



RiskPACC

INTEGRATING RISK PERCEPTION AND ACTION TO ENHANCE CIVIL PROTECTION-CITIZEN INTERACTION

CPA Consultation Report and Repository of Best Practices

Deliverable 1.2

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RiskPACC

Integrating Risk Perception and Action to enhance Civil Protection-Citizen interaction

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ABOUT RISKPACC

Increasingly complex and interconnected risks globally highlight the need to enhance individual and collective disaster resilience. While there are initiatives to encourage citizen participation in creating a resilient society, these are typically fragmented, do not reach the most vulnerable members of the communities, and can result in unclear responsibilities for building disaster resilience.

New technologies can also support preparedness and response to disasters, however, there is limited understanding on how to implement them effectively. Awareness of risks and levels of preparedness across Europe remain low, with gaps between the risk perceptions and actions of citizens and between the risk perceptions of citizens and Civil Protection Authorities (CPAs).

The RiskPACC project seeks to further understand and close this Risk Perception Action Gap (RPAG). Through its dedicated co-creation approach, RiskPACC will facilitate interaction between citizens and CPAs to jointly identify their needs and develop potential procedural and technical solutions to build enhanced disaster resilience. RiskPACC will provide an understanding of disaster resilience from the perspective of citizens and CPAs, identifying resilience building initiatives and good practices led by both citizens (bottom-up) and CPAs (top-down). Based on this understanding, RiskPACC will facilitate collaboration between citizens, CPAs, Civil Society Organisations, researchers and developers through its seven (7) case studies, to jointly design and prototype novel solutions.

The “RiskPack” toolbox/package of solutions will include a framework and methodology to understand and close the RPAG; a repository of international best practice; and toolled solutions based on new forms of digital and community-centred data and associated training guidance. RiskPACC consortium comprised of CPAs, NGOs, associated organisations, researchers and technical experts will facilitate knowledge sharing and peer-learning to close the RPAG and build disaster resilience.

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Executive Summary

Deliverable 1.2 is the second output of Work Package 1. The concepts used in this deliverable are based on D1.1, which provided the knowledge base for RiskPACC on the topics of disaster resilience, vulnerability, and risk perception as well as how these terms are operationalized by civil protection authorities (CPAs). The aim of the work is to:

- Study emergency and disaster management approaches and good practices of CPAs of all administration levels, through literature review, surveys as well as structured and productive dialogue with national, regional and local CPAs, in order to understand and identify similarities and differences of 'top-down' disaster resilience and risk communication approaches.

To accomplish the objectives of this deliverable, CPA practices were evaluated using three different techniques:

- Review of emergency and disaster management doctrine and practices at the international and EU level, including a brief description of practices for several countries across the world.
- Description of disaster risk management (DRM) approaches and current practices at national level for EU countries represented by RiskPACC partners gathered from literature and interviews.
- Interviews with CPA practitioners at a local, regional and national level. Twenty-two (22) interviews were conducted in total, 5 with local, 10 with regional and 7 with national level CPA representatives.

Following the introduction, the first section of the report reviews emergency and disaster management aspects and doctrine at the international, EU and national level. Then, the methodology, implementation and analysis of results from the consultation with national, regional and local CPAs is presented, using interviews based on an open-ended questionnaire designed by RiskPACC consortium members involved in WP1 and WP2.

Practices used at the international, EU and national level for several countries are described in the following subsections, aiming to provide an overview of various approaches used, as well as interconnection and cooperation of CPAs worldwide.

In the conclusions (Section 3), an inclusive evaluation of the results of Task 1.2 titled "Multidisciplinary Stakeholder Consultation" is presented.

This deliverable provides the first look at empirical research on CPA resilience and risk perception practices that will be used for the gap analysis for D1.3 and the foundational knowledge needed to feed into the other WPs of the project.

Glossary and Acronyms

Term	Definition/Description
BABZ	Federal Academy of Civil Protection and Civil Defence
BBK	Federal Office of Civil Protection and Disaster Assistance (Bundesamt für Bevölkerungsschutz und Katastrophenhilfe)
CECIS	Common Emergency Communication and Information System
CEMADEN	National Centre for Monitoring and Early Warning of Natural Disasters
CENAD	National Centre for Disaster Risk Management - Brazil
CPA	Civil Protection Agency
D1.1	Deliverable 1.1
D1.2	Deliverable 1.2
D1.3	Deliverable 1.3
DICRIM	Document d'Information Communal sur les Risques Majeurs
DORSCON	Disease Outbreak Response System Condition
DRM	Disaster Risk Management
DRMKC	Disaster Risk Management Knowledge Centre
DRR	Disaster Risk Reduction
ECHO	European Civil Protection and Humanitarian Aid Operations
ECMWF	the European Centre for Medium-Range Weather Forecasts
EFAS	European Flood Awareness System
EFEHR	European Facilities for Earthquake Hazard and Risk
EFFIS	European Forest Fire Information System
EMS	Emergency Management System
EPOS	European Plate Observing System
ERCC	Emergency Response Coordination Centre
ESA	European Space Agency
ESEPA	Voluntary Corp of Greek Firemen and Replanters (Ethelontiko Soma Ellinon Pirosveston Anadasoton)
EUCPM	European Union Civil Protection Mechanism
EU	European Union
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
FATF	Financial Action Task Force
FD	Floods Directive
FRONTEX	European Border and Coast Guard Agency (Frontières extérieures)
FTF	Foreign Terrorist Fighters
GDPR	General Data Protection Regulation
GEM	Global Earthquake Model
GSM	Global System for Mobile Communications
HRT	Hellenic Rescue Team
ICDO	International Civil Defence Organisation
ICMS	Incident and Crisis Management System

IDF	Israel Defence Forces
IFRC	International Federation of Red Cross
IOC	Intergovernmental Oceanographic Commission
JRC	Joint Research Centre
KEMEA	Kentro Meleton Asfaleias – Center for Security Studies
LRF	Local Resilience Forums
MS	Member States
NCCN	National Crisis Center
NEAMTWS	North-Eastern Atlantic and Mediterranean Tsunami Warning and Mitigation System
OECD	Organisation for Economic Co-operation and Development
RPAG	Risk Perception and Action Gap
SOTA	State-Of-The-Art
SSP	Special spatial plan
TE-SAT	Terrorism Situation and Trend Report
UCPM	Union Civil Protection Mechanism
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction (former UNISDR)
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organization
WP	Work Package

TABLE 1: GLOSSARY AND ACRONYMS

1 INTRODUCTION

1.1 Overview

RiskPACC focuses on enhancing citizens' risk perceptions and preparedness for disasters, by closing the so-called Risk Perception Action Gap (RPAG). Our analysis has shown that in many cases there is poor perception and understanding of risk in Europe among citizens and limited action is taken for risk perception (D2.1). As demonstrated in the literature, even when risk is adequately understood, limited action for risk perception is taken.

There is also inconsistency between how citizens perceive risk and how civil protection authorities (CPAs) do so, all of which contribute to the risk perception -action gap (Wachinger et al., 2012; Margolis, 1996; Ropeik, 2012). Bridging the RPAG could play a significant role in increasing disaster resilience in the case study areas involved in the project.

These issues will be addressed in RiskPACC through desk-based and primary research, as well as co-creation activities and framework creation that will involve both CPAs and citizen groups from the case-study areas. RiskPACC will also draw on different understandings of new technologies and new forms of media used for

communication both between and across CPAs and citizens, ultimately contributing to bridging the RPAG. Finally, the work of RiskPACC will be combined into “The RiskPack”, which will include a framework and a methodology to understand the RPAG in different settings, as well as to identify best practices and technological tools that can be used in communities to bridge the RPAG (RiskPACC, 2020).

The project consists of ten (10) work packages (WPs), with this deliverable being the second part of WP1 “Understanding good practices and challenges in Civil Protection policy and practice”. The overall objective of WP1 is to establish the scientific foundations of the project by researching the perception of disaster resilience from the perspectives of CPAs and identifying good practices that have been implemented by CPAs in terms of disaster resilience and risk perception (RiskPACC DoA, 2020, p. 11). The objectives of WP1 relevant to Task 1.2 are the following:

- Analyse the identified approaches and best practices through surveys and local dialogue focus groups with CPAs (and build a community of users for the following phases of the project).
- Combine an exhaustive literature review with interdisciplinary knowledge and CPA practices embedded within, emergency responders, responsible bodies and other key stakeholders represented in the project.

This WP, along with WP2 “Engaging citizens to expand understandings of risks, vulnerabilities, and data collection opportunities”, will provide the foundational knowledge needed to feed into the other WPs. The outputs and deliverables of WP1 will feed into both the baseline information required for WP3 “Co-creation lab and stakeholder integration,” and the development of the framework in WP4 “Framework development”, while also forming the baseline understanding of the terms disaster resilience, vulnerability, and risk perception that will be addressed and further analysed throughout the project.

This deliverable (D1.2), “CPA consultation report and repository of best practices”, is the output of Task 1.2, “Multidisciplinary Stakeholder Consultation” in the RiskPACC Description of Action (DoA). Desk-based research, targeted surveys/interviews, and dialogue meetings were applied to identify diverse approaches and practices used and recommended by CPAs and first responders. Desk-based research includes a literature review of DRM and emergency management doctrines and aspects at international and EU level, as well as identification of policies and best-practices for disaster resilience and risk communication across the world.

This desk-based research has been enriched with information from interviews with CPAs at local, regional and national level. These interviews were used to determine diverse resilience practices that are taking place in RiskPACC case study areas and internationally.

The aim of this report is to establish some of the current resilience practices that are taking place among CPAs in different administration levels and determine how disaster

resilience and risk perception relate to them, their organizations, and the communities that they work in and provide a better understanding for the similarities and differences between their risk perception approaches. Specifically, this report will outline the current resilience methods, establish current CPA needs and their plans for future resilience activities. This report will look at both traditional approaches and contemporary tools such as social media, that are currently being used. Interviews and desk-based research aim to identify the current resilience practices that countries are employing.

It should be noted that the purpose of the desk research for this deliverable is not an exhaustive analysis and evaluation of CPAs' practices at international and national level, but rather a concise presentation of these practices. The objective is to highlight different approaches and current practices and link them to relevant literature references, for possible further study at a later stage of the RiskPACC project.

For some European countries, interviews with national level CPAs were combined with literature reviews and information collection from partners. A separate chapter in the Deliverable is dedicated to providing details on different aspects of CPA activities at a national level.

In addition, the interviews conducted at national, regional and local level, provided an additional level of insight, from the practitioners' perspective, into the resilience practices of CPAs, the relationships between them and with local communities, their potential problems and limitations, and suggestions for future disaster resilience activities (Section 2.3).

Thus, the above three levels of analysis of CPAs' practices provide a multidimensional picture of the current practices to increase disaster resilience and the identification of gaps. This report provides the comprehensive background knowledge necessary for future tasks of the project.

Other tasks in WP1 and WP2, specifically D1.1 and D2.1, served as a basis for this deliverable. The working definitions for disaster resilience, vulnerability, and risk perception and how these concepts are perceived and applied operationally by CPAs, supported the structure of the interviews and the questionnaire and have provided the baseline for topics discussed in this report. The results of this report, combined with outputs from D1.1, will form the backbone of D1.3 and will highlight the gaps that have been identified in the operationalization of disaster resilience and risk perception practices.

This deliverable will also feed into the recommendations for the RiskPACC framework Task 3.1 "Baseline, needs, and user requirements assessment in case-study areas" and Task 4.2 "Repository of good practices – creating the Knowledge-base".

1.2 Structure of the deliverable

This document is comprised of five sections:

The Introduction section (current section 1) includes the overview of the task, and describes how it will be integrated into the overall RiskPACC project.

Section 2 is the main body of the deliverable where the work that has been conducted in the frame of T1.2 is described in detail. Section 2 has been divided in the following three sub-sections:

- Sub-section 2.1. The definition of term “best practices”.
- Sub-section 2.2. Review of emergency and disaster management aspects and doctrine at EU and national level.
- Sub-section 2.3 Methodology, implementation and analysis of results of CPAs consultation with national and local CPAs is presented, using interviews based on an open-ended questionnaire that was designed for this purpose.
- Sub-section 2.4. Best practices used at international, EU and national levels for several countries are described in the following sub-sections, in order to provide an overall view of various approaches used, as well as interconnection and cooperation of CPAs worldwide.

In Section 3 of the report, comments and conclusions from the analysis of task 1.2 are presented, while the next steps of the research are outlined, and an explanation is provided of how this work will tie into other RiskPACC tasks.

Section 4 includes the References used in D1.2 and finally Section 5 (Annexes) include the questionnaire that has been designed and used for the interviews with the CPAs, the information material provided to the interviewees and the consent form that has been prepared according to the RiskPACC ethical and GDPR rules and signed by the interviewees.

2 ROLE AND PRACTICES OF CPA IN DISASTER RISK MANAGEMENT

This chapter will explain the meaning of the phrase “best practices” as interpreted for this deliverable and will address different disaster management and resilience practices undertaken by different levels of CPAs. EU policies, activities at national level, and regional/local CPA resilience policies are discussed. This chapter highlights the current practices in disaster resilience and risk perception and includes a discussion of the methodologies used to gather information from different CPAs.

2.1 Definition of “Best Practice”

The definition of the term “best practice” was first formulated in 1927 as “*a procedure that has been shown by research and experience to produce optimal results and that is established or proposed as a standard suitable for widespread adoption*” (Merriam Webster, 2022).

In the Cambridge dictionary, it is referred as “*a **working method** or set of **working methods** that is **officially accepted** as being the **best** to use in a **particular business** or **industry**”.*

In reality, “best practices” is often used synonymous to “good practices”. The difficulty with the term “best practice” is that it connotes that an ideal has been achieved, whereas “proven practice” more reasonably asserts that an approach has been tried successfully. For this deliverable, best practice will refer to good practices that have proven successful past cases.

Best practices in disaster resilience and risk communication, are actually a set of guidelines, ethics, policies, or ideas (Hayes A., 2022) that have been followed on an international, EU, national, regional or local level, in order to achieve the elimination or mitigation of the impacts of a natural or human-made hazard. They can be established by authorities, such as by volunteer teams, CPAs, citizens.

2.2 Disaster Management, Resilience and Doctrine in European Union

This section will outline the current regulations and policies that govern the resilience practices employed by the EU and discusses current practices in the cross-board cooperation within the EU.

The protection of people, property, environment, and cultural heritage against multiple threats are primarily a national responsibility across the European Union. However, the EU complements, supports, and coordinates national action, and promotes cross-border cooperation.

A variety of EU policies and funds aim to strengthen collective safety and resilience against adverse events. Under the EU Civil Protection Mechanism (EUCPM), 27 EU

countries and six (6) other participating member states (MSs) regularly exchange information on disaster risks.

They also organize and implement joint exercises among MSs, coordinate rescue teams and allocate equipment of different MSs that can be rapidly mobilised when a disaster strikes any other country in the world and local authorities are overwhelmed (ECHO, n.d.).

Across the EU, a robust understanding of disaster risks is needed in order to frame risk management policies. To this end, the EU civil protection legislation defines obligations for both the European Commission and EU member states. Every three years, MSs must assess their disaster risks, and their risk management capabilities, and share the summary of this assessment with the Commission. In the same spirit, the Commission has the obligation to publish regularly a “cross-sectoral overview of natural and human-made disaster risks of EU interest, adopting a coherent approach across different policy areas that may address or affect disaster prevention and taking into account the potential impacts of climate change” (European Commission, 2020).

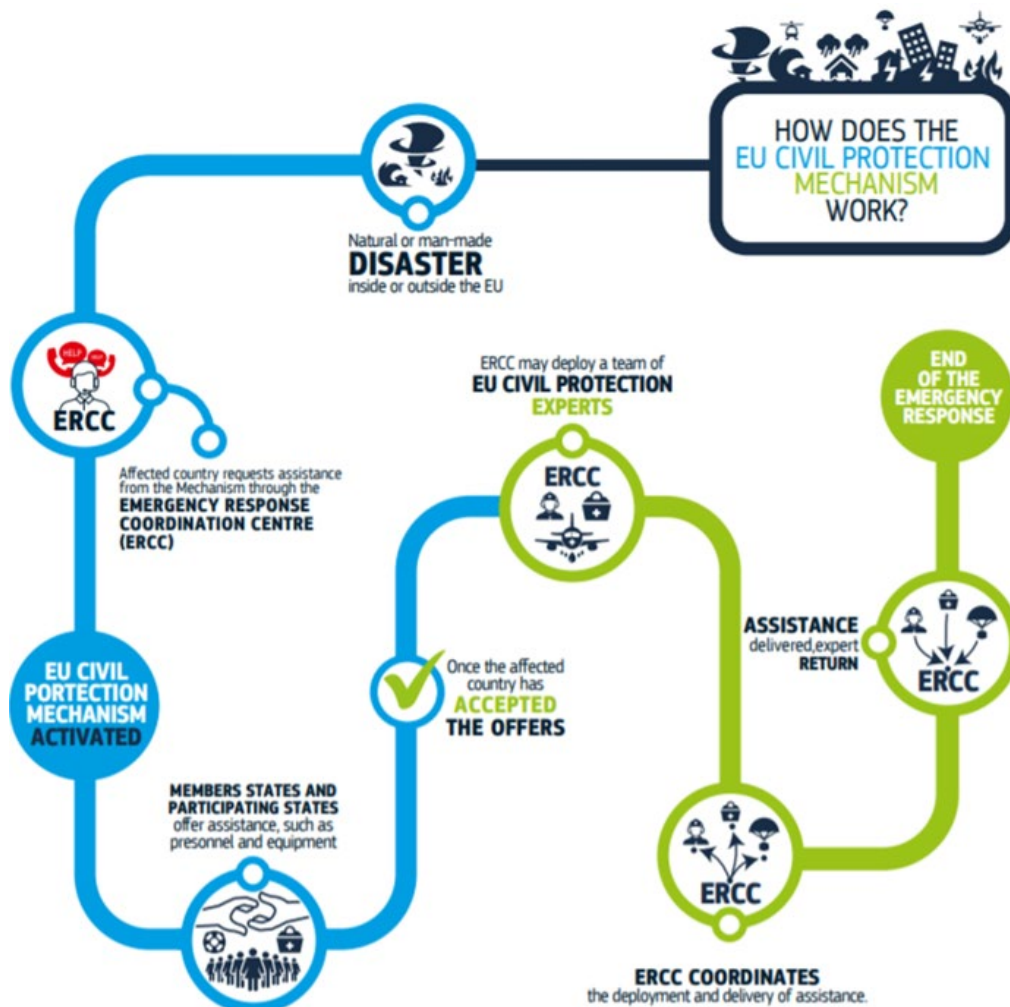


FIGURE 1 : EU CIVIL PROTECTION MECHANISM (SOURCE: EUROPEAN COMMISSION, 2020)

As disaster risk is dynamic and evolving, it requires systematic monitoring so that risk management policies can be adapted to the changing situation. Regular assessments of disaster risks, the ability to manage them and the sharing of risk information at the EU level, are important aspects of the disaster risk management work carried out under the EUCPM. Only a few MSs have a long history in disaster risk assessment, while most MSs started undertaking this assessment merely a decade ago after the Council invited member states to develop national approaches to risk analyses and make them available to the Commission information on risks of relevance at the EU level.

Currently, national risk assessments are an established practice across EU member states. In most cases, they are embedded in national legislative or policy frameworks. National risk assessments serve primarily to support national disaster risk management efforts, constituting at the same time a valuable source of information for action at the EU level (European Commission, 2020).

Although the EU Civil Protection Mechanism legislation does not restrict which hazards and threats can be addressed in a national risk assessment, it does recommend the adoption of an “all-hazards approach”, given that the overall objective of the EUCPM is to protect people, environment and property from “all kinds of natural and human-made disasters, including the consequences of acts of terrorism, technological, radiological or environmental disasters, marine pollution, and acute health emergencies” (European Parliament, 2013). Other international frameworks, such as the Sendai Framework for Disaster Risk Reduction 2015-2030, the OECD/G20 (Organisation for Economic Co-operation and Development) framework on disaster risk assessment and risk finance (OECD, 2012; UNDRR, 2015) or the Paris Agreement, also recommend taking a holistic and cross-sectoral approach to risk assessment and management in order to tackle the full range of risks threatening societies, as well as systemic interdependencies between them.

