415/EU: Council Decision of 24 June 2014 on the arrangements for the implementation by the Union of the solidarity clause.

Council of Europe, European and Mediterranean Major Hazards Agreement (EUR-OPA), Resolution 2011 – 1 of the Committee of Permanent Correspondents on Ethical Principles relating to Disaster Risk Reduction and contributing to People's Resilience to Disasters, adopted at the 60th Meeting of the Committee of Permanent Correspondents, Strasbourg, France, 15 April 2011, 27-31.

Council of Europe, European and Mediterranean Major Hazards Agreement (EUR-OPA), Resolution 2011 – 1 of the Committee of Permanent Correspondents on the inclusion of people with disabilities in disaster preparedness and response, adopted at the 64th meeting of the Committee of the European and Mediterranean Major Hazards Agreement (EUR-OPA), Paris, France, 24-25 October 2013

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology, MIS Quarterly, 13(3): 319-340.

Davis, S. and McHenry, K. (2005). A retrospective analysis of mass casualty presentation resulting from the release of toxic chemicals. International Journal of Emergency Management, 2 (3, 11 July), pp.231-238.

DECISION No 1313/2013/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 December 2013 on a Union Civil Protection Mechanism.

Eckenwiler, Lisa A. (2004). Ethical issues in emergency preparedness and response for health professionals. AMA Journal of Ethics, Virtual Mentor 6 (5). http://journalofethics.ama-assn.org/2004/05/msoc2-0405.html.

Esteves, Ana Maria; Daniel Franks & Frank Vanclay (2012) Social impact assessment: the state of the art, Impact Assessment and Project Appraisal, 30:1, 34-42, DOI: 10.1080/14615517.2012.660356

Eur-lex.europa.eu. (2019). EUR-Lex - ai0020 - EN - EUR-Lex. [online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Aai0020 [Accessed 5 Jun. 2019].

European Civil Protection and Humanitarian Aid Operations - European Commission. (2019). Emergency Response Coordination Centre (ERCC) - European Civil Protection and Humanitarian Aid Operations - European Commission. [online] Available at: https://ec.europa.eu/echo/what/civil-protection/emergency-response-coordination-centre-ercc_en [Accessed 5 Jun. 2019].

European Civil Protection and Humanitarian Aid Operations - European Commission. (2019). Monitoring tools - European Civil Protection and Humanitarian Aid Operations - European Commission. [online] Available at: https://ec.europa.eu/echo/what/civil-protection/monitoring-tools_en [Accessed 5 Jun. 2019].

Février, F. (2011). Vers un modèle intégrateur “expérience-acceptation”: rôle des affects et de caractéristiques personnelles et contextuelles dans la détermination des intentions d’usage d’un environnement numérique de travail. Dissertation, Université Rennes 2.

Greene, J.D., S.A. Morelli, K. Lowenberg, L.E. Nystrom, and J.D. Cohen. (2008). Cognitive load selectively interferes with utilitarian moral judgment. Cognition 107 (3): 1144–1154.

Grimaldi, Mary Elizabeth. (2007). Ethical decisions in times of disaster: Choices healthcare workers must make. Journal of Trauma Nursing 14 (3): 163–164.

Hales, D. and Race, P. (2010). Public Security Technical Program Planning Scenario: Final Report.Defence R&D Canada – Centre for Security Science.

Hall. C., et al., (2019). Findings from Systematic Review of Public Perceptions and Responses. PROACTIVE Project. Deliverable 1.1.

Havârneanu, G.M., Petersen, L. and McCrone, N. (2022). Stakeholder Engagement Model to Facilitate the Uptake by End Users of Crisis Communication Systems. In Security Technologies and Social Implications (eds G. Markarian, R. Karlović, H. Nitsch and K. Chandramouli).

Heath, R.L. and Lee, J. (2016). “Chemical manufacturing and refining industry legitimacy: Reflective management, trust, pre-crisis communication to achieve community efficacy”, Risk Analysis, 36(6): 1108-1124.

Heirston, B. (2010). “Firefighters and Information Sharing. Smart Practice or Bad Idea?”, Homeland Security Affairs, 6(2).