2.3 CPAs Consultation

This section discusses the methodology used to design and conduct the interviews that are the backbone of this report. These interviews with national, regional, and local CPAs highlight different resilience and risk perception activities that are currently being used by CPAs at the different levels of DRM structure. This section also includes an analysis of the interviews and a description of the current CPA practices identified.

2.3.1 INTERVIEWS DESIGN

The CPAs consultation was conducted through semi-structured interviews with CPA representatives and was based on questionnaires with open-ended questions, which were considered more appropriate for RiskPACC purposes (Bhandari, 2015; FAO, 2022; Harvard University, 2007). It allowed for open dialogue between CPAs and interviewers to explore CPA practices.

The interviews that have been conducted and listed in Table 2, as well as the analysis that follows in Sub-section 2.3.3, aim to establish a basis for further exploration of the information provided during CPA consultation procedure, for the purposes of Task 1.3 and D1.3 “Gap Analysis and Roadmap of key actions to advance SOTA”.

The designing of the questionnaire for the CPAs included targeted, meaningful and comprehensible questions that addressed the research objectives for Task 1.2 and ordering them in a useful and meaningful way, following the requirements of the researcher-administered method (Bhandari, 2015) and took place via telephone calls, in person, and online.

No pre-determined responses were available to the interviewees. The questions were used to solicit unrestricted answers and the respondents were encouraged to express themselves freely. This allowed them to manifest their opinions and emotions which were sought, in combination with more formal information.

Alternative with the interviews, dialogue meetings were conducted. The dialogue meetings were designed in a similar way as the interviews, i.e. the same questionnaires were used. However, at least two CPAs participated (from the same or different organisation), and there was more room for discussion and exchange of opinions with CPAs. For the evaluation in chapter 2.3.3, no difference was made between interviews and dialogue meetings.

The researcher-administered questionnaires methodology contributed to:

- Selecting the respondents and ensuring that they were representative of the target audience.
- Allowing clarification and analyses of ambiguous or unclear questions and answers.
- Achieving high response rates because it is harder to refuse an interview when a previous relationship and history of communication exists, or personal attention is given to respondents.

To ensure the integrity of the questionnaire in terms of its style, contents and consistency in the use of terminology and wording, a common questionnaire for the CPAs and the communities (local citizens) was designed in collaboration with WP2 partners. This questionnaire consisted of four parts:

1. General questions for both CPAs and the Community Groups
2. Questions for the CPAs
3. Questions for the Citizens/Community Groups
4. Summary which regards questions about the effects of the pandemic

Parts 1 & 2 were meticulously formulated by expert practitioners in order to be adapted more effectively for the interviews with the CPAs representatives. Finally, using the questionnaire Parts 1, 2 & 4, a pilot implementation of the interviews was conducted

with local CPAs in a selected pilot area. This helped to evaluate all the aspects of the consultation procedure and further improve the questionnaire.

The Regional Unit of Euboea Island, Greece, and more particularly two municipalities of the Northern part of the island (Istiaias - Aidipsoy, Mantoudi - Limni Agias Annas) which were severely affected in August 2021 by one of the most significant wildfires in Europe, were selected as the pilot area for this purpose and helped in the design and validation of the questionnaires. For the following reasons, this recent high-impact disaster event, is considered by the RiskPACC consortium to be a valuable case to be further studied during the project:

- The disaster is very recent, therefore representatives of CPAs and citizens have more vivid experiences and willingness to share them publicly.
- The event is related to extreme weather conditions (prolonged heat-wave), which occur more frequently nowadays than in the past. Thus, climate change effects are progressively becoming more clear and obvious to all. This helps transform risk perception and discussions about adaptation measures and mitigation policies.
- For the purposes of the RiskPACC project, the conditions and characteristics of the disaster and emergency management actions, coordination at national, regional and local levels and the communities' behaviour during and after the emergency event, can provide valuable information about the interaction among the CPAs, as well as between CPAs, citizens and community groups.

Thus, Northern Euboea Island is included as an additional case study for testing methodological approaches during the project and validating the project's outcome.

Pilot implementation of the CPA consultation procedure clarified several aspects that should be taken into account prior to and during the interviews. It contributed to the improvement and clarification of the questionnaire content, terminology and wording and helped the researchers understand the issues to be faced and solved at all stages of communication with the CPAs.

Following pilot implementation of the CPA consultation, specific terms such as 'resilience', 'risk perception', 'risk registry' used in the questionnaires, were further discussed and clarified among the partners, based on their detailed definition in D1.1. Moreover, for the conduct of the interviews, a document with the project's aims and objectives was created and whenever necessary, comprehensive alternative description of terms was provided as auxiliary material for the purposes of the interviews. Finally, a consent form to be signed by the interviewees was also prepared based according to the ethical and GDPR rules of the project.

The above documents are included in ANNEX 2 & 3 of this deliverable.

2.3.2 CONDUCT OF THE INTERVIEWS

The interviews were conducted by the partners involved in Task 1.2 with CPAs at national, regional and local levels, from France, Belgium, Israel, Italy, UK, Greece and Germany.

As described in the previous section, the questionnaires and all the information material that were prepared during the design phase, were made available to the researchers together with specific instructions for conducting the interviews, based on the experience gained and discussed during the pilot implementation.

Preparatory actions taken, a few days before the conduction of interview, included:

- Translation of all the information material and the questionnaire to the native language of the interviewees.
- Selection of the CPAs for telephone communication.

The following table presents the list of CPA representatives that participated in the interviews and the dialogue meetings:

CPA	Administrative level	Country	Role	Years of experience	Gender
Permanent de direction du Centre opérationnel gestion interministérielle des crises (Cogic)	National	France	President of club INTERMINES Gestion de Crise; Expert Advisor for the CNPC (Conseil national de la protection civile); Independent advisor in crisis management policies; Author of a variety of books regarding risk management in France	46	male
National Crisis Center	National	Belgium	Communication officer	6	female
Fire department Antwerp	Local/ Municipality	Belgium	Communication officer	6	female
West-Flanders Province	Regional	Belgium	Communication officer	6	female
MDA #1	Regional	Israel	Regional Volunteers Manager	12	male
MDA #2	Regional	Israel	volunteer team leader	4	female
MDA #3	Regional	Israel	volunteer team leader	4.5	male
Comune di Padova Department public works – UOS Civil Protection	Local/ Municipality	Italy	Local Police Officer – D6 Responsible for UOS PC	19	male
Veneto Region	Regional	Italy	Organizational	15	female
Public Sonar and Northern Ireland	Regional	UK	-	-	male

Lancashire County Council	Local	UK	-	-	female
12th Fire Station of Athens	Regional	Greece	Hellenic fire Brigade	-	male
Rafina Police Department	Local /Municipality	Greece	2nd lieutenant	-	male
The Fire Department of Nea Makri	Local	Greece	Fire Service Officer	-	2 males
Regional Unit of East Attica- Independent Directorate of Civil Protection	Regional	Greece	Head of Department of Civil Protection	-	female
Region of Attica, Independent Directorate of Civil Protection	Regional	Greece	Planning Department	2	female
Greek Fire Brigades	National	Greece	-	-	male
THW – Technisches Hilfswerk / Federal Agency for Technical Relief /Unit “Research Projects”	National	Germany	-	-	female
BBK – Federal Office for Civil Protection and Disaster Assistance General Aspects of Civil Protection, Volunteering, Risk Analysis	National	Germany	-	-	male
DRK – German Red Cross / General Secretariat	National	Germany	--	-	male
IdF – Institut der Feuerwehr NRW / Institute of Firefighters North-Rhine Westphalia / Crisis Management and Research	State	Germany	-	-	male
DRK – German Red Cross / General Secretariat	National	Germany	-	-	male

TABLE 2: LIST WITH THE CPA REPRESENTATIVES THAT PARTICIPATED IN THE CONDUCTED INTERVIEWS AND THE DIALOGUE MEETINGS

(- this information was not provided by the interviewees)

According to answers of interviewees, no significant difference were based on the participant's gender. That has to do with the fact, that the interviewees, were CPA representatives, and gender didn't really make any difference in their perspective. However, similarities in high degree were observed in opinion of interviewees from the same country, even from different administrative levels.

2.3.3 ANALYSIS OF THE INTERVIEW RESULTS

The information extracted from the above-mentioned interviews was analysed and, in an attempt to group shared elements, different common aspects of disaster risk management were identified and are presented in the following subsections. In each subsection, the information provided by the interviewees of all CPAs levels has been analysed, and selected representative statements are quoted. Interviewees from regional and local CPAs, often provided information about the practices at a national level and the interaction of their CPA with the national CPAs. Similarly, the representatives of national CPAs commented on the capabilities, resources etc., of regional and local CPAs, in their country. These interviews express the opinions of various interviewees and may not reflect an unbiased assessment of DRM activities in all areas.

2.3.3.1. Risk and hazard identification

All interviewees were asked about the potential risks and hazards that are present in their areas.

A wide range of hazards and threats concern CPAs operational action at a national level, while pandemics emerge as the most critical hazard at a global level. Severe weather-related hazards are also of major concern.

National registries exist for most countries and hazards are recorded and categorized by the national level CPAs. In general, prioritized hazards and threats are included in the national registry and the CPAs at this level are aware that they have to respond, based on specific plans for each of them. Typically, to assess whether a hazard should be considered as a national priority, its frequency of occurrence is evaluated with respect to its impact.

For instance, in 2018, the National Crisis Center (NCCN) in Belgium coordinated a large-scale risk assessment for the country for the period 2018-2023, identifying 32 key risks. These were categorised into four groups: technological risks (e.g. a nuclear emergency), natural risks (e.g. floods), health risks (e.g. a pandemic) and security risks (e.g. a cyber-attack). By means of the Belgian National Risk Assessment 2018-2023, the NCCN wants to evaluate the major risks to which Belgium may be exposed in a structured and scientifically correct manner.

For this risk assessment, 100 experts from 40 different public organisations analysed the probability and impact of various risk scenarios that could occur in Belgium over the next five years. The scenarios were divided into four themes: natural risks, techno-economic risks, health risks and human-made risks (risks caused by human action and with malicious intent) (NCCN, n.d.).

In Germany, a federal risk analysis is performed for the hazards that are divided into natural hazards, human-made hazards etc. In addition, there is a list of hazards with federal outreach, which is updated periodically. There is always a need to keep this

list updated considering emerging hazards, as well as hazards already prioritized by other countries. At a state level there is no proper inventory of hazards, as risk management is not part of the remit (training institution).

In Greece there is a national registry of hazards. A detailed classification of hazards/risks is included in national Action Plans. Risk assessment is performed at a national level, for those hazards that have been characterised as national priority hazards: earthquakes, floods, landscape fires, extreme weather events, tsunamis, landslides, cyber-attacks, industrial accidents, radiological accidents and public health related hazards.

In the UK, hazards are identified at the county-level by the Local Resilience Forums (LRF). According to these, internal plans are developed regionally and locally to address these risks, while in Italy there is a general categorisation in Legislative Decree 1/2018 which includes the following types of risks: seismic, volcanic, tidal, hydraulic, hydrogeological, adverse weather phenomena, water deficit and forest fires. At a regional level there are also hazard and risk maps for some hazards (flood, industrial chemical, seismic, forest fire and landslide).

Throughout the areas interviewed at regional and local level, different hazards are identified depending on the specific environmental and socioeconomic features of the area and local plans elaborated for those that affect the area.

Regarding the regional and local levels, preparedness levels vary significantly, as some administrations are well-prepared and others not at all. Moreover, a significant comment that was made by some interviewees is that at both national and local level, natural, technological and societal hazards tend to be given attention only when they occur.

As an interviewee from France stated:

“... the risk has always been there, and lessons learned from former hazards are not sufficiently taken into consideration. However, for some administrations, the risk is forgotten and thus insufficiently integrated in risk management policies.”

While there seems to be consensus from national CPAs that legislation exists to conduct national risk assessments and hazard analyses, there is less consensus around the practicalities of creating responses to these assessments. Some interviewees commented on their lack of preparedness to address the hazards that have been identified.

2.3.3.2. Risk perception

As derived from the replies of the CPA interviewees, the CPA representatives are familiar with the risks because of the nature of their work. As was expected, the population perceives risks differently from the CPAs. People have a different understanding of the magnitude of a hazard and its probability of occurrence. In the

opinion of many CPAs interviewed, citizens are not concerned enough with the risks and how to be best prepared for them. This difference in perception is discussed in depth in D1.1.

According to many interviewees, authorities tend to be more rational and objective in their perception of risk and try to be guided by circumstances and statistics, while the population tends to be more emotional. This results in a shifted perception; more severe risks are not perceived as so bad. As an example: people from the Ahr River area in Germany, which has been severely affected by flooding, want to rebuild in the same place instead of moving to a safer locality despite the risk.

Several interviewees commented on their attempts to increase risk perception. An important aspect in this context, according to an interviewee was: *“help for self-help, authorities must sensitize the population to possible dangers”*. One example of sensitizing the population given, was an attempt by authorities to educate and train the citizens to protect and help themselves and other citizens during a disaster/crisis.

However, it is a common insight that local voluntary groups are often specialized in certain types of risk and have a good perception of them. Undoubtedly, the need for a more integrated knowledge and information about the risks is an issue, not only in European countries, but also worldwide. In order to be prepared for hazards, community resilience is important.

It was also mentioned that, in most cases, the citizens were not trained for the actions they should take in case of emergencies.

For example, an Israeli interviewee, who expressed also other interviewees' view, stated that *“For the public- they know what they see on the news. It is not enough to make them truly understand the risk. Maybe it changes during times of escalation or terrorist incidents: then their attention is focused more upon the risks.”*

For certain, risks that are quite ‘controversial’, ‘politically charged’ or heavily present in the media, such as nuclear risks, the gap is significant between the perception of risk of the CPAs and citizens. As a CPA representative from Belgium quoted: *“For instance, authorities attach great importance to / invest a lot in the Seveso risk, which seems of low concern to citizens. Except when there is an odor nuisance. Then you have to explain that a smell doesn’t necessarily mean that there is something wrong. Off course this changes in neighbourhoods where there have been a lot of incidents in the past. There you notice the opposite: every tiny amount of smoke is enough to raise a lot of concern”*.

People's expectations from the authorities regarding their safety have also changed. The German Red Cross and other aid organisations are also considered to be responsible for providing aid and safety at all instances. This is reflected in the increasing number of operations. People call 112 when they have a problem, and expect to be helped with all issues, no matter whether they are life-threatening or not.

Education and experience are aspects that influence the understanding and awareness of risk. Experience is also critical; yet, its inevitable subjectivity, as well as the fact that often only few people may experience a certain hazard should be taken into account. According to many CPAs interviewed, there should be a wide range of education for all ages in the field of disaster preparedness/risk perception (e.g., international earthquake response exercises).

The information gathered from CPAs, at different administratively levels on risk perception, details the opinions of different CPAs on the risk perception of their citizens. They highlight the opinion that is pervasive across many different CPAs, which is that citizens do not understand the risks they face and that they need to become more self-reliant. To combat this, the most common activities conducted by CPAs are information campaigns for all ages.

2.3.3.3. Resilience aspects

Resilience, as the majority of CPAs noted, is defined as “the strength as a society to be able to deal with and survive an emergency”. Resilience as a term is not usually used operationally, although it is known to the CPAs. As an interviewee mentioned, it is not really a word that is used beyond the emergency planning community and is typically absent in communication with the general public. In areas that “resilience” isn’t commonly used, as mentioned in interviews, when necessary, in existing policies and operational actions the terms “risk management”, “emergency management”, “hazard prevention” may be used instead. For example, the concept of resilience exists in Greek legislation (Law 4662/2020). However, it is not widely used for official purposes. Instead, the terms 'information', 'prevention', 'risk management' and 'emergency response management' are used. A common agreement is that, in order to increase resilience, citizens should be more informed and responsible about natural hazard impacts.

The term resilience is also used in education and disaster risk reduction projects in Germany. In these projects, the ability to restore the response capacity (as well as the health of the system, the organisations and the emergency workers) plays a central role. Strengthening and supporting organisations, communities, social spaces and emergency responders is important, as is conducting an assessment of a situation. From 13.07.2022, the federal government adopted the German resilience strategy for strengthening disaster resilience (BBK, n.d.).

As it was mentioned from a CPA in Belgium, “*We define resilience as “the actions citizens can take themselves to prepare for or protect themselves in an emergency situation, without relying on the government”. In Belgium (more so than e.g. in the United States) people are used to rely on the government for social security, housing, etc. This is in itself a good thing (and something a government should provide), but we notice this same more-or-less “passive” mentality in emergency situations. However,*

there are a lot of things that citizens could do to help themselves and others in emergency situations”.

In France, as it was mentioned from a CPA, *“there is a civil security response mechanism which any French citizen can join. It is called the “Réserve Communale de Sécurité Civile” and it is organised by municipalities. The mechanism allows citizens to complement municipal agents and civil health workers (Red Cross, Ordre de Malte, etc.) in situations of crisis. This is an efficient way to train and prepare communities for natural hazards and create solidarity within the community. However, it exists at a local level and is not always sufficiently organised. Nevertheless, some municipalities have a very functional community reserve and this mechanism could easily be adopted on a European scale because it can be adapted to all laws and customs”.*

Regarding the conceptualization of resilience, there is a real need for the citizens to be more informed about the different aspects of different prevention measures (e.g. vaccination, the clearing of undergrowth, the cleaning of watercourses, provision of food stocks, etc.), but also the need to know how to react in a timely manner to different hazardous situations before civil protection can bring the situation under control.

2.3.3.4. Resources

The need for more resources was emphasised by many interviewees, especially those representing local level CPAs. According to an interviewee from Israel, *“Budget and new tools or technology are always something we should have more of.”* While availability of resources is a concern for some countries (e.g. Greece, Israel), other CPAs did not describe it as a problem (e.g. Belgium, UK). As shown in diagram below, the current need on resources is focused more on trained staff and equipment or technological tools. Only a few interviewees (11,11%) claimed that the resources given are good enough, and some (7,41%) that there is a positive evolution on the distribution of resources. Someone even mentioned *“Prevention becomes more and more important, and there is more budget for it”.*

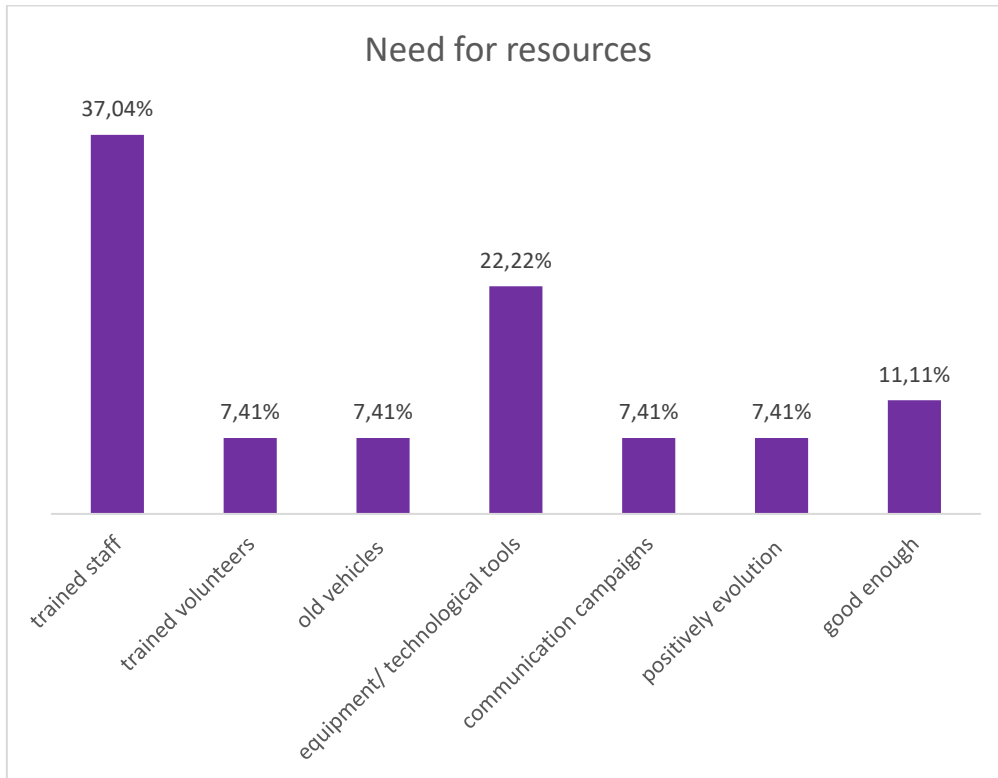


FIGURE 2 : DIAGRAM OF CPAs NEEDS FOR RESOURCES

In Greece, after a decade of austerity, the civil protection mechanism has encountered many gaps in resources and faces many barriers each year to accomplish its goals. Due to austerity, the Civil Protection’s budget is far under what is deemed necessary. For example, according to an interviewee from Greece, the latest research estimates around 10,000 firefighters should be hired. According to interviewees in Greece, there are concerns about lack of resources, understaffed services, especially in specific periods of increased needs and lack of quality training of the personnel in all organizations. Another comment for Greece was that DRM is based on old fashioned organisational approach trying to mimic army forces which have by far more extensive resources. Interviewees described the need for campaigns and Legal Frameworks that are designed to engage volunteers, clarifying their obligations and management.