Huijts, N. M. A., Molin, E. J. E., Steg, L. (2012). “Psychological Factors Influencing sustainable energy technology acceptance: A review-based comprehensive framework”, *EnergyRev*, 16(1): 525–53.

Jennings, B., & Arras, J., (2008). Ethical Guidance for Public Health Emergency Preparedness and Response: Highlighting Ethics and Values in a Vital Public Health Service, available at https://www.semanticscholar.org/paper/Ethical-guidance-for-ublic-health-emergency-and-%3A-Jennings-Arras/01430218c871b8df2d0d41be63617dab415301ed

Jillson, Calo (2019). *American Government: Political Development and Institutional Change*. London: Routledge.

Kailes, J.I. and Enders, A. (2007). Moving beyond “special needs”: A function-based framework for emergency management and planning, in Journal of Disability Policy Studies, 17(4): 230-237.

Kanda, H., et al. (2014). “Internet usage and knowledge of radiation health effects and preventive behaviours among workers in Fukushima after the Fukushima Daiichi nuclear power plant accident”, Emergency Medicine Journal, 31(1): 60-65.

Karadag, Ozge C., and A. Kerim Hakan. (2012). Ethical dilemmas in disaster medicine. Iranian Red Crescent Medical Journal 14 (10): 602–612.

Lucini, B. (2017). The Other Side of Resilience to Terrorism: A Portrait of a Resilient-Healthy City. New York: Springer International Publishing.

Malich, G., Coupland, R., Donnelly, S. and Nehme, J. (2016). “Chemical, biological, radiological ornuc lear events: The humanitarian response framework of the International Committee of the Red Cross”, International Review of the Red Cross, 97(89): 647-661. doi:10.1017/S1816383116000266.

Mastroianni, Anna C., Jeffrey P. Kahn, and Nancy E. Kass (eds), The Oxford Handbook of Public Health Ethics, Oxford Handbooks (2019); online edn, Oxford Academic, 8 Jan. 2019), https://doi.org/10.1093/oxfordhb/9780190245191.001.0001, accessed 18 July 2023.

Mathieson, K. (1991). “Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior”, Information Systems Research, 2(3): 173-191.

Matthiessen-Guyader, L. (2004). Conference on Ethical implications of scientific research on bioweapons and prevention of bioterrorism. Report. Brussels: European Commission.

Mendonca, D., and F. Fiedrich. (2006). Training for improvisation in emergency management: Opportunities and limits for information technology. International Journal of Emergency Management 3 (4): 348–363.

Mustonen R. (2018). Preparedness and response to radiological emergencies. Finland: Radiation and Nuclear Safety Authority.

Nozick, R. (1974). Anarchy, state and utopia. New York: Basic Books.

O’Mathúna, Dónal P., Bert Gordijn, and Mike Clarke, eds. (2014). *Disaster bioethics: Normative issues when nothing is normal*. Dordrecht: Springer.

O'Mathúna, D. P. (2019). “Ethics and law for chemical, biological, radiological, nuclear & explosive crises”. D. P. O'Mathúna, & I. de Miguel Beriain (Eds.). Springer International Publishing.

Pinel, W. (2009). La résilience organisationnelle: concepts et activités de formation. M.A.Sc. thesis. École Polytechnique de Montréal, Quebec, Canada.

Poortinga, W., Steg, L. and Vlek, C. (2004). Values, environmental concern and environmental behavior: a study into household energy use. *Environmental Behaviour*, 36(1): 70–93.

Ramesh, Aruna C., and S. Kumar. (2010). Triage, monitoring, and treatment of mass casualty events involving chemical, biological, radiological, or nuclear agents. Journal of Pharmacy and Bioallied Sciences 2 (3): 239–247.

Rebera, A. P. (2019). “Building Ethics into CBRNE Security”. In *Ethics and Law for Chemical, Biological, Radiological, Nuclear & Explosive Crises* (pp. 37-51). Springer, Cham.

Rebera, Andrew P., and Chaim Rafalowski. (2014). On-the-spot ethical decision-making in CBRN (chemical, biological, radiological or nuclear event) response. Science and Engineering Ethics 20 (3): 735–752.

Rice et al. (2017). Human Rights-Based approach to disaster Management, Journal of Human Rights and Social Work, Springer- 2: 117:127.

Scheinin, Martin, Vermeulen, Mathias (2010). Unilateral Exceptions to International Law: Systematic Legal Analysis and Critique of Doctrines that Seek to Deny or Reduce the Applicability of Human Rights Norms in the Fight against Terrorism, EUI LAW, 2010/08, [DETECTER] - https://hdl.handle.net/1814/14178

Sokol, D.K. (2006). Virulent epidemics and scope of healthcare workers’ duty of care. Emerging Infectious Diseases 12 (8): 1238–1241.

Stănciugelu, I., & Krieger, K. (2014). PRACTICE Ethics Checklist for Tool Providers, Project PRACTICE, contract no 261728.

Starcke, K., A.C. Ludwig, and M. Brand. (2012). Anticipatory stress interferes with utilitarian moral judgment. Judgment and Decision making 7 (1): 61–68.

Ten Have, Henk. (2014). Macro-triage in disaster planning. In Disaster bioethics: Normative issues when nothing is normal, ed. Dónal P. O’Mathúna et al., 13–32. Dordrecht: Springer.

Tricot, A., Plégat-Soutjis, F., Camps, J.F., Amiel, A., Lutz, G., & Morcillo, A. (2003). Utilité, utilisabilité, acceptabilité: interpréter les relations entre trois dimensions de l’évaluation des EIAH. In: Desmoulins C, Marquet P, Bouhineau D (ed.) *Environnements informatiques pour l’apprentissage humain*, pp 391–402.

United Nation General Assembly, (2006) Optional Protocol to the Convention on the Rights of Persons with Disabilities, resolution A/RES/61/106

University of Bern (2008). Brookings Institution, Project on Internal Displacement. Annual Report.

Venkatesh V.; Thong J. Y. L. and Xu, X. (2012). “Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology”, MIS Quarterly, 36(1): 157-178.

Venkatesh, V.; Morris, D. (2003). “User Acceptance of Information Technology: Toward a Unifie View”, MIS Quarterly, 27(3): 425-478.

Vosoughi, S., Roy, D. and Aral, S. (2018). “The spread of true and false news online”, Science, 359(6380), 1146-1151. doi: 10.1126/science.aap9559.

Wagner, J. M., & Dahnke, M. D. (2015). Nursing Ethics and Disaster Triage: Applying Utilitarian Ethical Theory. *Journal of Emergency Nursing*, *41*(4), 300–306. https://doi.org/10.1016/j.jen.2014.11.001.

Wagner, Jacqueline M., and Michael D. Dahnke. (2015). Nursing ethics and disaster triage: applying utilitarian ethical theory. Journal of Emergency Nursing 41 (4): 300–306.

Webb, G.R. (2004). Role improvisation during crisis situations. International Journal of Emergency Management 2 (1–2): 47–61.

West, J. (2013). “Bowling with terrorist: Resilience, social capital and hybrid security in the effort to prevent terrorism”, Paper presented at the CPSA Annual Conference.

World Health Organisation (WHO). (2015). Global Health Ethics – Key issues, Luxembourg.

World Medical Assembly (1981, revised 2005) Declaration of Lisbon on the rights of the patient, Lison Portugal, available at https://www.wma.net/wp-content/uploads/2005/09/Declaration-of-Lisbon-2005.pdf, accessed August 2023

Yoshida, M., et al. (2016). “Availability of Japanese Government's supplemental texts on radiation reflecting the Fukushima Daiichi Nuclear Power Plant accident for elementary and secondary education from dental students' understanding”, *Journal of Environmental Radioactivity*, 155-156: 7-14.