In Belgium, as stated by the national CPA representative, *“we are part of the federal government and receive funding as part of an operational budget and through Seveso and nuclear funds. Operators of Seveso and nuclear establishments have to pay an annual fee to generate income for risk prevention & emergency planning. Our budget, personnel and equipment are still evolving. From 2015 – 2021 our organisation almost doubled in size (93 to 188). Because of the Belgian political situation, competencies and jurisdiction are fragmented among federal, regional and local authorities.”*

In the UK the comment of the interviewee was *“At the county council, we have been given the availability of unlimited spending. We have the authority to spend money on whatever is needed. We apply a whole range of services and employ hundreds of people, so we have access to all of the personnel we need, and if they don’t work for*

us, then someone that does, knows who we can contact". While this might not reflect the current situation across the entire UK, this local CPA has detailed that they have most of the resources that are necessary.

The information presented above highlights the differences in country structures of DRM funding, showing that some of the countries and organizations have struggled to fund their civil protection and disaster resilience activities, while others seem to have the resources they need.

2.3.3.5. Risk communication and relationship with the local communities

In terms of risk communication, differences were found in the interviews depending on which level of CPA was consulted. The national CPAs interviewed did not have direct relationship with local community groups. Thus, their actions on risk communication are related to the national level campaigns, including the provision of guidelines on their official website, along with similar actions.

In contrast, regional and especially local CPAs have more direct communication with various community groups, which are active in their area of responsibility. Local CPAs typically have good collaboration with the community groups and many actions related to all DRM phases involve organized volunteers' groups and citizens. As noted by an Italian interviewee, citizens in some territories are quite well informed thanks to the information campaigns for specific hazards and threats that often occur in their area. These information campaigns highlight the potential effectiveness of local CPAs risk communication. According to the diagram below, in total 72% of the interviewees claimed that in their territory, there are dedicated policies to increase disaster or community resilience.

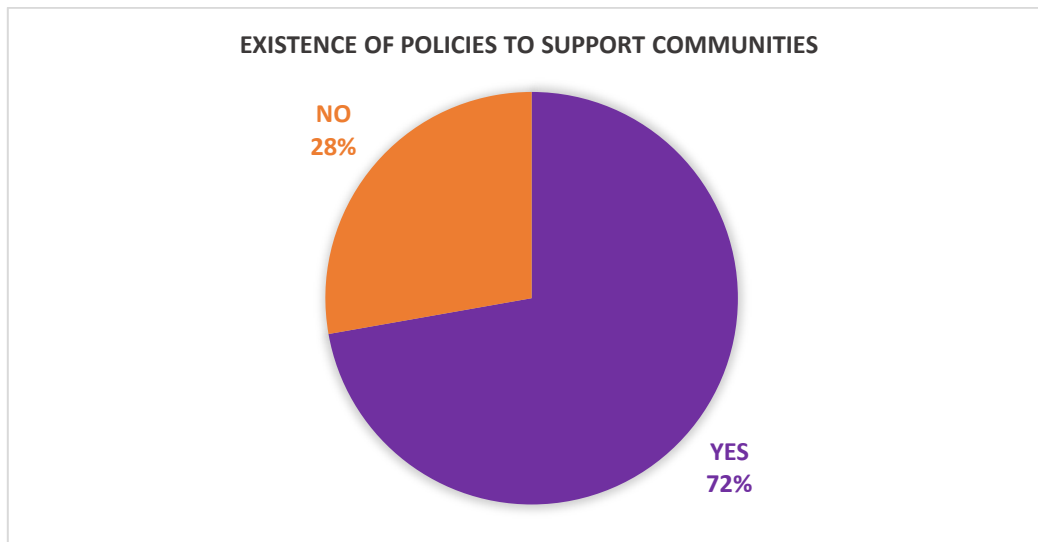


FIGURE 3 : DIAGRAM OF EXISTENCE POLICIES TO SUPPORT COMMUNITIES

Regarding risk communication, there are several actions being undertaken in all countries, with many of them based on social media and new technological tools which

are considered useful and attractive. However, a comment from a Belgium CPA representative about this which expresses the view of many interviewees, was that *“the focus cannot be solely on technology and social media. We must take into account that a large proportion of the population is not [sufficiently] digitally literate. People cannot be excluded from official crisis information because of this.”*

In France, at a local level, there is a document called the “Document d’Information Communal sur les Risques Majeurs (DICRIM)”, which specifies the content and form of information to be brought to the attention of the public. Produced by the mayor, this document aims to inform the inhabitants of a local area about the risks to which they are subject. It includes foreseeable consequences, as well as the prevention, protection and safeguard measures to be taken in response to major risks that are likely to affect the area and aims to inform the inhabitants about the risks and their consequences. Secondly, the Réserve Communale de Sécurité Civile, accessible to the entire French population, is intended actively to change public understanding of risk.

In Greece, regarding the methods used to communicate with community members, technological tools (the 112-emergency line) and social media are being used for risk awareness and risk communication. However, the challenge is to disseminate information to vulnerable groups, the elderly, and children, who do not have access to the Internet. Specific provisions and practices for vulnerable groups of citizens are provided in the civil protection plans.

In UK, as part of InTheKnow¹, a digital network dedicated to innovation, style with main goal to improve new generation’s lives, there is an alert system. It is mainly used by the police for local crime issues, but it is a good way to get messages out quickly to local populations. Local Resilience Forum (LRF) is working on a new digital strategy as well, and there is a national alert system that is being rolled out.

The German Red Cross is trying to introduce educational programmes on risk perception and safety measures in communities. There is a model of safety parties to playfully learn how to deal with dangers and the response capacity, but unlike in other countries is it not yet applied in Germany.

These are just a few of the examples of risk communication activities undertaken by different CPAs.

The need to improve risk communication by using new technology was emphasized by the interviewees. The next step for community engagement and crisis response is two-way communication, in which the CPAs provide information and citizens volunteer resources and information. Nevertheless, some concerns were expressed as well:

¹ More info: <https://www.youtube.com/@InTheKnowByYahoo/videos>

- CPAs are worried that mass communication will be flooded with alerts and thus they may not be effective.
- The possible problems during the acute emergency phase if the telecommunications network is unavailable.

2.3.3.6. Other CPA activities

Despite the fact that many of the CPAs are focusing their activities on risk communications, CPAs interviewed have conducted a variety of other activities in their case study areas. These include preparation activities, response activities, mitigation, and trainings of both citizens and civil protection volunteers. In terms of training, many of the CPAs interviewed, discussed their work of training students on how to behave during disasters. For example, in Belgium, fire fighters have set up simulation activities for students to experience what would happen in case of a fire and train them on how to act. Other CPAs have been tasked with training civil protection volunteers. These activities include helping volunteers to understand the activities that they will be involved in and the plans that have been created.

Many of the CPAs also discussed their preparation activities. Besides informing citizens of their risk, many CPAs work with others to create emergency plans. In addition to creating these plans, several CPAs also discussed the importance of putting these plans to action in an attempt to identify and address potential weaknesses. This was a particular focus of the Belgian CPAs that were interviewed. Belgian CPAs also discussed plans for the security and protection of critical infrastructure. Several CPAs, specifically in Italy and Israel, also mentioned mitigation activities, such as upgrading drainage systems and creating seismic risk standards for buildings.

Most of the detailed information in the interviews about CPA activities was focused on risk communication, and therefore there was limited information on other activities that are being undertaken. This highlights that many of the CPAs, in our case study areas, believe that risk communication is one of the most effective ways to increase risk perception and disaster resilience.

2.3.3.7. Interaction with other CPAs

All interviewees were asked several questions about the interactions they and their organizations have with other CPAs in their region.

Interaction with other CPAs is generally defined in the national emergency management plans. The operational interaction among the CPAs is based on the DRM mechanism of each country. As many interviewees stated, sometimes there are coordination problems, especially during hazards that affect large areas. Also, the prioritization of different responses is a source of tension among national and local authorities, especially in cases of simultaneous occurrence of disastrous incidents (e.g. forest fires). Additionally, a common operational picture and better coordination

through an interoperable operations centre that can be used simultaneously by all CPAs and first responders, was cited as a requirement by the majority of the interviewees.

In Greece, all CPAs highlighted the good cooperation among the authorities operating in the study area: the fire stations (12th and Nea Makri, Attica), the police stations of Nea Makri and Rafina, the local Municipalities, the Forestry Department of Penteli, the Port Authority of Rafina, the Health Centre of Rafina, voluntary groups and local associations, in all stages of risk management: prevention, response and rehabilitation. Despite the overall cooperation, a problem commonly mentioned is the lack of an interoperable Operations Centre that can be used simultaneously by all CPAs.

So far, separate systems are used for internal communication of each CPA and others used to obtain a common operational picture with other stakeholders, such as mobile phone networks (Global System for Mobile Communications - GSM) and wireless communication networks (VHF), which connect all the volunteer groups operating in the area. Better coordination with regard to the Civil Protection Operations Centre (CPC/CEPC) and its interoperability is required.

On the other hand, in Belgium there is an online platform, the National Security Portal ICMS (Incident and Crisis Management System). It is an online platform to which all partners have access during an emergency. Through this platform they can quickly exchange information. The platform includes a database with all the contact information that is useful in an emergency, a library which contains contingency plans and a calendar to plan exercises. In an emergency situation, the platform can be used to create a logbook, both for all partners involved (multidisciplinary logbook) and one logbook per discipline. It can also be used to create situational reports that reflect the situation at a single point in time. Lastly, it can be used to share a map. On this map, all important areas or locations can be shown (e.g. the intervention areas or the location of the Operational Command Post).

Nevertheless, improvements were proposed for better coordination among the CPAs because, as was stated by a Belgium interviewee, *“With each exercise or emergency situation there are lessons learned for information management and communication with other authorities, e.g., improvement of 'sitrep' reports, improvements for ICMS tools, designation of a liaison officer, etc.”*

The statement of another interviewee from UK is characteristic as well *“there is a message board for event response, but it is slow to get set up if an event occurs. Initially, the blue light services use communication channels that other groups do not really have access to. And with the county being so big, local authority officers cannot always get to the scene to be a part of the conversation. So we are reliant on communication from the blue lights back to us, which can be a bit of a mess initially. Once a message board gets set up, and everyone can contribute, the picture becomes clearer.”*

The responses from local CPAs interviewed show that improvements are needed in almost all countries in terms of integration of all CPAs and creating interoperable communication networks.

2.3.3.8. The role of the pandemic

Most interviewees stated that COVID-19 has changed the way that they think about risks and confirmed their convictions. Specifically, according to diagram in Figure 4, 53% of interviewees noted that recent pandemic has changed their view about risk and verified the need for more sustainable risk management plans and policies. It is a common view that over time, new and/or previously underestimated risks emerge and existing risks become even more complex, which provides an opportunity to upgrade disaster resilience activities. It was crucial and pointed that even first responders felt vulnerable, as there was not something they were doing during in the preparedness drills. As one interviewee claimed:

“When undergoing a crisis, there is also an opportunity to know a new risk from which we will be able to protect ourselves or we will improve prevention, protection, planning, training and exercises.”

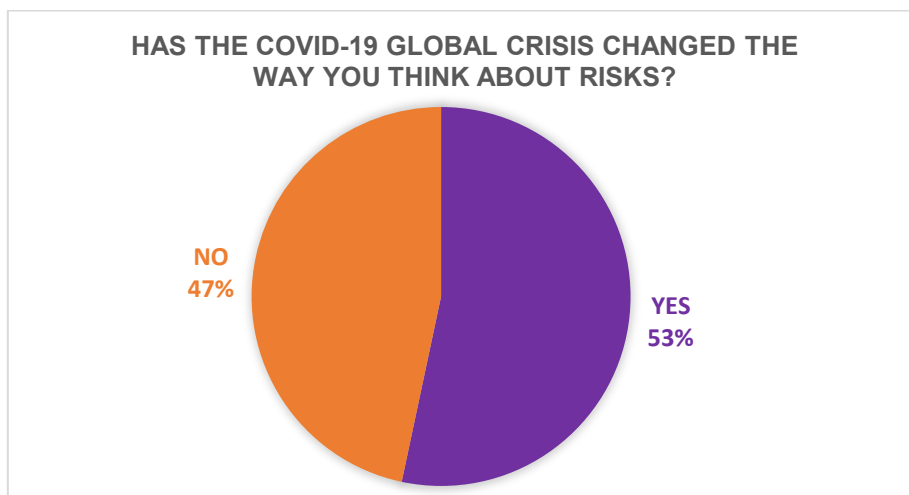


FIGURE 4 : INFLUENCE OF COVID-19 IN RISK PERCEPTION

It is a common understanding that preventive measures and plans developed a long time ago for hazards that occurred in the past are less efficient than new plans and measures for hazards that have occurred recently due to pandemics. Currently, CPAs are focusing more and more on inclusive crisis and risk communication. To get more insight in how to achieve this enhanced inclusivity, the Belgium national CPA interviewed was part of an interdisciplinary research project entitled “Towards an inclusive COVID-19 crisis communication policy: the development and validation of strategies for multilingual and media accessible crisis communication” which ran from February 2021 until March 2022. The project was carried out by a consortium led by UAntwerpen which included KULeuven, UCLouvain, Thomas More Mechelen-Antwerpen, Atlas Inburgering & Integratie and the National Crisis Center.

In Germany, COVID-19 has massively increased risk awareness and improved communication. At DRC, education was changed, and there was a steep learning curve in DRC. A lot was learned through the density of use in the testing and vaccination centres, including counselling skills and safety awareness. Fear was also alleviated. Thus, as mentioned above, the “National Resilience Strategy” recently adopted, take in consideration all phases of the risk and crisis management cycle (BBK, n.d.).

The need for more collaboration with scientific partners (specifically social sciences) was emphasized by many interviewees as well as the need to research risk perception and behavioural change. It is important to motivate and convince people to act, rather than just inform the population.

Interviewees also detailed the significant impact of disinformation, political dissent and polarisation during pandemic crisis management. Civil society organisations and network communication seem evermore indispensable for this kind of risk, due to interviewees discussed need to better integrate citizens into crisis management. According to interviewees, harmonisation with political communication actions is a priority and should be a priority in addressing future risks.

The COVID-19 pandemic has been an opportunity to see the structures of crisis management at work in many of the case study areas. Many CPAs have detailed that while there have been major challenges, the pandemic has provided an opportunity to create more sustainable disaster resilience structures. So far, the public attention for CPAs is very much limited to pandemics and other health issues, and it remains to be seen if it sustains and leads to an increased resilience beyond health risks.

2.3.3.9. Suggestions for the future

According to the majority of the interviewees, disaster provides opportunities for improvement. Many interviewees, especially those representing regional and local CPAs, commented on the weaknesses of CPAs due to limited resources or coordination problems and the insufficient actions for risk management and communication. Ideas and suggestions from the interviewees for future good practices of the CPAs are outlined below:

- A more methodological approach: a) risks addressed by committees, b) plans that address the required resources based on task resource analysis (an approach already used in aviation for rescue and firefighting). This will feed back into the initial risk register and help to address gaps and more realistically face the impact of hazards. A lessons-learned approach will correct tune the approach based on resource availability. In Greece, in the region of Mati, for example, after the fire of 23 July 2018, gathering places were created, signs marking routes to the sea were erected, and the drafting of special spatial plans (SPPs) began.

- As for a doctrine to support communities to prepare for, confront and recover from natural hazards, there are national civil protection plans, which set out actions by each level of government (national, regional and local).
- In addition to the volunteers of the communal reserve, it is good to take into account the so-called "resource citizens", such as bakers, supermarkets (who can maintain emergency stocks on behalf of the municipality), doctors, pharmacists, veterinarians, transporters and even farmers. It is necessary to make an inventory of these civil resources and make them available (through legal agreements) on an as-needed basis in the event of an emergency.
- The plan for safety (PPMS) in France, which is an emergency plan for schools, not only links up with the PCS, but also raises awareness among young people and thus trains citizens for the future. In this spirit, the communal information file on major risks (DICRIM) is a vital document that informs the inhabitants of the local area of actions to prevent, protect and safeguard against major risks. Not only DICRIMs made for young people are useful, but also DICRIMs produced by young people in schools. Not only do they train future citizens, but they will be read and exercised within families. We should consider a European campaign of DICRIM for young people.
- A family safety plan, would allow each household to prepare itself for isolation and evacuation.
- Through collaboration with local authorities, intermediaries and associations who have the most influence on the people around them, a new risk communication strategy can be planned in order to put more emphasis on tailor-made risk communication and promote a more inclusive approach.
- There is a need for large-scale quantitative and qualitative research into perception, knowledge of risks and the right reflexes in emergency situations among the Belgian population.
- There should be a focus on inclusive risk and crisis communication through improvements in web accessibility and investigation of offline channels and digital divide.
- A database of accessible communication materials, translated in many languages including sign language, would be helpful.
- It would be useful to raise people's awareness by pinging their mobile phones to send warning alerts. Such initiatives will make people more aware of their own responsibility to decrease vulnerability.
- Language and vocabulary: a more systematic inclusion of technical language and information from the authorities is needed. Technical terms are used more in this context, also in the media and in normal language.
- More training and explanatory activities should take place so that people learn more and be constantly alert and ready to face threats and hazards.
- A central management system is needed in order to control available resources, implement plans and depict risks in a cartographic system

- A volunteer register system will feed into other first responders' systems with the capability to engage and monitor them directly as resources with a mobile phone application.

2.4 Best Practices in DRM and Resilience for CPAs

This section provides information on current practices that are being undertaken by different DRM practitioners at international and national level. This includes regulations and procedures that govern DRM activities.

2.4.1 RECILIENCE IN DRM

The global environmental and pandemic crisis and climate change effects have exposed how underlying vulnerabilities and inequities have catastrophic consequences for the most vulnerable people across the world (Volz, 2020). Prevention and the risk reduction agenda are essential in order to achieve a sustainable future for the environment and the human communities (UN, 2017).

RiskPACC defines disaster resilience as: *“The ability of an individual, community, region, or country to resist, adapt to, and recover from the impact of a hazard, either natural or anthropogenic. Enhanced resilience can be embedded in activities in all stages of the disaster cycle and includes positive transformation that strengthens the ability of current and future generations to adapt to future crises, and to survive and thrive as conditions change”* (D1.1).

At a government/national level, a number of factors such as ineffective governance, policies and service delivery, lack of political will and local or national political interference all affect resilience-building.

Governments increasingly recognize the need for comprehensive multi-stakeholder and multi-sectoral national coordinating mechanisms - National Platforms for Disaster Risk Reduction - to reduce, prevent and manage the impact of natural hazards. Many countries have already launched National Platforms for Disaster Risk Reduction. Several other countries are in a process of establishing them.

Governments also have the capacity and political power to embed resilience in their national development plans. National resilience frameworks require: systems for disaster preparedness and response; options for a living wage; equal access to services and political participation; and sharing risk through social insurance. (Oxfam, 2016)

Turnbull et al. (2013) recommend supporting national disaster resilience policies by:

- Establishing and strengthening governance of risk management. This includes national laws, dedicated ministries, mainstreaming of risk management policies, and multi-stakeholders, as well as multi-level decision-making (so efforts can be scaled up from local to district and national levels).

- Developing longer-term plans that are inclusive of multiple institutions ('whole of government' approach) and that identify key partnerships from different social sectors as well as the human and financial resources required.
- Strengthening institutions and entitlement systems 'to ensure equitable access to key assets'. Examples include national policies on potable water, health services, education, climate information and basic rights; local norms regulating access to natural resources; laws for indigenous groups' land rights; and customs encouraging wealthier households to support poorer ones during hardships.
- Supporting people's ability to influence policy and planning at different levels, in government and governance. This can be through popular campaigning to ensure that at-risk populations can raise concerns that are heard and acted upon by decision-makers.
- Providing national support to innovation and learning, e.g., with inputs or insurance for changing crop types, training in new employment skills or promotion of improved sanitation designs.

At a regional and local level financial, material, human and administrative capacities of civil protection departments are most limited especially in small cities, but these municipalities are often more innovative and effective in disaster risk reduction.

- Community participation in planning and implementation: In some cases, small municipalities overcame some constraints by relying on other organisations. Contact with communities can be proven beneficial for communicating risk, enhancing preparedness and supporting evacuation measures.
- Social capital: the population benefits from already having 'bonding social capital' (based on friendship and kinship), and 'networking social capital' (based on trust and reciprocity between the community and the municipality). Building on extensive work of researchers (Aldrich, 2012a; Aldrich & Meyer, 2015; Aldrich and Kyota, 2017), social capital can be understood as the 'trust ties' between individuals and has proven to be a catalyst in the amelioration of disaster impacts and the reduction of human losses during extreme weather events (Aldrich, 2012a; Aldrich, 2012b; Aldrich & Sawada, 2015). Further, as strong social ties allow for easier sharing of information, the overcoming of barriers to collective action, and informal insurance, better-connected communities show better recoveries after major crises (Iwasaki et al., 2017). Focusing on social capital is pivotal for enhancing community resilience since social capital, like other forms of capital, can be strengthened and deepened, and hence local communities and organisers can invest in programmes that would nurture resilience to future shocks (Aldrich & Kyota, 2017; Aldrich & Meyer, 2015; Coaffee et al., 2018).

- Relations between municipalities and states: Two factors may play a role, partisan change (the state most used to opposition parties being elected in cities cooperates better) and the number of municipalities (a greater number leads to a less interventionist and controlling state).
- Political change: 'Policy entrepreneurs' can be catalysts. A new mayor mobilises the population, spurring increased participation and raised expectations, leading to efficiency.
- Focus on measures with multiplier effects: Education and communication for awareness and preparedness are effective. However, persistent limitations, such as over-reliance on evacuation, required for costlier measures such as land-use planning and resettlement, which require external support.

In most countries, operational disaster resilience policies are based on a top-down approach from central government, that have been actualised through meta-strategies linked to national security or emergency management. A number of examples can be given from the UK, Japan, Brazil, the Netherlands, New Zealand and the United States to showcase this strategy, which are analysed in the D1.1.

2.4.2 INTERNATIONAL CRISIS MANAGEMENT MECHANISMS

International organizations and national Civil Protection authorities worldwide focus on actions directives, regulations and strategies for the adaptation of DRM policies and practices to the emerging challenges.

The United Nations Office for Disaster Risk Reduction (UNDRR) coordinates international efforts in disaster risk reduction, and guides, monitors and reports on the progress of the implementation of the Sendai Framework for Disaster Risk Reduction (DRR) 2015-2030.

The UN General Assembly recognizes the Global Platform as a critical mechanism to review progress on the implementation of the Sendai Framework for Disaster Risk Reduction. At the Platform, governments, the UN system and all stakeholders get together to identify ways to accelerate further the implementation of the Sendai Framework. The seventh session of the Global Platform (GP2022) organized and convened by the UN Office for Disaster Risk Reduction (UNDRR) in Indonesia, provided an opportunity to showcase the importance of international solidarity and cooperation, as well as to discuss ways to tackle underlying risk drivers both locally and globally. Additionally, it explored how to strengthen disaster risk governance and how to build stronger systems for managing all types of risks. GP2022 offers a chance for governments, UN system and all stakeholders to recommit, with urgency, to accelerate progress on disaster risk reduction towards the achievement of sustainable development (UNDRR, 2022; UNI, n.d.).

The International Civil Defence Organisation (ICDO)² is an intergovernmental organisation whose objective is to contribute to the development by States of structures ensuring the protection and assistance of populations and safe-guarding of property and the environment in the face of natural and human-made disasters. These structures are generally known as civil protection, civil defence or civil safety and are all concerned with the management of emergency situations. The ICDO federates the national structures established by States for this purpose with the aim of favouring cooperation and mutual solidarity between them.

On an operational level, this Organisation has broadened its scope from the protection of civilians and historical monuments in wartime to the protection of people, property and the environment against natural and human-made disasters. In the same vein, in the face of climate change characterized by seasonal malfunctions with surprise effects on community planning, the ICDO has developed forecasting mechanisms based on information technologies in order to reduce the vulnerability of people exposed to disasters that have become recurrent, increasingly more violent and devastating, as well as to risks, some of which are newly emerging.

Furthermore, as part of its response preparedness, particularly in terms of proactive decision-making by communities at risk, the ICDO has developed a permanent monitoring tool, the International Monitoring and Coordination Centre (IMCC), with branches in certain countries. The Centre provides States with information on the situation regarding disaster risk and offers related training.

The ICDO also implements training for senior civil protection staff through various theoretical and practical training programmes. These cover all aspects of disaster management, before, during and after catastrophes, as well as the practical use and maintenance of material for civil protection, civil defence, and emergency services.

The ICDO regularly calls upon experts to conduct risk assessments, to provide advice and to assist Member States in the implementation of new policies. Since 2004, the ICDO offers Audit and Consulting services to National Civil Defence structures, including in the following areas:

- Creation of a Rapid Response Team.
- Studies on the reinforcement of capacity building towards territorial risk reduction.
- Analysis of private and public resources and intervention strategies for emergency situations.
- Raising awareness of representatives about the role of territorial administrations towards disaster fighting.

² ICDO has 60 member States, 16 Observer States and 22 affiliated members

In an attempt to increase public awareness at a national level, the ICDO recommends that countries organize the following types of activities aimed at promoting and disseminating knowledge about the role and place of civil protection in modern society.

- World Civil Defence Day
- Civil Society Action
- Domestic Accidents Action

2.4.3 EU LEVEL

A wide set of EU policies and funds aim to strengthen collective safety and resilience against adverse events. Under the EU Civil Protection Mechanism, 27 EU countries and 6 other participating states regularly exchange information on disaster risks. They also run exercises together and pool rescue teams and equipment that can be rapidly mobilized when a disaster overwhelms any other country in the world.

2.4.3.1. *Risk assessment*

Due to the diversity of the European Union Member States, in terms of their climate, location, and prevalent hazards, the EU as a whole is exposed to most of the possible natural hazards, as well as the anthropogenic hazards. To address these hazards, the Union Civil Protection Mechanism (UCPM) was established in 2001 to facilitate cross border cooperation in disaster prevention, management, and response (European Commission, 2020). There are some hazards that are more prevalent than others throughout the EU, as well as ones that have a larger impact. In terms of natural hazards, those that have a large impact include flooding, heat waves, and wildfires.

- **Flooding:** In their individual risk assessments, almost all Member States mention flooding of some form as a major risk (European Commission, 2017). Fluvial flooding is the most common type of flood risk, but EU countries with a large coastline also have the risk of storm surge or coastal flooding. Since 2002, the EU Solidarity Fund for disaster recovery has spent 2.2 billion Euros on flood recovery (European Commission, 2017). Recent flooding events include the 2021 flooding in Germany, Belgium, and the Netherlands; North Macedonia and Albania in 2015; and Italy, France and Slovakia in 2013. Besides the financial impact, flooding can have a major impact both on critical infrastructure and historically important landmarks across Europe. During flooding in Venice, many of the historic buildings in the town centre were damaged (European Commission, 2020). Most waterways in Europe are characterized by river basins that are located in more than one country, thus cross region flooding can occur quite frequently. To assess the risk of flooding and the impact in the areas affected, the Flood Directive was establishing in 2007 (ibid). This directive calls for the assessment of all river basin districts, map flood extent and assess human risk in the area and take adequate and coordinated measures to reduce flood risk. Additionally, the European Flood Awareness System was established in 2002 to monitor and forecast flooding events across Europe (European Commission, 2017).

- **Wildfires:** Across the EU, wildfires are considered a high probability risk and are a reoccurring phenomenon across the Member States (European Commission, 2017). Wildfires are most common in the Mediterranean countries Portugal, Spain, France, Greece, and Italy, but can also impact other regions. For example, there were recently fires in Lapland in Sweden. Wildfires are the most common hazard that requires the assistance of the UCPM, with Greece and Portugal being the countries most commonly using the assistance (European Commission, 2020). Major fire events have been declared in every year from 2012 to 2017, with 2017 resulting in a record number of appeals for help. In terms of damages, wildfires in Europe tend to be slightly less impactful than floods. The EU Solidarity fund has spent 142 million Euros responding to disasters caused by wildfires, far less than flood damages. Regardless of the reduced cost of response, major damages can still occur, especially through damages to transport systems and critical infrastructure. There are several EU wide policies in place to address the wildfire risk. The EU Forest Strategy provides a framework for forest management strategy, which includes a focus on forest fire prevention. The European Union Fund for Rural Development also provides support for forest fire prevention.

- **Other hazards** facing the Member States of the EU include heatwaves, which have been fatal during the summer months in many different countries in the EU and required billions in response funding, as well as other extreme weather events (strong storms, snow events, and droughts). Additionally, earthquakes, especially in South-Eastern Europe and Iceland, have been very destructive and costly throughout history. Since 2002, the EU Solidarity Fund has spent 1.2 billion Euros in recovery from earthquake events (European Commission, 2017; 2020).

Besides these natural hazards, there are several additional hazards of concern for the European Union. First, as has been highlighted in the past two years, pandemics are a major risk to the health and economy of the EU. COVID-19 has shown that the EU needs a cross border response to these challenges, and many developments have been made in cross border preparedness, response, and research of many different emerging and re-emerging illnesses. Anthropogenic hazards such as nuclear accidents, terrorist attacks, and cyberattacks are also risks of concern to European countries (European Commission, 2020).

All risks discussed above, and others that are not mentioned, are determined in individual countries risk assessment reports. Each country will conduct their risk assessment, and then pass on information that is relevant at an EU level on to the European Commission (European Commission, 2020). A new law established in 2019 requires Member States to share information on all disaster risks with the potential for cross border impacts, as well as low probability risks with high impacts. Additionally, this legislation urges all risk assessments to be conducted looking at new scenarios, focusing on cascading effects, and drawing on new data sources. Figure 5 below shows the typical process of risk assessments in the EU, focusing on risk identification, risk analysis, and risk evaluation.

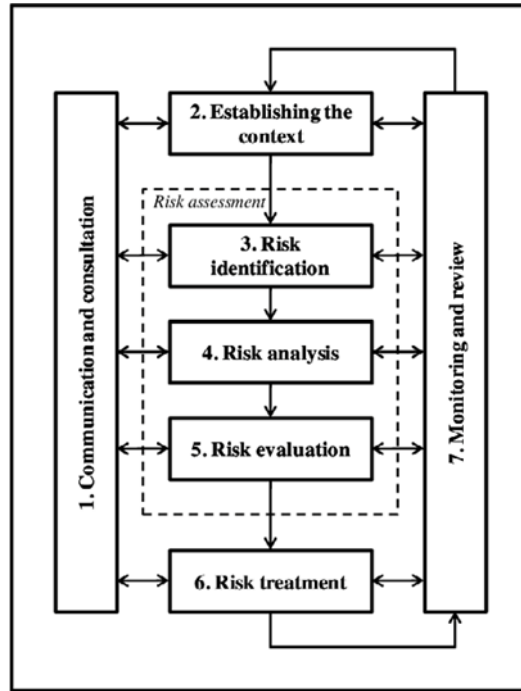


FIGURE 5: RISK ASSESSMENT PROCESS (SOURCE: ISO 31000: RISK MANAGEMENT)

Recently, the UCPM has recommend that all EU member states use an all-hazards approach to these risk assessments. While many have adopted this approach, some member states have yet to do so (European Commission, 2020).

2.4.3.2. Structure of the risk and crisis management mechanism

For the European Union, a big part of the disaster prevention and response is considered primarily the responsibility of individual member states. These states are responsible for most hazard events that occur within their borders, while the EU is responsible for facilitating cross border cooperation (European Commission, 2020; European Council, 2021). As mentioned above, the EU Civil Protection Mechanism (UCPM) was established in order to increase the cross-border disaster cooperation. This mechanism provides emergency response coordination between countries in the EU, as well as conducts cross border work on disaster prevention and preparedness. Member states share information on different risks, run drills together, and pool equipment and rescue teams through the UCPM (European Commission, 2020). EU countries can make appeals to the UCPM when faced with a disaster, for example the fire season in 2017 led to a record number of appeals, which included the use of pooled fire fighters and equipment. In 2014, the EU Civil Protection legislation was updated to include more focus on prevention and preparedness. This legislation created components that are involved in the UCPM, the European Emergency Response Capacity, the Emergency Response Coordination Centre (ERCC), and the Common Emergency Communication and Information System (CECIS). The ERCC now works as the main crisis monitoring and coordinating body for the EU’s response (Parker et al., 2019).

In addition to the UCPM, there are several different directives and funds created to address risk and crisis management throughout the EU. The first is an EU wide risk management directive for flooding, named the EU Floods Directive that was created in 2007 to increase protection against flooding. The Floods Directive (FD) requires member states to create flood risk management plans, assess their flood risk, and work on flood prevention and protective measures. The FD also coordinates actions between member states and the EU to produce common strategies. In addition to the FD, the EU is stepping up cross border communication between police, civil protection and military personnel to create a more coordinated response for chemical, biological, radiological and nuclear disasters (European Commission, 2020).

In terms of financial support for EU member states to prepare for and respond to disasters, there are funds available to support both investment in disaster resilience, response and recovery. The European Structural and Investment Fund provides funding for the support of disaster resilience, with 10 billion Euros allocated between 2014-2020 to invest in climate change adaptation, disaster prevention, and other disaster management activities. The EU Solidarity Fund provides financial support in emergency situations and recovery activities for member states. Since it was established in 2002, this fund has provided 5.5 billion Euros to recover from 88 disasters. There are several additional funds available to research different disaster management initiatives: Horizon Europe, EU Life, Internal Security Fund and the EU Health Program (European Commission, 2020).

In addition to these funds and mechanisms established, there are several coordinating centres, including the European Commission Disaster Risk Management Knowledge Centre (DRMKC) that address EU wide disaster management. The DRMKC was established to provide member states with useful tools to carry out disaster risk management (DRM) activities, including multi-hazard risk assessment. It promotes coordination between scientists and policy makers at the EU level and translates science into useful information for decision making (Albris et al., 2020; ECHO, n.d). This includes making data publicly accessible for all.

The DRMKC of the European Commission and its Joint Research Centre (JRC) offer EU countries technical and scientific advice on their risk assessment methodologies. The centre consolidates scientific networks on related disaster risk management matters and develops an online repository of relevant research results and operational outcomes. JRC's classification and categorization of hazards includes Earthquakes, Tsunamis, Floods, Forest fires, Droughts and Natech disasters (De Groeve et al., 2013).

Moreover, the DRMKC responds to the Sendai call on existing networks and science organisations to facilitate the use of scientific results, improved research, and technology. The DRMKC provides a coherent interface between science and policy by contributing research on hazard modelling, forecasting and early warning systems, crisis management technology, critical infrastructure protection, risk standard setting

(e.g., Eurocodes, disaster loss and damage data, etc.), and risk assessment methodologies, often based on research networks within EU Member States.

An example of the DRMKC works can be observe in the WebGIS-based platform - the Risk Data Hub it has developed, aimed at improving access to and sharing of EU-wide risk data, tools, and methodologies in support to policy Directorate-General and national authorities for their Disaster Risk Management actions. Especially, for floods the European Commission and the European Centre for Medium-Range Weather Forecasts (ECMWF), jointly developed the European Flood Awareness System (EFAS) which is a hydrological forecast and monitoring system independent of administrative and political boundaries in the greater European domain. The aim of EFAS is to support preparatory measures before major flood events strike, particularly in the large trans-national river basins and throughout Europe in general. EFAS is the first operational European system monitoring and forecasting floods across Europe and is a component of the Copernicus Emergency Management Service.

Apart from DRMKC, RescEU, a relatively recent proposal from the EU, specifically developed to build the capacity of member states to respond to disasters (ECHO, n.d.). The goal of RescEU is to increase the capacity of individual state's civil protection as well as improving operations at the EU level. The goal of increasing state level capacity is to increase a member states ability to provide civil protection functions if the ERCC is overwhelmed with multiple requests (Parker et al., 2019).

RescEU constitutes a European reserve of resources, including firefighting planes and helicopters, medical evacuation planes, medical equipment, field hospitals that can respond to emergency health incidents, as well as mobile shelters for those displaced. RescEU is activated when a country is confronted with an emergency that overwhelms its abilities to respond by its own. In this case, other MSs send forces of their reserve that they have for this scope. For example, when the war in Ukraine started, EU activated RescEU, providing medical supplies from several MSs. Additionally, in order to strengthen its forest fire defence following a season of extreme high increase of wildfires (for example the wildfire on Euboea Island in Greece) and because of the climate change, the Commission plans to enhance rescEU ground and aerial assets with 22 planes, 4 helicopters and prepositioned ground teams, in the upcoming summer of 2023 (ECHO, n.d.).

When the scale of an emergency exceeds the national response capacities, the European Civil Protection Mechanism allows the organization of coordinated assistance by the participating States. ERCC, the heart of the EU Civil Protection Mechanism, provides a 24/7 disaster watch and response coordination capability and it collects real-time and early warning information on risks and prepares plans for the deployment of resources (experts, civil protection teams and specialised equipment). All EU Member States participate in the mechanism, as well as Iceland, Norway, Serbia, North Macedonia, Montenegro and Turkey (Ministere de l'interieur, 2017).

2.4.3.3. Early warning mechanisms

Early warning mechanisms play a significant role in disaster resilience, aiming to prevent and mitigate harm, prepare populations when an emergency occurs, and combine and validate information in the whole disaster crisis cycle, even support long-term sustainability (European Commission, 2017b, UN. N.d.).

There are several EU wide initiatives that provide early warning for EU wide natural hazards. The Copernicus program provides emergency services and disaster managers with accurate geo-spatial information from satellites. Copernicus produces maps and data on EU hazards. It is implemented in partnership with the Member States, the European Space Agency (ESA), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the European Centre for Medium-Range Weather Forecasts (ECMWF), EU Agencies and Mercator Océan. The information services provided are free and openly accessible to users.

Copernicus services have different degrees of maturity. Some were already declared operational several years ago (in 2012 for the Land Monitoring Service and the Emergency Management Service – Mapping, in 2015 for the Atmosphere Monitoring Service and the Marine Environment Monitoring Service). Others were declared operational more recently (in 2016 for the Border Surveillance and Maritime Surveillance components of the Security service, in May 2017 for the Support to External Action component and in July 2018 for the Climate Change Service). Copernicus Emergency Management System (EMS) On Demand Mapping, provides on-demand detailed information for selected emergency situations that arise from natural or human-made disasters anywhere in the world. Copernicus EMS Early Warning and Monitoring offers critical geospatial information at European and global level through continuous observations and forecasts for floods, droughts, and forest fires. Copernicus is used in European crisis response as well as prevention, preparedness, and recovery operations (Copernicus Emergency Management Service, n.d.).

Using Copernicus data, The European Flood Awareness System provides an overview of ongoing and forecasted floods up to 10 days in advance, the European Forest Fire Information System (EFFIS) gives real-time information on fires in Europe, and the European Drought Observatory provides early warnings for droughts in Europe (European Commission, 2020).

2.4.3.4. Public warnings

After learning experiences from huge disasters, and more specific, after the pandemic of COVID-19, the international map of communication has been changed, with an emphasis on enhancing the public warning systems.

The immediate warning of the population in the event of disasters and other accidents, is made through sirens, radio announcements, loudspeaker announcements and increasingly also warnings through internet-based media such as apps.

In the EU, according to 91/396/EEC: Council Decision of 29 July 1991 on the introduction of a single European emergency call number, the 112 number was developed, figuring an integrated emergency communications service, which includes an inbound and an outbound component. Dialling 112 is free. The outbound component allows citizens to receive warnings via multiple technologies and communication channels in case of imminent or occurring incident or dangerous situation constituting an immediate threat to your health and safety, so that you can take protective action.