9. ANNEX 1 – ETHICAL OBSERVATION AND EVALUATION PLAN

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

ETHICAL OBSERVATION AND EVALUATION PLAN

Project PROACTIVE 2nd Field Exercise, RIETI, Wednesday November 16th 2022

PROACTIVE PROJECT ETHICS OFFICER (PEO) Approval Reference: **PEO no 17/10.10.2022**

CBRNE (Chemical, Biological, Radiological, Nuclear and explosive) events raise important ethical issues in which fundamental principles have to be followed and competing values must be weighed. These tactical objectives are part of the ethical observation and evaluation plan and should be seen as a practical guide for the evaluation of the work of response teams and emergency medical staff when confronted with disaster situations.

EXERCISE TACTICAL OBJECTIVES

GENERAL

1. Ensure that the exercise is carried out with respect for human dignity at all times.
2. Guarantee that all proper authorisations (i.e. by corresponding local data protection agencies, LEAs, etc.) are obtained.
3. Ensure that exercise briefings are carried out in accordance with PROACTIVE ethics briefing pack materials and recommendations.
4. Make sure volunteers have completed a consent form(s) as recommended.
5. Ensure that relevant legislation concerning your duties in the exercise has been complied with.
6. Identify and take into account cultural differences during fieldwork activities.
7. Recognise the role of different spiritual beliefs during fieldwork activities.
8. Make sure environmental rights have been respected during fieldwork activities.
9. Respect privacy and autonomy of volunteers unless it becomes necessary to override these rights to protect the public from serious harm.
10. Make sure restrictions to individual liberty are proportional, necessary and relevant, employ the least restrictive means and are applied equitably.
11. Make sure, when resources are limited, that the needs of the exercise volunteers and surrounding community are considered rather than one's own self-interest.
12. Make sure health care resources are allocated fairly with a special concern that those most vulnerable are treated fairly.

13. Ensure that communication with participants and among managers and researchers is clear, precise, and reassuring.
14. Ensure that decisions about evacuation and quarantine are carefully scrutinised to protect people's interest.

TRIAGE

1. Facilitate that all actors involved in the exercise get situational awareness which should provide a global view shared in real time with first responders and the general population via reliable communication means and secured information networks.
2. Provide safety and security tools to the population.
3. Equip First Responders with suitable personal protective equipment (PPE).
4. Evaluate if wearing PPE is an impediment to carry out exercise activities such as conducting field triage or gathering participant consent.
5. Prioritise vulnerable groups safety and wellbeing at all times.

OBSERVATION PLAN

GENERAL ETHICAL PRINCIPLES AND DILEMMAS DURING THE EXERCISE

1. Which were the contextual factors limiting respect to main ethical principles (beneficence, justice, autonomy)?

2. Where there any moments where it was needed to choose between competing plausible courses of action?

3. Was it necessary to take care of the cultural differences when dealing with 'patients'?

4. How have cultural differences been taken care of during the exercise?

5. Were there any situations where cultural values and principles which guide the responders' decision clashed?

6. Were there any moments where it was necessary to choose between duty of care to patients and personal wellbeing or responsibility owed to loved ones?

CONSIDERATION OF SOCIETAL DIMENSIONS

1. Have the role of diverse spiritual beliefs been recognised during the exercise?

2. Have environmental rights been respected?

3. Have participants been properly treated?

4. Have vulnerable groups been prioritised?

5. Have privacy and autonomy of patients been practically respected (i.e. tents used for undressing procedure; waterproof curtains used for decontamination etc)?

OPERATIONAL AND ASSESSMENT ETHICS

1. Have safety been guaranteed at all times? Have potential safety risks been given sufficient attention?

2. Have contact between responders and participants been minimised before the exercise in order to prevent biases in the exercise process and evaluation?

3. Have you been able to interact with participants at all times?

4. Have you had access to all relevant information?

5. Have you been provided with the field exercise general scenario prior to the deployment?

6. Have you been able to give feedback on the approach to ethical and legal aspects of the exercise?

7. Have you participated in the debriefing sessions with the participants in the field exercise?

8. Has consent been properly collected?

9. Has the information sheet and the consent form been able to properly informed the participants?

10. Was wearing PPE an impediment to conducting field triage or gathering participants consent?