112 is available 24 hours a day, 7 days a week and can connect the caller with (Ministry for Climate Crisis and Civil Protection, n.d.):

- Police, Fire Brigade, Emergency Medical Services, Coast Guard
- the European hotline for missing children 116000

the National Helpline for children SOS 1056In Greece, the severe weather phenomena warnings are issued by the Hellenic National Meteorological Service and high-risk areas are being informed through emergencies messages through the number 112, in order to take measures for precaution. Tsunami early warnings are provided by the Institute of Geodynamics, which hosts the Hellenic National Tsunami Warning Centre.

In Italy, there are several systems for communicating an imminent risk in addition to the single emergency number, often adopted at local level in Italy. An example is the set of apps developed by the IT department of the Fire Brigade which provide and collect information related to fire emergencies in an alternative way to standard communication ones (Vigili del Fuoco, n.d.).

They manage numerous risk awareness campaigns as well as playing an important role in intervention following an event. One example is the campaign "Io non rischio - Buone pratiche di protezione civile" ("I don't risk - Good practices of civil protection") at national level that aims to inform citizens about natural and human-made risks affecting our country.

The campaign, which aims to promote a culture of prevention and encourage an active approach to risk reduction, is aimed at citizens through civil protection volunteers. A key initiative is the annual appointment in Italian squares with information gazebos dedicated to earthquake, flood, tidal wave and volcanic risks.

In the UK, the government will typically be the first to provide warnings during an emergency. The Civil Contingencies Act includes public awareness and warnings as a legal duty of Category 1 responders. It stipulates that arrangements must be made to warn and inform the public in the event of an emergency. Plans for warning and informing the public should be included in any emergency plan that is created. Some methods employed in the UK to warn the public of an emergency include officers knocking on doors, media announcements, PA announcements, sirens, and

automated messages to cell phones or other electronic means of communication. For natural hazards such as severe storms and tidal flooding, the MET office provides warnings to both the public and the local civil protection authorities (MET Office, 2021). The UK is also currently developing and testing a new automated alert message system with different cellular providers to send messages for all emergencies (UK Gov, 2022). Additionally, the BBC local radio is recognized as an emergency broadcaster for the UK and is used to communicate risks to the public prior to and during an emergency (Cabinet Office, 2018). There have also been recent attempts to increase the two-way communication between the government and citizens. In Doncaster, more informal, two-way communication occurs between the village flood wardens and villagers, which allows for local knowledge to be considered in the crisis response (Ping et al., 2016).

Moreover, in Belgium, the National Crisis Center manages BE-Alert, an alarm system that allows the government to inform you in an emergency situation. A mayor, governor or minister activates Be-Alert to send a message via SMS, e-mail or voice call to everyone impacted by the emergency situation. Either a message can be sent to all citizens who subscribed to BE-Alert in a certain area, or to all people who are actually present in a certain area (location based). In this way, residents can quickly receive the necessary recommendations, like closing windows and doors in the event of a fire. BE-Alert has sufficient capacity to inform a large number of residents at the same time via different channels. We will continue to test this capacity on a regular basis (BE-Alert, n.d.).

2.4.3.5. Training

Quality education, moreover training of public administration officials, as well as volunteers, is very important to ensure an adequate response in case of disasters and other emergencies (Sarka, 2016). Both in Europe and worldwide, many countries have adopted training programs in order to obtain well-trained personnel, but also to prepare citizens in case of an emergency.

For example, in Germany, the Federal Office of Civil Protection and Disaster Assistance's (BBK) is responsible for the training of senior civil protection experts in Germany. It is the only training institution in Germany, which brings together experts up to the political level from all actors involved in national emergency management, i.e. armed forces, intelligence services, the police and civil protection and critical infrastructures. In addition, the Federal Academy for Civil Protection and Civil Defence (BABZ) is involved in the training activities at EU level, inter alia running the High-level Coordination Course under the EU Civil Protection Mechanism (EC, 2022; Vollmer & Frech, 2014).

Regular “Interministerial and Interstate Crisis Management Exercises” (LÜKEX – “Länder Übergreifende Krisenmanagement-Übung/Exercise”, coordinated by the Federal Office of Civil Protection and Disaster Assistance) allow the Federal Government and the Länder to jointly prepare for (extraordinary) incidents and provide them with an opportunity for putting existing plans and management concepts to the test. LÜKEX is structured as a strategic staff framework exercise, i.e. it is not a

complete exercise. During the execution phase, up to 3,000 persons from the crisis staff of the core states and other participants (the so-called framework management) are involved in the exercise. Periodical exercises are organised at regional and local levels (Vollmer & Frech, 2014).

The Federal School of the Federal Agency for Technical Relief with its two headquarters situated in Hoya and Neuhausen provides practical and theoretical training for its specialists and executive staff. The school in Neuhausen also provides training at EU as well as at UN level (example: the "Operational Management Course" within the framework of the EU Civil Protection Mechanism (Vollmer & Frech, 2014).

In addition, the Länder and of course the various NGOs carry out their own training exercises in the field of disaster management (EC, 2022). For example, all states provide training for fire-fighters in their respective schools for fire brigades (in total 19 schools) (Vollmer & Frech, 2014, p. 676).

In Greece, Public information covers the whole disaster management cycle. Trainings and exercises are undertaken at national, regional, and local level by competent authorities. Greece also participates in the Union Civil Protection Mechanism training programme.

The act 3013/2002 officially introduces the role of volunteers within the legal framework. In particular, the act N3013/2002 offers a detailed description of the role of voluntary organizations within the civil protection system, the interagency cooperation, and the financial instruments through which the various bodies secure their funding along with the establishment of an inventory from the General Secretariat of Civil Protection. Overall, volunteers are scattered in small groups with a predominant local supportive character and re-sources. A few volunteer groups manage to organise and set up a significant network across the country. Two of these organizations are the ESEPA (The Voluntary Corp of Greek Firemen and Replanters) focused on forest fires and HRT (Hellenic Rescue Team) focused on earthquakes (Papanicolaou et al., 2013).

In Italy, training is essential to enable any operator to carry out their work effectively, efficiently and safely for themselves and for the people in their care. Continuous training and updating is a must for a good operator, even a volunteer one. The Italian Civil Defence provides both basic and specialist courses.

In UK, regulations that accompany the Civil Contingencies Act of 2004 requires that Category 1 responders (that are subject to the full set of civil protection duties) incorporate activities of volunteer organizations in their emergency planning (Cabinet Office, 2018). Responders are legally obligated to include volunteer services in every stage of disaster management, from training and exercising to responding to emergencies. Four different models for engagement with volunteer groups have been proposed with many local areas using a combination of models:

1. Engagement with the LRF: each LRF appoints a voluntary sector representative that can speak for all volunteer organizations in the area.

2. Volunteer sector sub-group within LRF: a coordinating group at the local level is established so that cooperation between local services and volunteer groups is more effective. This allows all civil protection services to understand better the volunteer services available.
3. Bilateral link based on function: this approach allows those volunteer services that provide similar services to be grouped together and then linked with the local Category 1 provider that is responsible for those functions.
4. Bilateral links based on capabilities: this is a similar approach to model 3, but it looks at specific services provided by volunteer groups and distinguishes between support roles (such as providing food to emergency services) and direct assistance in an emergency. (Cabinet Office, 2011)

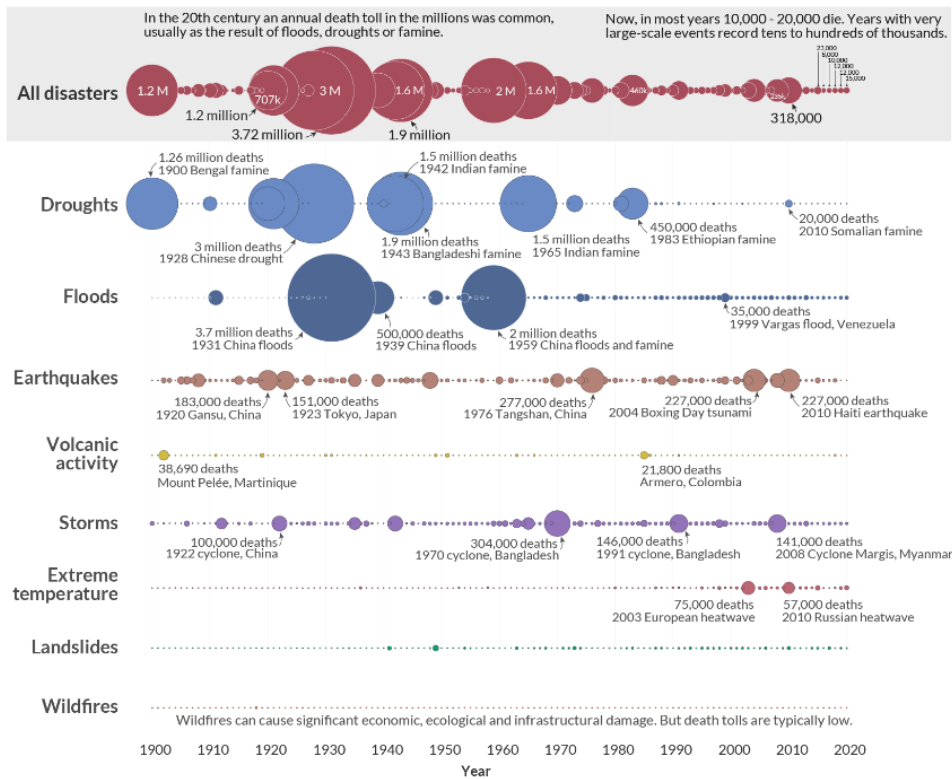
There are many different volunteer groups working in the UK, including the British Red Cross, Salvation Army, St. Johns Ambulance, British Cave Rescue Council, International Rescue Corp, and the Royal National Lifeboat Institute to name a few (Cabinet Office, 2011). There are many other organizations that also operate in the disaster management sphere. These organisations tend to work closely with disaster management and civil protection authorities both locally and nationally.

2.4.3. NATIONAL EXAMPLES OF BEST PRACTICES PER HAZARD TYPE

At the national level, the main risks are identified based on the impacts they have on the population: the level of risk is based on the severity of the effects caused to the population (Figure 6), the built and the natural environment. Risks can be also identified according to the origin of the respective hazards, which may include a variety of types related to several processes and causes such as climate change, hydrogeological and hydraulic, snow and avalanches, draughts, forest fires, earthquakes, tsunamis, volcanic eruptions, pandemics, industrial and other anthropogenic causes including nuclear accidents as well as other environmental processes (Ritchie H., et al, n.d.).

Global deaths from disasters over more than a century

The size of the bubble represents the estimated annual death toll. The largest years are labeled with this total figure, alongside large-scale events that contributed to the majority – although usually not all – of these deaths.



Data source: EM-DAT, CRED / UCLouvain, Brussels, Belgium - www.emdat.be (D. Guha-Sapir). OurWorldinData.org - Research and data to make progress against the world's largest problems. Licensed under CC-BY by the author Hannah Ritchie.

FIGURE 6: NUMBER OF DEATHS BY TYPE OF NATURAL DISASTER (SOURCE: RITCHIE H., ET AL., N.D.)

Practices applied both at national and local level, focus on the protection of the integrity of life, property, settlements and the environment from damage or the danger of damage resulting from disasters by conducting risk forecasting and prevention, rescue of affected populations, combating and overcoming emergencies and risk mitigation.

Good practices implemented in a certain area are directly related to its vulnerability to specific risks. In the next sections, the best practices commonly identified for various hazards are presented, in order to achieve both prevention, reduction and even elimination of the effects when they occur.

In future, we can expect more extreme events and increasing damage due to the convergence of driving forces that are reshaping hazards and threats and influencing

the exposure and vulnerability of our societies to disasters. One of the major drivers of increased disaster risk is climate change.

Changes observed in the Earth's climate are triggering more extreme weather events, which occur more frequently. This is compounded by sea-level rise and changes in the geographical distribution of some infectious diseases.

2.4.4.1. Earthquakes

Earthquakes are the most hazardous geophysical phenomena that affect many people worldwide (Figure 7). However, not all countries are affected in the same way. In Europe the earthquake hazard is particularly high in the southeastern part of the continent, particularly in Italy as well as in Greece and in the surrounding areas.

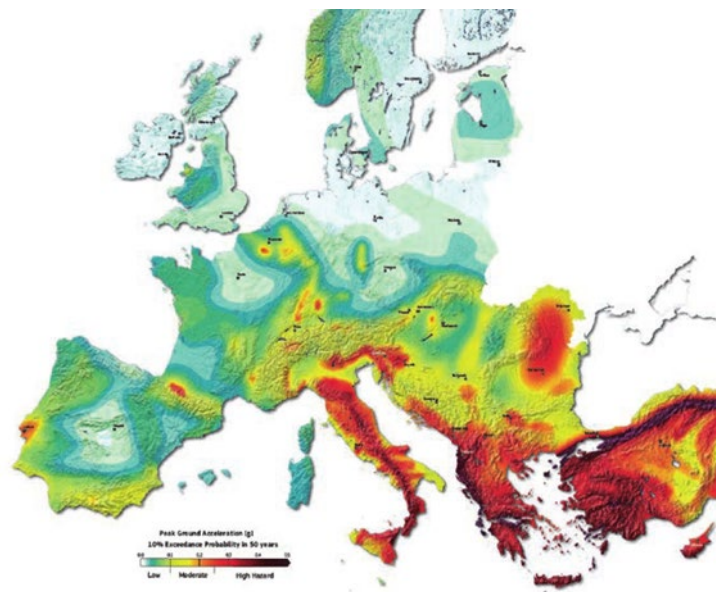


FIGURE 7: EUROPEAN SEISMIC HAZARD MAP 2013, SWISS SEISMOLOGICAL SERVICE, (ETH ZURICH, 2013).

Earthquakes cannot be prevented nor precisely predicted, but efficient mitigation measures informed by earthquake hazard and risk models can significantly reduce their impacts. The European Facilities for Earthquake Hazard and Risk (EFEHR) maintains and will further develop and improve the earthquake hazard and risk model for Europe in collaboration with the GEM Foundation and EPOS (Figure 8).

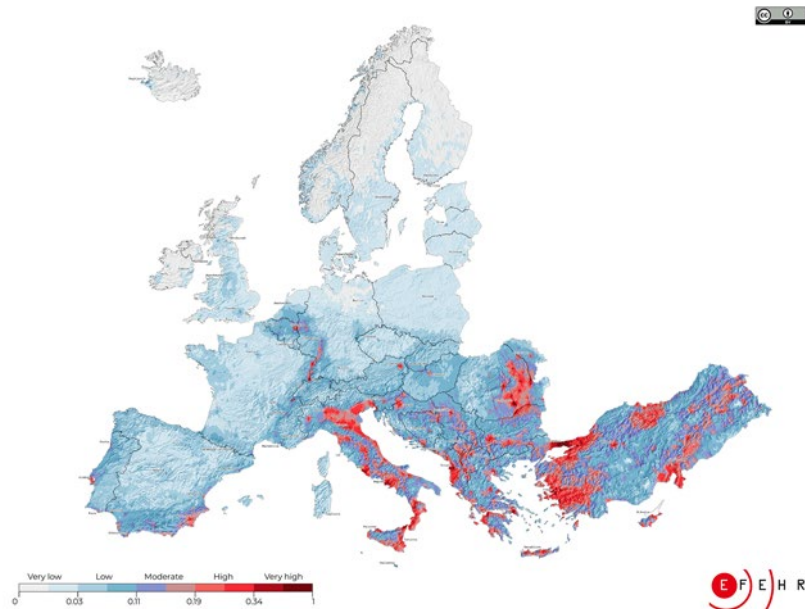


FIGURE 8: THE EARTHQUAKE RISK MAP OF EUROPE BASED ON THE 2020 EUROPEAN SEISMIC RISK MODEL. (LOW RISK AREAS ARE COLOURED FROM WHITE TO LIGHT BLUE, MODERATE RISK AREAS FROM BLUE TO RED AND HIGH-RISK AREAS SHOW IN DARK RED.)

The construction of earthquake-resistant structures is the corner-stone of the policy for protection against earthquakes. In Greece, the first national building code was established in 1959 after the devastating earthquakes that hit the country during the 1950s. The code was updated on several occasions after impactful earthquakes, but a New Building Code was put in action in 1995. The last important modification was made in 2000, while further minor modifications were incorporated more recently. To increase the population's awareness of the risk, several actions such as exercises and educational brochures and videos, have been undertaken since 1984 after the establishment of the public Earthquake Planning and Protection Organization. Another important development has been the establishment (2010) of the national Hellenic Building Interventions Code³. The purpose of this Code is to establish criteria for the assessment of the carrying capacity of existing structures and implementing rules for their seismic redesign, as well as for possible interventions, repairs, or reinforcements. A third major achievement has been the creation (2007-2008) of the national accelerometric network, which is an important infrastructure action since it allows the systematic collection of strong motion data nationwide.

In Italy the first legislation for a seismic building code passed in early 1909 after the devastating Messina earthquake. However, the official nationwide building code was established on a fully scientific background only after 1980, after the devastating earthquake of Irpinia (Slejko et al. 2022). In the field of preparedness, the elaboration of emergency plans is an important component. Of equal importance is the development of a variety of awareness actions similar to the ones mentioned for

³ An update of this code was performed in June 2022

Greece. The responsible authorities undertake exercises and provide education for the population and target groups (i.e. students, teachers, workers). Civil Protection departments share educational material and instructions through official webpages and social media. An important development after the disastrous L' Aquila earthquake of 6 April 2009 is that the Italian Administration established a 10-member International Commission of experts for the Operational Earthquake Forecasting. The findings and recommendations of the Commission found worldwide recognition and adoption. In this frame the Italian civil protection supported academic efforts to calculate aftershock probabilities during ongoing seismic sequences for operational purposes.

In Israel, the Israeli Geological Survey has been assigned by the Ministry of Energy to perform studies and surveys aiming to reduce earthquake risk across the State of Israel. In this country the building code, called Standard SI 413, aims to design earthquake-resistant structures. The code became effective in 1980.

The main difference in the actions undertaken by Greece and Italy is that in Italy the policy against earthquakes and other natural hazards is strongly decentralized with the Regions and Municipalities of the country playing an important role. On the other hand, in Greece the system is more centralized with the Regions and Municipalities playing a less important role. In Israel, the Israel Defence Forces is the responsible authority to protect the entire State of Israel, and guarantee the security of its citizens and residents against all type of hazards.

On a global level, Japan, undoubtedly, features one of the best mechanisms in preparedness and risk perception. The triple disaster that took place in March 2011, when an earthquake of a magnitude 9.0 struck 130 km east of Sendai in the North Pacific Ocean, followed by a tsunami up to 40 meters high that killed more than 15.500 people and left homeless another 450,000, destroying in the same time three nuclear reactors at the Fukushima Daiichi Nuclear Power Plant releasing toxic radioactive material. This disaster exposed the tensions between traditional top-down, centralized command and control power structures and more organic bottom-up governance configurations where the importance of tacit community knowledge was increasingly important. In the wake of 3/11 this prevailing governance culture collided with a re-invigorated Machizukuri approach (community planning) and led to conflicting redevelopment aspirations and ultimately a reframing of disaster reconstruction as a **resilience building programme**, not only in the affected localities but for the nation as a whole in an attempt to overcome intergovernmental friction (Aldrich, 2019; Coaffee and Lee, 2016; National Geography, n.d).

According to their new legal system, the new structures (buildings, schools, houses, etc.) are more resistant and capable of withstanding a large magnitude earthquake. Their communication system has been upgraded with contemporary emergency alert systems for earthquakes and tsunamis, installed on every smartphone in the country, with the ability to alert about 5 to 10 seconds before a disaster. Even trains are equipped with an earthquake sensor, able to freeze the train if necessary. When an earthquake occurs, there is an immediate cover of all Japan's channel, informing

citizens, and giving guidelines of what they should do and how to evacuate in case of a tsunami (Dayman L., 2022).

In Japan, in order to reduction earthquake impacts, like tsunamis, they have built one of the biggest, most expensive, and most impressive structures in the country, the Water Discharge Tunnel in Tokyo, a maze of tunnels and 5 huge 70 meter tall cylindrical tanks underneath the surface with 6,3 km length, collecting flood waters in a case of a natural disaster, even in an emerge of tsunami (Ortiz D. A, 2018).

2.4.4.2. Tsunamis

In the Mediterranean region, tsunamis are generated mainly by submarine earthquakes but also by landslides and volcanic eruptions (Maramai and 2014; Papadopoulos et al., 2014) (Figure 9). However, the main sources of large tsunamis can be found along the Hellenic Subduction Zone. along trench. In the rest European region a significant source of seismic tsunamis is located in the Gulf of Cadiz, SW Iberia, while in Norway local tsunamis are produced by landslides.

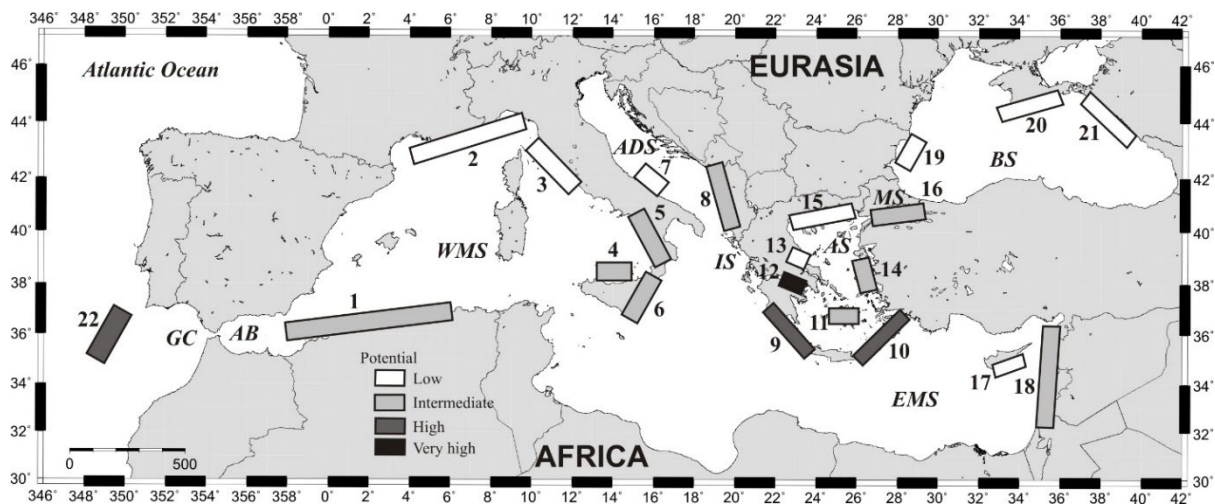


FIGURE 9: TSUNAMIGENIC ZONES DEFINED FROM DOCUMENTARY SOURCES AND THEIR RELATIVE TSUNAMI POTENTIAL CLASSIFICATION(SOURCE: PAPAPOULOS ET AL. 2014)

(WMS=WESTERN MEDITERRANEAN SEA, GC=GULF OF CÁDIZ, AB=ALBORAN BASIN, EMS=EASTERN MEDITERRANEAN SEA, AS=AEGEAN SEA, ADS=ADRIATIC SEA, MS=MARMARA SEA, BS=BLACK SEA, ZONATION KEY: 1=East Alboran Sea/North Algerian Margin Sea, 2=Liguria and Côte d’Azur, 3=Tuscany, 4=Aeolian Islands, 5=Tyrrhenian/Calabria, 6=Eastern Sicily and Messina Straits, 7=Gargano, 8=East Adriatic Sea, 9=West Hellenic Arc, 10=East Hellenic Arc, 11=Cyclades, 12=Corinth Gulf, 13=Maliakos Bay, 14=East Aegean Sea, 15=North Aegean Sea, 16=Marmara Sea, 17=Cyprus, 18=Levantine Sea, 19=Bulgaria, 20=Crimea, 21=East Black Sea, 22=SW Iberia

A systematic study of the European tsunamis initiated with the pan-European project GITEC (Genesis and Impact of Tsunamis on the European Coasts, 1992-1995), and other subsequent projects, all funded by the EC. The importance of these projects is that they created a scientific and technological basis as well as a critical mass of scientists and engineers. As a result, Europe was ready to develop its own tsunami early warning system after the Indian Ocean devastating tsunami of 26 December 2004.

In 2005, after the 2004 tsunami, the country-members of the Intergovernmental Oceanographic Commission (IOC) of UNESCO decided to establish the North-Eastern Atlantic and Mediterranean Tsunami Warning and Mitigation System (NEAMTWS). Greece, Italy, Israel and other countries joined the system, which has been operational since the summer of 2012. The system is governed by the Intergovernmental Coordination Group, which consists of representatives of the 40 country-members which today join the initiative. Currently five national monitoring centres operating in Portugal, France, Italy, Greece and Turkey play the role of Tsunami Service Providers. In Greece, in Italy and in the other countries, after the origin time of a strong submarine earthquake the national monitoring centres send confidential tsunami warning messages to civil protection authorities within ~10 min. from the earthquake origin time. Forwarding such messages to target groups in coastal communities is a challenge for the CPAs and no absolutely effective ways have been found so far. However, after the large (magnitude 7.0) earthquake in Samos Island (Greece) on 30 October 2020 the civil protection informed local communities about the tsunami hazard via SMS released through the European emergency phone number 112 (Triantafyllou et al., 2021). This has been the first time in the life of NEAMTWS that such an operational practice was followed.

A major component of the protection against tsunamis is the organization of exercises in coastal communities in the three countries. A good example comes from Israel. In 2019 the Israeli Defence Forces (IDF) organized a large-scale exercise focused on tsunami response under the auspices of the NEAMTWS/UNESCO. The exercise simulated a scenario where a powerful earthquake from the Cyprus Subduction Zone caused a huge tsunami threatening the Israeli coast. In the context of the exercise, the participating forces performed nationwide schools evacuations. In the same year (2019) a joint international training exercise designated as "Mighty Waves," was conducted under the guidance of the IDF Navy. The exercise simulated a scenario where a powerful earthquake hit the State of Israel. In the context of the exercise, the participating naval forces performed joint medical drills, surface and underwater rescue/extrication exercises, live-fire exercises, and formation drills.

In Italy, significant progress has been noted in the implementation of the UNESCO/IOC Tsunami Ready Program (ITIC, n.d.). The scope of this initiative is to build resilient communities through awareness and preparedness strategies that will protect life, livelihoods and property from tsunamis in different regions.

2.4.4.3. Floods

Flood disasters are one of the most common hydrological risks worldwide, and are becoming more frequent due to climate change. Flooding causes long-term damage to wetland areas as well as in urban areas, reduce biodiversity, release pollutants stored in the ground in underground aquifers and cost many human lives.

According to the Floods Directive 2007/60/EC on the assessment and management of flood risks, all EU countries are required to (European Commission, 2022):

- Assess the high and low risk flooding areas.
- Map the flood extent and assets and humans at risk in these areas and produce Flood Hazard Maps and Flood Risk Maps.
- Take adequate and coordinated measures in order to mitigate the flood risks and the flood impacts.

Water management systems, forecasting, flood defense measures, crisis management, urban planning and building legislation are some of the measurements that can make a high flood risk area more vulnerable. Relocation of extremely endangered activities and buildings could be advisable at least in some cases. If it is not possible, then decision makers must undertake actions to prepare communities on how to react during floods with appropriate risk communication and early-warning systems (Noggin, 2022).

The Netherlands, being a country with more than 65% of its land area below the sea level, has developed one of the most tested and effective flood management strategies. The protective dike network over 22,000 km with different protection flood levels (including dikes that do not serve as flood defences) is one of the most characteristic preventive measure against the consistent flood threat (Dutchdikes, 2022). However, nowadays, because of climate change, sea level rise and frequent heavy rains, the flood threat in the area has further increased. Therefore, the national government recently, implementing the UN's Valuing Water Principles, adopted a risk – based approach for the flood risk management policy. For example, the city of Dordrecht that has experienced one of the most catastrophic floods in history and is constantly vulnerable to flood events, due to its low elevation and the fact that it is located at the intersection between the sea and three major rivers, is developing a new more sustainable urban design prevention and preparation strategy. One of the measures of the prevention strategy is to not allow grant building permits in its high flood-prone areas, as well as preventing rebuilding in flood-prone areas to repeat flooding devastations. The preparation strategy consists of an evacuation plan to the De Startt district, a higher located area, in order to move people to higher grounds in a case of a flood. The city will be developed with new sustainable housing, flexible spaces, and a public transportation system to help evacuate people, with priority to the vulnerable members of the community. This new urban planning strategy may seem expensive, but in the aftermaths of the future serious impacts of the climate change this strategy, will ensure the viability of the area (UNDRR, 2021).

Outside the EU, in Brazil the national authority for disaster risk governance, called National Centre for Monitoring and Early Warning of Natural Disasters (CEMADEN), was established in the aftermath of the 2011 flash floods that occurred in the mountainous areas of the state of Rio de Janeiro, where 916 people died and a further 35,000 were displaced. In addition, it was created an institutionalization of formal

instruments - such as policies, plans, laws and protocols – to confront the impact of natural hazards (Horita et al., 2017). CEMADEN is mandated with developing and operating information systems that monitor environmental variables (e.g., volume of rainfall or water level in riverbeds), as well as issuing warnings of imminent natural hazards by CENAD which is later responsible for mobilising different national and local agencies to respond to the potential event, through a process of local mobilisation (Tkacz et al., 2021). In other words, CEMADEN is the central hub for disaster risk forecasting and early warning, but the mobilisation of emergency response mechanisms lies with local authorities at the state or (less frequently) at municipal level. Accordingly, many other countries have developed similar mechanisms to mitigate the effects of future flood disasters.

2.4.4.4. *Wildfires*

In recent years there has been a significant increase in fires worldwide. Wildfires are a part of the natural cycle, but human activities have significantly affected their rate of occurrence. Certainly, climate change, which has brought huge periods of drought, with reduced and at the same time intense rainfall, strong winds, heatwaves, has a significant effect on the increase of these phenomena and the difficulty of dealing with them. In addition, human negligence, the lack of national strategies, and in many cases insufficient equipment and resources, intensify this phenomenon.

Main practices currently applied, focus more on the wildfire suppression, without providing mechanisms for prevention, which is not an integrated strategy allows to protection of forest ecosystems, flora, fauna, and societies. Hence, there is a need to a more holistic fire management approach at a European and worldwide level.

A holistic fire management plan must cover the following aspects (DRIVER, 2020):

- Early warning and rapid detection,
- Good access,
- Well trained and equipped fire services,
- Community awareness,
- Leadership and coordination among involved actors,
- Reduction of fuel load and fuel availability,
- Forest conversion towards resilient structures, i.e. “continuous cover forestry”.

Furthermore, studies have highlighted the need of defining roles and responsibilities of local communities (cited from the report: “Forest Fires – Sparking Firesmart policies in the EU”) and authorities. Pro-active wildfire management must include practices, tools and programs in all phases of the fire crisis management cycle, prevention, preparedness, response and recovery. This includes education programs on a Pan-European level to make communities more aware, fire risk assessment, development of wildfire management, in order to lead to more resilient landscapes.

When it comes to rapid detection planning, the Copernicus / Emergency Management Service - Mapping of the EU (Copernicus, n.d.- a), which provides immediate data and

maps to all stakeholders, free of charge for the management of their work, plays an important role.

In order to achieve wildfire prevention, some of the following measures that following (DRIVER, 2020), could be a good practice for fire prevention and mitigation:

- Creating fire and fuel breaks by removing the entire vegetation or reducing in a great degree the fuel load of an area
- Performing fuel treatments along the roadsides in order to reduce both the spread of a fire and the ignitions.
- Prescribed burning
- Grazing

Countries most affected by fires are mainly the Mediterranean countries, Greece, Spain, Portugal, Italy, etc., as well as many regions of America, such as California, where huge areas are burning every summer destroying thousands of acres of forests (Copernicus, n.d.-b).

They have tried to develop fire defense mechanisms, but unfortunately many times, both due to the weather conditions and the lack of coordination and equipment, but also because of the initially incorrect assessment of the seriousness of the incident, fires spread at a rapid rate burning huge areas, settlements, and vast areas of vegetation, costing even human lives. Even more, extreme temperature conditions make vegetation more susceptible to fire and ignitions due to high flammability level (DRIVER, 2020). The rescEU mechanism has already been activated several times by MSs requesting the assistance of the EU for firefighting equipment, airplanes as well as personnel (Reliefweb, 2020).

For this reason, as mentioned before, due to the now obvious serious effects of climate change, the mechanism is going to significantly strengthen its equipment and personnel within the year.

Because forest fires are an extremely dynamic phenomenon influenced by many factors, is difficult to find practices that lead to a substantial mitigation, they mostly focus mainly on awareness building and prevention. Daily «Fire Hazard Prediction maps» that are drawn up to inform citizens about areas where there is a high risk of fire and organizing, frequent firefighting patrols are some of the measures taken by some countries in order to mitigate or even prevent the start of a fire in time. In Greece, for example, the General Secretariat for Civil Protection issues the daily forest fire risk map during the summer period. It is uploaded on its website and sent to all competent and local authorities involved in forest fires management. In addition, all throughout summertime, there are daily informative spots about actions that could reduce the chances of causing or spreading a fire or about protection instructions in case people they find themselves in a fire. The Anti-fire period lasts from the beginning of May to the end of October. In that time, any open-air activities that may cause fire (i.e. torch weld, wheel or other instruments that create sparks), is forbidden. Moreover, owners,

before the start of the anti-fire period, within approved zoning plans and settlements, are obligated to clean their properties to prevent the risk of fire or its rapid spread. The Ministry for Climate Crisis and Civil Protection has developed a campaign about the majority hazards, including forest fires that provides citizens with useful information and guidelines on how to mitigate forest fires and how to protect themselves against them (Ministry for Climate Crisis and Civil Protection, n.d.-b).

One of the technological tools that can significantly change the fire forecast map, are the wildfire sensors. Sensors are able to detect forest fires during the early stages, as they can even detect smoke. Detecting a fire in an early stage can lead to their extinguishment before they spread. A variety of forest fire detecting sensors has been developed, and studies are still on going in order to improve their technology, their maintenance, their accuracy, the density and the appropriate distance between them in order to completely cover an area, as well as their power capability. Even if forest fire detecting sensors are still in a premature stadium of development, they already have been tested successfully in a few case studies, for example in Gimpi n Country (Denver 7, 2022) and Ventura in California (Gridwide Fire, n.d.), where they detected smoke even before it was noticed by a citizen.

2.4.4.5. Technological hazards

Technological disasters can be characterized as human made disasters, as they are highly dependent on humans to manage and use the technology appropriately. These so- called natech accidents may include explosions and toxic or radioactive releases at installations. The main technological accidents can be recognised as chemical accident risks, nuclear risks and natech risks.

Sendai Framework for Disaster Risk Reduction recognizes the importance of technological hazards and includes a holistic approach of all hazards to disaster risk reduction. Sendai Framework, the Better Regulation Agenda of the EU, as well as initiatives in OECD, laid the groundwork for adaptation government programs including those aiming to reduction of chemical accidents (Wood & Fabbri, 2019).

Chemical hazards are not associated with a particular industry, but are characterized by differences in the substances, processes, technology and equipment that create the risk. Chemical accidents, are mostly connected to violations of well-known principles for chemicals risk management. Studies have shown that 98% of all industrial accidents can be prevented, which highlights that knowledge about chemical accidents risks and chemical accident control technologies haven't led in a significant reduction in chemical accidents disasters (European Commission, 2017).

Nowadays increasing complexity, lack of data of chemical accidents and interest in them, lack or delay of mechanisms' maintenance and repair, lack of adequate resources and infrastructure, dependency from automation of new technological systems, failure of risk management and risk assessment, lack of training and expertise on responsibilities associated with the risk, even failure to learn lessons from past accidents and near misses are some of the main reasons, that chemical accidents

are still occurring. In order to mitigate chemical accidents, several chemical material and process accidents databases were developed to improve information sharing, such as eMARS, (EC), HSEES (USA) and PEC-SAFER (Japan) (Namjin et. Al, 2012). Even though, obtaining enough data gives a more clear picture on tracking incident frequency and severity of incidents over time, creation of databases cannot be considered as a measure of prevention and reduction, or a global assessment of chemical accident risk.

The Seveso accident occurred in Italy in 1976, constituted the beginning for the adoption of regulations, standards, codes and management systems, such as Seveso Directive.

Natech hazard is a high-risk hazard located in countries with a high developed industry. Germany has a high number of Seveso establishments observable (leading rank in Europe) (de Groeve et al., 2013, p. 28). "Germany has issued two Technical Rules for Installation Safety (TRAS) that support the implementation of the German Major Accidents Ordinance (MAO) with a focus on reducing Natech risks. TRAS 310 addresses Natech hazards due to floods and precipitation, while TRAS 320 deals with hazards triggered by wind, snow and ice loads. Both TRAS follow an assessment approach that is based on methodologies already applied to operational hazards in the chemical industry" (UNDRR 2018, p. 51). Impacts of climate change on Natech risks need to be addressed and understood in more detail (Cruz & Krausmann, 2008, p. 3). Furthermore, "the applied German standards for buildings do not take into account the combined risk of building collapse and the presence of hazardous materials handled or stored" (Cruz & Krausmann, 2008, p. 3).

A general framework for the protection on nuclear accidents is provided by the Directive 2014/87, which is consistent with the Safety Fundamentals established by the International Atomic Energy Agency (IAEA) and the main recommendations provided by the Western European Nuclear Regulators Association (directive for reactors in operation) and new reactors.

2.4.4.6. Terrorism

The protection of Europe citizens is a primary duty for every government. Governments have to propose measures that are complying with the values that govern EE, respect of human rights, democracy, legislation. Any measure taken for prevention or repression dealing with the return of terrorist fighters, should be in accordance with international obligations to protect human rights. Europol's mission is support MSs, non-EU countries and international organizations in preventing and combating international and organizes crime, cybercrime and terrorism, where interoperability is needed.

The terrorist attack on the twin towers in America in 2001, as well as the terrorist attacks on the airport in Belgium in 2015 and in Bangladesh in 2014, as well as the war in Syria, have significantly changed the strategies followed to combat terrorism on a national, European and international level.

The carefully planned attacks continue to demonstrate the elevated threat to the EU from an extremist minority, operationally based in the Middle East, combined with a network of people born and raised in the EU, often radicalised within a short space of time, who have proven willing and able to act as facilitators and active accomplices in terrorism (Europol, 2023). Every year, Europol publish the EU Terrorism Situation and Trend Report (TE-SAT), which provides an overview of the terrorism revolution, helping in strategic analysis.

In order to shield Europe against terrorist attacks, a series of legal texts on foreign terrorist fighters and terrorist acts have been enacted (KEMEA, 2021):

- 2170/2014, 2017/2014, 2242/2015, 2253/2015, 2322/2016, 2341/2017, 2396/2017 resolutions of the UN Security Council
- 196/2005 Council of Europe Convention on the Prevention of Terrorism, and the additional protocol of 2017/2015.
- 9956/2014 Revised EU Strategy for Combating Radicalisation and Recruitment to Terrorism and 13469/1/14/2014 and 9646/2017 about guidelines for the strategy,
- 2017/541 on combating terrorism
- EU Directive 2017/458 as regards the reinforcement of checks against relevant databases at external borders
- EU Directive 2017/853 on control of the acquisition and possession of weapons (Text with EEA relevance)
- EU Directive 2018/843 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing

For the board's protection, EE has founded FRONTEX organization "*European Area of Freedom, Security and Justice, in collaboration with other EU MSs, they ensure safe and well-functioning external borders providing security*". FRONTEX role is to analyze data and patterns, in order to detect cross-border criminal activities and terrorists, carries out vulnerability assessments for every country. In addition it has developed training programs for border guards amongst Europe. National authorities in collaboration with FRONTEX are responsible to decide, who can get international protection or not.

The main concern of MSs is jihadist terrorism and the closely related phenomenon of foreign terrorist fighters who travel to and from conflict zones. Radicalisation leads to violent extremism has increased significantly the last decades. In a time where a series of ever-increasing needs arising from the phenomenon of radicalisation and violent extremism arises, in order to mitigate radicalisation, Centre of Security Studies in Greece (KEMEA) has developed a training for first responders in the identification of risk indicators and handling of terrorist threats. The main issue of the training involved recognizing of Foreign Terrorist Fighters (FTFs) and of the risk of radicalization in migrants/refugees, through recognition of risk indicator, like personal items, body, and behavioural signs (Radicalisation, n.d.).

Such training programs are too crucial for countries identified as physical paths to Europe. Especially, Greece, due to its geographical location, is one of the natural and most frequent entrances of terrorists in Europe. More likely paths that terrorist fighters follow when they return back to Europe, are possible identified with the routes followed by refugees and asylum seekers, which make the work for authorities in charge of managing migration flows, checks and possible detection of returning fighters much harder.

Funds generated in Europe are transferred outside Europe in various ways. To move funds, terrorists employ cash operations, hawala banking, corporate structures and trade transactions, as well as money remittances.

Combatting terrorist financing is the main priority for the Financial Action Task Force (FATF). FATF started its action since 2001. The terrorist attack in Bataclan theatre in Paris in 2015, was followed by a significant increase in terrorism attacks worldwide and especially in European territory posed by the so-called Islamic State of Iraq and the Levant (ISIL/Da'esh), and by Al-Qaeda and their affiliated terrorist organizations. Funding flow cross-border to provide equipment and resources, to terrorism organizations or even radicalized lone actors.

FATF sets global standards to combat terrorism financing and helps authorities to implement financial provisions according to the United Nations Security Council, and to prevent, detect, investigate and prosecute the financing of terrorism. FATF's goal is to improve the understanding of terrorist financing risks in order governments to allocate resources to detect or disrupt terrorist financing (FATF, n.d.).

Funds generated in Europe are transferred outside Europe in various ways. To move funds, terrorists employ cash operations, hawala banking, corporate structures and trade transactions, as well as money remittances.

In practice, cash transfer, money services businesses and hawala are often used in combination, e.g. for cash compensation between different those involved in hawala hawaladar (Europol, 2020).

2.4.4.7. Pandemic

The World Health Organization (WHO) founded in 1948, is an international intergovernmental organization that also works as a special agency of the United Nations (UN). WHO's main role is providing guidelines with regard to health aspects at international level. The WHO has played a significant role in the elimination of Smallpox, the almost elimination of poliomyelitis, the development of the Ebola vaccine development and the strategy to fight against AIDS, Malaria, tuberculosis, and even non-contagious diseases like cancer and heart diseases (UNRIC, n.d.).

The occurrence of the Ebola virus disease, Malaria, Influenza and a serious of others outbreak diseases, incited the designing of disease models, which aims to predict both the spatiotemporal spread and the magnitude. Multiple interventions and measures

taken in order to mitigate and eliminate infectious diseases, like contact tracking and case isolation included guidelines for burials of Ebola victims, enforced sanitary measures, border controls and establishing of field hospitals and laboratories. It is extremely difficult when disease modelling rapidly determines effective outbreak cessation measures, but the most important element in eliminating the geographical spread of a disease is the rapidly tracking of new diagnosed cases and adopt best practices to the healthcare system (Dembek Z.F., Chekol T. & Wu A, 2018).

One of the greatest hazards that impacted the world in the 21st century, causing massive economic disaster, effecting the sectors of construction and transportation and costing many human lives, was the COVID-19 pandemic. In contrast to many other types of hazards, a global pandemic is not limited to a certain area, it has a global impact. It affects all citizens, critical infrastructures, and CPAs in every country. Another thing that must be taken in mind, is that the contagiousness of a virus within a country, as well as the countermeasure strategy the country develops, is directly bonded by its characteristics, such as the population, urban planning organization, its health system, its economic situation, the economic well-being of its citizens, their educational level, technology, religion, and culture.

In the beginning of the pandemic, it was obvious that countries that were more prepared to such disasters were countries that in the recent past have experienced other pandemic diseases, like Japan, Taiwan, (Dembek Z.F., Chekol T. & Wu A, 2018) and Singapore. For example Singapore follows up a general framework for classifying the severity of disease outbreaks, called DORSCON (Disease Outbreak Response System Condition), which is characterised by 4 colour levels: green, yellow, orange and red. Green means low public health impact and red means high risk of massive public health impact. This document identifies the general principles for responding to a pandemic (MOH, n.d; WHO, 2021).

In the majority of the EU countries, there was no fundamental experience in pandemic response, even though pandemics have been considered in the federal government's risk analyses and conceptual preparations have been made. The COVID-19 pandemic showed the need for unified action to create a strong concrete health framework (European Council, 2022).

The most common anti-COVID-19 strategies most countries worldwide adopted, were:

- Lockdown
- Vaccinations and strategies in order to increase of vaccination rate.
- Contain of potential meeting places (leisure, facilities, restaurants, etc)
- Mandatory quarantine for those traveling from abroad.
- Traffic control to decongest and avoid contact.
- Mandatory use of a mask and rapid tests
- Keeping social distances
- “Stay home” campaigns through social media (internet, tv, radio)

- Creating guidelines for the management of COVID-19, both for self-protection and for
- Training material staff
- Providing isolation facilities/hotels for quarantine compliance.
- increasing the number of beds in medical facilities
- Quarantine of the effected people, or people that were in touch with effected people.

WHO provides a Coronavirus (COVID-19) Dashboard, where people can see the ongoing course of the pandemic and the extend of the measures undertaken by a country.

The majority of governments worldwide adopted the strategy of district lockdown, cutting out the internal locomotion, but this didn't happen in the cases of Japan and Taiwan, which applied a more conservative strategy, and adopted less stringent protection measures. Taiwan, like Japan, has at times declared a state of emergency due to rising case numbers, but neither country had to impose a lockdown. The experience with previous outbreaks (SARS) and the provision of a name-based mask system and government quarantine facilities (hotels) has had a significant impact on the acceptance and cooperation of the country's citizens.

Italy was the first European country to be confronted with the novel coronavirus and one of the worldwide countries with the highest numbers of deaths associated with COVID-19. The well-developed health system, especially in northern Italy, was initially massively overwhelmed by the sudden outbreak of infection. The overload of the health system led to considerable bottlenecks in the medical care of infected patients, especially in the initial phase.

Measures that followed to contain the spread of the virus Case isolation, were contact tracing and lockdown measures. The decentralised structure within the Italian health system prevented the formation of a uniform approach in the different regions of the country. In addition, Italy was in a tense political situation at the time of the outbreak, which also affected confidence in the government.

The culture and the ethics played a significant role in the COVID-19 disease spreading. The Italian greeting culture tended towards close physical contact (e.g., kissing on the cheek) and everyday activities such as eating together in large families are celebrated extensively. Thus, the acceptance of the restrictions by the population and their willingness to cooperate was initially restrained. However, after the peak of deaths in the country was reached in March 2020 and the number of deceased could no longer be managed without military support, the feeling of solidarity and cohesion increased, so that there was only minimal resistance to the restrictions (Berardi C. 2020).

Despite experience in dealing with infectious outbreaks, Italy lacked an effective pandemic plan, medical capacity (staff, hospital beds and ventilators) and needed support in the fight against the coronavirus. Extended and strict lockdown periods were needed to prevent further spread of the virus and to reduce the rising numbers of new

infections and the rate of deaths. In order to compensate halfway for the economic damage caused, the government decided to provide various financial aid packages.

In contrast with Italy, Japan was one of the few countries that in the beginning of the pandemic managed to weather the globally prevalent COVID-19 pandemic with relatively low numbers of infections and deaths.

Combining the experience of dealing with outbreaks of other infectious diseases and the measures taken by the government, Japan kept a low profile to be tending to have a good strategy in dealing with the Corona virus. In addition, Japanese culture unlike Italy, was already characterised by certain manners before the pandemic. These include greetings without a handshake or hug, taking off shoes before entering indoor areas, and wearing masks as a matter of course, unlike Italy. Due to the existing compliance of the population, the government's requests could be seen as recommendations rather than restrictive measures.

In Taiwan, since the SARS epidemic, exercises have been held regularly to prepare the medical supply system. Every four years, a check is made to ensure that all medical staff, necessary equipment, and reserve stocks for infection control are in place. Unlike in other countries, hospitals have been able to mobilise immediate measures such as triage and further resources more quickly.

Of course, in countries like Israel, there was a challenge to combat a pandemic in times of religious-political tensions. In addition to coordinating crisis management and related communications with citizens that were appropriate for the target audience, the various reservations that conservative citizens had toward the state had to be taken into account. The Israeli authorities' solution was to engage religious leaders to ensure the acceptance of this segment of the citizenry. (Ministry of Health Israel, 2022a; Ministry of Health, 2022b).

Unlike other countries, like Japan and Taiwan, Brazil disposes a weak health system, with significant shortages of important medical equipment, like ventilators, lack of health workers. There was a struggle, and efforts had been made through the beginning of pandemic to cover all these needs, providing additional financial assistance.

However, about half of the Brazilian population either lives in poverty or is at risk of poverty, which puts them at an additional disadvantage when it comes to protecting their families and themselves from infections. In addition, measures such as social distancing in overcrowded settlements, such as Brazilian slums, are difficult to implement and facilitate the spread of a virus. The indigenous population as well as people in rural areas also have more difficult access to medical care, which had also led to increased deaths (Reliefweb, 2020).

For the need of contact tracking of COVID-19 cases, in many countries there were designed tracking apps to help governments to mitigate the geographical spread of the disease. More details about tracking apps are given in Annex 4.

3 CONCLUSION

In this report, the practices of CPAs for emergency and disaster management, including resilience and risk communication, are presented for all levels of Civil Protection Administration. For the implementation of this task:

- a thorough literature review has been performed in order to present an overview of CPAs practices for several countries
- a number of CPA stakeholders have been consulted at a national, regional and local level.

CPA consultation was based on structured interviews using open-ended questions, which allowed the responders to express and analyse their expert opinion and views on a number of aspects related to risk management and resilience. Thus, apart from the information about the typical CPA role and ordinary activity, RiskPACC partners regarding specific characteristics and requirements of CPAs acquired a large amount of knowledge. The sufficient number of interviews together with the best practices reporting establish an essential basis of information and knowledge for the analysis that will follow in Task 1.3 and for a better understanding the CPAs role and “top-down approaches” in bridging the RPAG.

Main conclusion from interviews analysis

As was presented thoroughly, both from the interviewees and the practices applied, in recent years for natural and human-made risks, due to climate change and technological development, we are at the turning point of upgrading the strategies that have been followed either at national, European or international level. It is vital to recognize the necessity of the risks that an area may experience to identify potential risks associated with future developments. As conducted from the interviews, although most EU countries have taken significant steps in adopting a risk assessment and prioritizing their hazards, there is a need for a more methodological approach including risks addressed my committees and plans that address the required resources based on task resource analysis, in order to achieve a more realistic risk management and addressing the gaps existed.

One of the key features that accompany a comprehensive strategy is the recognition of the role of the competent authorities and society in it. In addition, it is very important to recognize the role of citizens and volunteer groups and how they can be part of both in preventing and adverting a disaster.

As concluded, the gap is significant between the perception of risk of the CPAs and citizens. People have a different understanding of the magnitude of a hazard and its probability of occurrence. Education and experience are aspects that influence the understanding and awareness of risk. In addition, absorbing “resilience” in policies and operational actions would significantly make society more vulnerable and more capable to deal with and survive an emergency. As interviewees claimed, in their territory, there are dedicated policies aiming to increase disaster or community

resilience. In the future, based on the development and needs of society, we expect strategies more oriented to resilience.

In order to make a society more resilient is vital that resources needed from CPAs to be secured. Available resources is one of the major concerns in risk management. The majority of CPAs interviewed, have encountered many gaps in resources and face many barriers each year to accomplish their goals. It is noted that the greatest deficiency is observed in trained staff and sufficient and evolved equipment and technological tools. Only a few CPAs claimed that the resources given are good enough.

Another major step to achieve a holistic risk management is risk communication. Local CPAs have a more direct communication with various community groups, which are active in their area of responsibility, collaborating with them to all DRM phases. Social media and new technological tools, educational programs, even information campaigns are the main sources of information. However, the challenge is to disseminate information to vulnerable groups, the elderly, and children, who do not have access to the Internet, so specific provisions and practices for vulnerable groups of citizens are provided in the civil protection plans. The next step for community engagement and crisis response is two-way communication, in which the CPAs provide information and citizens volunteer resources and information. Moreover, there should be a focus on inclusive risk and crisis communication through improvements in web accessibility and investigation of offline channels and digital divide.

As many interviewees stated, sometimes there are coordination problems, especially during hazards that affect large areas. In addition, the prioritization of different responses is a source of tension among national and local authorities, especially in cases of simultaneous occurrence of disastrous incidents (e.g. forest fires). It is crucial in the immediate future to ensure coordination and interoperability between the different CPAs and CPAs in different administrative level.

Main conclusion from best practices analysis

Best practices in disaster resilience and risk communication, are a set of guidelines, ethics, policies, or ideas. In reality, “best practices” is often used synonymous to “good practices”. Good practices implemented in a certain area, directly related to its vulnerability to specific risks. It is obvious that good practices applied are directly related to a major disaster that this area has experienced before, like the triple disaster in Japan, the earthquakes in Italy and Greece.

Due to the necessity of tightening relations, both between the members of the European Union and the rest of the states, important bilateral and multilateral agreements have been created, while the European Union has laid a solid foundation by creating organizations, in order to support its member states in any disaster. Even in disasters that are not limited within the inland borders, nor the European borders, International Organizations and conventions have significantly improved to cover this level.

As resulted from the above analysis, technological developments play an important role in predicting and combating natural disasters, while of course new technological achievements can significantly help both in vulnerability models and in management plans in order to combat a risk.

As came clear both from the literature and from the interviews taken for the first part of the deliverable, one of the most serious obstacles faced by countries worldwide, is the lack of personnel and equipment, both numerically and properly trained for this purpose. Surely one society facing a hazard cannot become as resilient as another. There are countries that have the financial ability to invest in order to build extremely expensive but necessary structures in order to protect themselves from future disasters, such as Japan and other countries that, due to their difficult economic situation, cannot ensure basic needs, like Brazil during the pandemic.

The advent of the pandemic, a global and largely unexpected hazard especially for the citizens, demonstrated strongly to the CPAs worldwide the existing gaps and the need for better interaction among the CPAs at all levels, as well as the importance of resource allocation for community awareness and cooperation. The pandemic led to the revision of risk management plans and demonstrated the need for interoperability for communication and collaboration between governments and CPAs worldwide.

3.1 Going Forward and Next Steps

This work, along with D2.2, examines the practices that are currently ongoing by both citizen groups and CPAs in case study areas. These two reports will provide information on ongoing activities in the case study areas to inform the consortium and provide insights. This deliverable is a continuation of D1.1 and provides the first look at empirical research on CPA resilience and risk perception practices. This work will be used for the gap analysis that will be completed for D1.3. This gap analysis will draw together findings from this deliverable and D1.1 to identify and map gaps in the current operations of disaster resilience and risk perception concepts across risk management sectors. A similar gap analysis will be done in WP2 through D2.3. Along with WP2, this work contributes to establishing the conceptual foundations of the RiskPACC project.

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5 ANNEXES

Sub-section	Annex number	Title
5.1	ANNEX 1	Questionnaire for CPA interviews
5.2	ANNEX 2	Participant Information Sheet
5.3	ANNEX 3	Statement of Informed Consent
5.4	ANNEX 4	Global Pandemic Case Study Report

TABLE 3: ANNEXES

5.1 ANNEX 1 - Questionnaire for CPA Interviews

Questionnaire for CPAs

Case study country:
Case study name:
Name of representing organization:
Administrative level⁴:
Current position:
Years in position:

⁴ Administrative levels used are: National, state, region, municipality, community.

PART 1: General questions

- 1. Is there a register of the hazards and risks (natural or humanmade) for the area (municipality/county/state/other) that you work in?**
 - a. If yes, are these categorized and in which categories?
 - b. If not, are you aware about the risks in your area area/community/municipality? Which are these risks?
 - c. Do you believe that the perception of risk between CPAs and local citizens/citizen groups coincide? Please explain.
 - d. What types of other stresses does your area/community/municipality (beyond the abovementioned risks) concern you?
 - e. What kind of actions are you currently taking to address these hazards/risks?

- 2. What are your current needs in terms of resources for managing the hazards and addressing the impacts of these hazards/risks?**
 - a. Do you have enough budget, equipment, personnel?
 - b. Do you think that existing budget, means or personnel could be distributed and used more efficiently?
 - c. What would you like to do differently?

- 3. Is the word “resilience” used in any policy report/paper or doctrine in your area of work?**
 - a. If used, what does it practically mean for your area of work?
 - b. If resilience isn't a term commonly used in your area, what are the terms used to describe the process by which hazards are managed (this might for example be risk management, emergency management, etc.)
 - c. Are there any dedicated policies to increase disaster or community resilience? Please specify.
 - d. Are resilience actions based on prevention or response actions?

e. Can you think of any ways that disasters can result in positive outcomes for your area, such as opportunities for improvement? If yes, can you give examples?

PART 2: Questions for the CPAs

1. Is there a doctrine to support communities to prepare for, confront and recover from natural hazards in your area?
 - a. What are the policies in place that you follow to support such actions? Please list relevant policies at national, regional/provincial and city/municipal levels.
 - b. What are your current activities being undertaken in your area?
 - c. Do you plan on introducing any specific activities in the near future?
 - d. What kind of activities? (Preparation or procurement, training, raising awareness...)
 - e. Longer-term, what would you like to see your area doing to increase resilience?
 - f. On your current approaches what are your strengths and weaknesses?
2. In your opinion are all community group members conceptualising risk in the same way or not? Please elaborate.
 - a. What methods, including digital technology, do you use to communicate with community members?
 - b. Do you believe that new technological tools & social media are effective for risk awareness and risk communication?
 - c. Do you believe that the existing communication actions in your area are effective?
 - d. What are the challenges with such communication?
3. How would you describe your relationship with the community that you work with?
 - a. Are there any community groups that you work closely with?

- b. Is there any specific consideration for the sensitive groups of citizens (e.g children, people with special needs)?
 - c. Are there any cultural, environmental and other associations and volunteer groups that could contribute to your mission?
 4. **How would you describe your collaboration with the other CPAs that you work with?**
 - a. Which CPAs collaborate with you for risk management? (Specify for prevention, response, recovery phases)
 - b. Do you use any methods/ tools or communication protocol for acquiring a common operational picture and coordinating your actions? Please specify
 - c. What would you improve in your communication and coordination with the other CPAs?

Part 3: Community group questions

1. How would you describe community action in your area with regard to the risks faced?
 - a. Are there recent hazard events that the community has responded to?
 - b. Are community members organised in groups/teams/organisations etc?
 - c. Is there more than one community organisation in your area working on issues of risk reduction?
 - i. If yes, do they communicate with each other?
 - ii. Are there any specific policies or plans from the municipality that encourage the formation of such groups, or is this the result of communities self-organizing? Please elaborate
 - d. In your opinion, is there a shared sense of community in your area or are there divisions?
2. Is there any communication between local authorities and community groups/individuals in your area with regard to the risks faced?
 - a. How is communication done?

- b. How effective is the communication?
 - c. How could communication be made better?
3. What are your opinions on the existing approaches to managing the risks in your area?
 - a. What are the strengths and weaknesses of existing risk management policies and mechanisms in place?
 - b. As a community group, how are your views on risk currently addressed by existing risk management approaches?
 - c. What opportunities are there for citizens/community groups to influence policy and decision making in your area?
 - d. If not, what more would you like to see occurring?
4. Related to the risks you mentioned above, for which kind of events
 - a. Do you feel well prepared? Why?
 - b. Do you feel not well prepared? Why?
5. As a community member, what are the needs of your community during a potential disaster?
 - a. Are you leading or are you aware of any community-led mechanisms in place in case of for disaster risk response?
 - b. What kind of support would you expect from CPAs in such situations?
 - c. In an ideal situation, what kind of methods/mechanisms would you like to see activated for disaster risk response?
6. Is citizens' perception of risk important for effective risk planning and response, in your opinion? Please elaborate.
 - a. How is citizens' perception of risk incorporated in existing risk management plans and policies in your location?
 - b. What would you like to see changing in the existing context?
 - c. Can you think of any possible ways that risk perception could be registered and incorporated in future risk management plans and policies?

- d. Are there any potential barriers in the participation of communities to disaster risk activities? Please elaborate.

Part 4: Summary

1. How has the COVID-19 global crisis changed the way you think about risks?
2. How has the COVID-19 global crisis changed the way you plan for managing future risks

5.2 ANNEX 2 - Participant Information Sheet

PARTICIPANT INFORMATION SHEET

RiskPACC: *Integrating Risk Perception and Action to enhance Civil protection-Citizen interaction*

You have been invited to take part in the RiskPACC project, funded by the European Commission and run by Dr. Florian Neisser, Senior researcher at Fraunhofer Institute for Technological Trend Analysis (INT). The research will be conducted by [*names of researchers at institutions*]. You are free to withdraw your participation at any time, as it is voluntary. For your decision whether or not take part, you should understand the reasons why this research is being done and what will be involved. Please take time to read the following information carefully and feel free to ask questions.

1. THE PROJECT

RiskPACC focuses on increasing disaster resilience across society by closing the so-called Risk Perception Action Gap (RPAG) and aims to provide an understanding of disaster resilience from the perspective of citizens and Civil Protection Authorities (CPAs), identifying resilience building initiatives and good practices led by both citizens and CPAs. This research runs from September 2021 till August 2024. For more information the website www.RiskPACC.eu is designed. The Consortium consists of 20 organisations from industry, academia and the public sector.

Partner	Country
FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (FhG)	DE
TRILATERAL RESEARCH LTD	UK
INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (ICCS)	GR
THE UNIVERSITY OF WARWICK (UoW)	UK
KENTRO MELETON ASFALIAS (KEMEA)	GR
EUROPEAN ORGANISATION FOR SECURITY (EOS)	BE
FORUM EUROPEEN POUR LA SECURITE URBAINE (Efus)	FR
CESKA ASOCIACE HASICKYCH DUSTOJNIKU SDRUZENI (CAFO)	CZ
UNIVERSITY OF STUTTGART (USTUTT)	GER
SERVICE PUBLIC FEDERAL INTERIEUR (IBZ)	BE
UNIVERSITEIT TWENTE (UT)	NL
MUNICIPALITY OF EILAT (MoE)	IL
MAGEN DAVID ADOM IN ISRAEL (MDA)	IL
UNIVERSITY COLLEGE LONDON (UCL)	UK

CROWDSENSE BV (CS)	NL
STAM SRL (STAM)	IT
I.S.A.R. GERMANY STIFTUNG GGMBH (ISAR)	GER
THE CHIEF CONSTABLE OF LANCASHIRE CONSTABULARY (LC)	UK
DIMOS RAFINAS-PIKERMIOU (MRP)	GR
COMUNE DI PADOVA (CPD)	IT

2. WHAT WILL THE RESEARCH INVOLVE?

RiskPACC includes different research and training activities in which you could participate, e.g. workshops, interviews, surveys, demonstration and exercises, together with consortium members or relevant stakeholders, like Civil Protection Authorities, Civil Society Organisations, NGOs, etc.

Interviews: Questions about your experiences in disaster response, related technologies and resilience and well as approaches to closing the RPAG will be discussed. The interview will take 30-90 minutes, and will be held via Teams or a similar video-conference software.

Workshops: Various stakeholders assembled to consider the practicalities of your work. We may shadow an individual or group, observe interactions, or gather information on user experiences. In addition, co-creation plays an important role in the project. This means that stakeholders will actively participate in selecting and developing solutions to close the RPAG.

Surveys: Questionnaires on specific issues in the risk cycle, resilience and vulnerabilities in Europe may be circulated.

Demonstrations: The tools involved in RiskPACC as well as well as the final platform and physical Risk Pack will be demonstrated to test and validate their way of working and impact. These demonstrations may include trainings, roleplays and evaluation activities.

You will be asked to provide the following information when taking part in any of these activities:

- Your name, professional affiliation, age range and contact information
- Your personal and professional views and experiences as they relate to the activities above
- Photographs, video and/or audio recordings of your participation in RiskPACC activities (e.g. documentation of discussions in workshops or activities in demonstrations).

3. WHY HAVE I BEEN CHOSEN?

You have been invited because of your experience and ability to articulate the needs of stakeholders in ways that can be informed and be engaged with in complex and cross-disciplinary situations.

4. DO I HAVE TO TAKE PART?

No, your participation is completely voluntarily. You can leave at any time without giving a reason and without any consequences in the further participation in the project. You are free to refuse to answer any questions or provide any information. If you were invited to participate by your employer or university, be assured that you are under no undue pressure, advantage, or disadvantage to take part. You have the right to ask questions and receive understandable answers before making any decision.

5. WILL I BE RECORDED AND HOW WILL THE RECORDED MEDIA BE USED?

During the research, observer notes, audio and/or video recordings of your activities may be made. The information that you provide may be used to write articles for peer-reviewed journals and relevant industry magazines, for presentations at conferences and workshops, and in the promotion of RiskPACC in general. Additionally, your participation will be used to form our user requirements, revise system design, and develop the RiskPACC technologies with respect to responsible use. Without your written permission, no other use will be made. You can review any recording and notes upon request.

6. WHAT ARE THE POSSIBLE ADVANTAGES OF TAKING PART?

Whilst there are no immediate benefits, this work will contribute to future improvements in disaster resilience, reduction of the Risk Perception-Action Gap and decrease disaster risks. You will not be provided any incentive to participate.

7. WHAT ARE THE POSSIBLE DISADVANTAGES TAKING PART?

There is a small risk that you may share some confidential information by chance or that you may feel uncomfortable talking about some issues. You can inform us at any time, if you decide you do not want to have something you said or did used for RiskPACC research purposes. There is a small risk in terms of entrusting your personal data to the research team. To mitigate this risk, we have outlined strict privacy

and data management procedures, in line with the applicable National and EU regulations, including the requirements of the Regulation EU 2016/679 (General Data Protection Regulation).

8. RIGHT TO WITHDRAW

You may withdraw your consent from this project at any time without giving a reason with just contacting [the Researcher] or project coordinator. You will be asked whether you would like us to delete your data or whether you are fine for these data to continue to be processed. You may be asked why you have decided to withdraw, but you are under no obligation to give a reason.

9. PRIVACY NOTICE

In this research project, your personal data will be processed as long as it is required, however, the data you provide will be anonymised to the extent possible. We will only collect and process data that is strictly necessary for running the research, for our internal processing, administrative purposes, and to enable us to contact you if we require further information. The record of your participation will be kept in a file separate from the research data. These data will not be shared with or disclosed to anyone outside the research team.

We will not share any information we collect about you unless we are required to do so with the European Commission as part of our obligations. However, the researcher has a duty of care to report to the relevant authorities possible harm/danger to the participant or others. If this was the case, we would inform you of any decisions that might limit your confidentiality. All information will be stored in a secure location at [Researchers Institution], on password protected computers and encrypted. They are only shared through a secure online platform managed by Fraunhofer INT. This information will be retained for the lifetime of the project. After the research ends, it will be either permanently and irrevocably deleted after a maximum of 12 months or archived for continued research in line with the EU General Data Protection Regulation and the other applicable national and supranational data protection laws.

10. DATA SUBJECT RIGHTS

If you are concerned or have questions about how your personal data is being processed, you have the right to contact both the consortia lead or the Legal, Ethical and Security Issues Manager. You also have the right to check what is collected and processed, to access to your data being processed, to delete or make any changes to

this information, to restrict processing and to receive requested information in a time-limited fashion.

11. INCIDENTAL FINDINGS

There is a small risk that RiskPACC research reveals insights about individuals, groups and/or the collaboration between civil protection authorities, citizens and other stakeholders that have not been envisaged and that are adverse for one of the aforementioned groups and/or their collaboration. In case that any such findings should be made on the individual level, you will be informed personally via phone after careful considerations together with other researchers have concluded that informing you will be more beneficial than not informing you. In case such findings relate to the collaboration or a particular case study, the respective incidental findings contact person will be contacted.

12. CONTACT FOR QUESTIONS, CONCERNS, OR FURTHER INFORMATION

If you have any questions about this research or your prospective involvement in it, please contact:

<p>Individual conducting the research: Name of researcher: Organisation: Address: E-mail:</p>	<p>Project Coordinator Dr. Florian Neisser Email: florian.neisser@int.fraunhofer.de Phone: +49 2251 18 144 Fraunhofer Institute for Technological Trend Analysis (INT), Appelsgarten 2, 53881 Euskirchen, GER</p>
<p>Data controller Name: Organisation: Address: E-mail:</p>	<p>Legal, Ethical and Security Issues Manager Dr. Su Anson Email: Susan.Anson@trilateralresearch.com Trilateral Research Ltd., Crown House, 72 Hammersmith Road, London W14 8TH, UK</p>



5.3 ANNEX 3 - Statement of Informed Consent

STATEMENT OF INFORMED CONSENT – RiskPACC Project

By signing this form, you agree to take part in the RiskPACC research. The nature of the research, your involvement in it and your rights regarding your participation in the action are explained in the Information Sheet accompanying this form.

To agree with following statements, please put an "X" in the boxes.

1. I confirm that I have read and understood both this form and the accompanying Information Sheet. I had the time and opportunity to ask questions as needed.
2. I understand that I am free to withdraw my consent at any time without giving reason.
3. My personal data can be gathered to be used, stored and shared in the ways described on the accompanying Information Sheet.
4. Data from my participation can be used to inform RiskPACC user requirements, revise design, and develop RiskPACC technologies.
5. Data from my participation may be used to write articles for peer-reviewed journals and relevant industry magazines, for presentations at conferences and workshops,
6. Data from my participation may be used in the promotion of RiskPACC in general.
7. RiskPACC may take research notes or audio recordings of my activities as I participate in RiskPACC
8. I give my consent to be identified in any public reports.
9. I agree to having photos or videos taken of me for research purposes.



10. I agree to having photos or videos taken of me for communication purposes.

11. I agree to be quoted directly.

12. I would like to receive updates on the progress and findings of the project.

13. I agree to voluntarily take part in the RiskPACC research.

Participant Consent

Name

Affiliation

Contact

Age Range 18-30; 30-50; 50-60; over 60.

Signature Date
(Day/month/year)

Statement by the Researcher taking consent

I have accurately provided the information sheet to the participant and, to the best of my ability, made sure that the participant understands it. I confirm that the participant was given an opportunity to ask and get answers to questions about RiskPACC, the research activity he/she will be involved in. I confirm that the participant has given consent freely and voluntarily.

Name of Researcher _____

Signature of Researcher _____

Date _____ (Day/month/year)

5.4 ANNEX 4 - Global Pandemic Case Study Report

CPA	Germany	Australia	Israel	Japan	Taiwan	Italy	Singapore	Brazil	UK
Inhabitants (in millions), 20231⁵	83.8	26.1	9.3	125.5	23.8	60.3	5.9	215.3	68.5
Date of first case of COVID-19²³	27.01.2020	NA	NA	15.01.2020	21.01.2020	28.01.2020	23.01.2020	25.02.2020	NA
total cases (in millions)²³ (24.01.2022)	9.9	2.1	2.5	2.1	0.018	10.1	0.32	24.3	16.9
% Total rate of cases²³ (24.01.2022)	11.8	8.1	26.8	1.7	0.1	16.8	5.4	11.3	24.7
total deaths²³ (24.01.2022)	122,001	3,393	8,481	18,523	850	144,084	854	623,412	156,073
% Total rate of deaths²³ (24.01.2022)	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.3	0.2
new infections/ 24 h²³ (24.01.2022)	90,962	40,683	73,307	48,411	NA	78,039	3,002	199,126	102,364
% full vaccinated²³ (24.1.2022)	73.26	76.87	64.38	80.65	72.2	77.44	83.33	69.17	71.43
% Total rate of cases²³ (12.01.2023)	44.8	43.1	51.2	24.7	38.3	41.9	37.2	17.0	35.3
total death² (12.01.2023)	163,625	17,653	12,111	61,281	15,702	185,417	2,210,633	695,255	201,028
% Total rate of deaths²³ (12.01.2023)	0.2	0.1	0.1	0.0	0.1	0.3	0.0	0.3	0.3

⁵ Worldmeter Coronavirus Data, <https://www.worldometers.info/coronavirus/>, last access 12 Jan 2023

CPA	Germany	Australia	Israel	Japan	Taiwan	Italy	Singapore	Brazil	UK
% Internet users ⁶	93.3	81.6	76.3	94.2	91.9	85.3	81.1	77.1	96.6
residents consider themselves tech-savvy ⁷	More than half	NA	NA	very tech-savvy	Strong tech talent, very tech-savvy	Moderately tech-savvy	Very tech-savvy	NA	NA
		High level of political will for digital health, but deficits in implementation	Digitization in Israel is above average compared to the European Union		One of the most densely populated country in the world		High level of education, good health care. One of the richest countries in the world	Indigenous population, different ethnic groups, Country of young people, but will also be dealing with an aging population	one of the technology hubs in the world. Most visitors from Europe

⁶ List of countries by number of Internet users, https://en.wikipedia.org/wiki/List_of_countries_by_number_of_Internet_users, last access 12 Jan 2023

⁷ Most Technologically Advanced Countries 2023, <https://worldpopulationreview.com/country-rankings/most-technologically-advanced-countries>, last access 12 Jan 2023

CPA	Germany	Australia	Israel	Japan	Taiwan	Italy	Singapore	Brazil	UK
Tracking	No location tracking	Yes/No permanent	Yes	NA	Yes	NA	Yes	Yes	Yes
	The aim is to break the infection chains		Matching personal GPS data with historical data of patients	COVID-19 contact-tracing via COCOA-App			Singapore's TraceTogether, SafeEntry	Coronavirus-SUS/ Brazilian Tô de Olho (TdO)	NHS COVID-19 app
	When encountering another user, the end devices exchange encrypted random codes (duration of contact, etc.)		The app is available in five languages (Hebrew, Arabic, English, Russian and Amharic)	Decentralized approach through Bluetooth and is designed not to store personal information on a central server controlled by the government or the developer				information about symptoms, COVID-19-related news, map with public health facilities in one's region	
COVID Application	corona Warn app, Covpass app, luca-app	COVIDSafe	HaMagen 2 /Upon Purchase	NA	TRACE	Immuni	Yes		Yes
Data Availability (in days)	14	21	NA	NA	14	NA	25	NA	

The pandemic case study focuses on the usage of tracking applications during the COVID-19 pandemic. Thus, a compilation of countries that have used/are using COVID-tracking-apps is presented below. It is described which apps are being used in these countries and how they work. Together with chapter 2.3.4, this chapter will feed into the further work on the case study.

Australia

The COVIDSafe⁸ app is an app approved by the Australian government that helps to identify people exposed to the coronavirus. It's voluntary and supports the manual process of finding people who have been in close contact to someone infected with COVID-19. The language of the app is English, but it's also available in Chinese, Vietnamese, Arabic, Korean, Greek, Italian, Punjabi and Turkish. People who download the app will be asked to fill in a name (can be a pseudonym), their age range, their postcode and their mobile number. To work sufficient, the app needs to run in the background. It uses Bluetooth to connect with others. The proximity is approximately 1,5 m for a time period of 1 minute or longer. The phones will exchange Bluetooth signals and do a digital handshake. The strength of the Bluetooth received signal strength indicator to know the distance. This is encrypted and stored for 21 days, and then it will be deleted automatically. If someone is tested positive, they're asked to upload their digital handshakes to make it easier to inform the contacts, but they won't have access if the Positive-tested doesn't agree. Also, the name of the infected person won't be shown. At the end of the pandemic, the app is going to be deleted, as are all the connected information. It has a range of privacy and safeguards build in and does not collect location data. It's also the only contact tracing app in Australia.

Additionally, the coronavirus Australia app provides up-to-date information and advice on the virus and Australia's effort to combat it, the current status, relevant contact information and notification of urgent updates. A QR-code app is used for collecting information about customers and visitors as some states and territories require from some businesses.

Germany

Germany uses 3 different apps. The first one is the Corona Warn App (corona warning app)⁹ which is made for contact tracing and to store vaccination and test certificates. The app is voluntary and can be downloaded in the app stores. For the contact tracing, the device sends out rolling proximity IDs on a regular time frame and is searching with Bluetooth low energy for other IDs at the same time. It saves those other IDs local. Those are valid for 10-20 minutes and are encrypted. If a positive test is reported to the app, the infected person is asked to upload the data of the last 14 days (also encrypted). After this step, the exposure notification system checks, whether they fit to the rolling proximity identifier and then contact those with a high risk. If someone has had a vaccination or a test, they can upload it via QR-code. Additionally, if you are

⁸<https://covidsafe.gov.au/background.html>; last access 24 Jan. 2023

⁹<https://www.coronawarn.app/de/>; last access 24 Jan. 2023

planning an event, you can create a scan in QR code for others, so they can register for the time being there.

The second app is the Covpass app¹⁰ designed by the RKI. All data are saved only locally and encrypted. This app is for having saved your vaccination and recovery certificates. It also shows whether your vaccination is accepted by other countries. The Vaccinations status is shown via QR codes. The app can read other QR-codes, e.g. for checking in 2G areas.

The third app is the Luca-app¹¹, which is used only in some parts of Germany. It is only for contact tracing. Via QR code one can sign in with your contact data. It automatically logs you out via geo-fencing if wanted. It saves a contact history and sends a message in case some of the contacts have been infected. In case of an infection, the data can be sent to the health authorities. Compared to the Corona Warn App, the data is not collected locally, but on a server, leading to safety issues.

Israel

The Israelian app HaMagen 2¹² is also a contact tracing app. It cross-checks the GPS history of the mobile phone with historical geographical data of diagnosed patients. It notifies the individuals with the exact time and location where they have been together with an COVID-19 diagnosed person. The used data is collected locally for 14 days and is not send to the Ministry of Health. The app requires authorisation to access tracking services, internet access and Bluetooth services on the user's device. The user is able to review, confirm or reject notifications. If someone accepts them, it is led to the website of the Ministry of Health for further information. The app is available in Hebrew, Arabic, English, Russian and Amharic. Even if the data is normally stored on the phone, in case of an infection the server publishes a list of GPS locations with the exact time on date thus revealing the persons.

Italy

Immuni¹³ is the Italian COVID-19 tracing app. It also works with Bluetooth (Bluetooth-Low-Energy-Technology) and swaps automatically generated, anonymous codes when being in short distance with other phones. When user health facilities or local health authorities register a new positive case, the infected person inserts a code into the system with the help of a health operator, which then send out notifications to those in close contact with the positive case. The app stores data local on will not trace movements, and it will only be possible to share data with the authorization of the

¹⁰ <https://www.digitaler-impfnachweis-app.de/>; last access 24 Jan. 2023

¹¹ <https://www.luca-app.de/>; last access 24 Jan. 2023

¹² <https://govextra.gov.il/ministry-of-health/hamagen-app/download-en/>; last access 24 Jan. 2023

¹³ <https://www.immuni.italia.it/faq.html>; last access 24 Jan. 2023

smartphone's user. The app is available in Italian, English, German, French and Spanish.

Japan

The Japanese app COCOA¹⁴ (COVID-19 Contact-Confirming Application) also uses Bluetooth to detect possible contacts. This information, which is anonymized, is stored on the users' phone and is deleted after 14 days. Phone number or location is not recorded. Positively tested persons upload this on the app. The notification server then cross-checks with the health centre whether the test is real and then sends notification to all possible contacts. The recipients also receive guidance from the application about what to do next.

Taiwan

Taiwan's corona app¹⁵ is different to those from other countries. It is described as a mobile-phone based electronic fence and uses location tracking to ensure, that infected or quarantined people stay at home. It is believed to be the first mobile phone system for that purpose. The system monitors phone signals and alert the police and local officials if the quarantined persons move away from their home or if they turn off their phone. Authorities will contact or visit within 15 minutes from there. Also, the quarantined will be called twice a day, to ensure that they haven't just left their phone at home. This system raised privacy concerns in other countries like the United States, but there are less complaints in Taiwan.

Singapore

Singapore's TraceTogether¹⁶ was the first App ever to use Bluetooth Low Energy for contact tracing. With this technic, it finds other people with the app in the proximity. The found data is deleted after 21 days, however, the app is connected to the phone number and thus the user identifiable. It's available in Bengali, Burmese, Chinese, English, Hindi, Melayu, Tamil and Thai. Since Mai 2020 the App SafeEntry is necessary to check-in and out in e.g. offices, hospital, shops, hotels etc. The app has two backgrounds: a green one with the vaccination status and a white one for the check- ins and outs. On the green screen, there is an animated otter, to make it easier for venue staff to check, whether it's a screenshot or not. A syringe and a test memo icon on the left upper corner show if you meet the vaccination status and if your tests are clear.

¹⁴ https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/cocoa_00007.html; last access 24 Jan. 2023

¹⁵ <https://www.reuters.com/article/us-health-coronavirus-taiwan-surveillanc-idUSKBN2170SK>; last access 24 Jan. 2023

¹⁶ <https://support.tracetgether.gov.sg/hc/en-sg/categories/360004509513-TraceTogether-App>; last access 24 Jan. 2023

Philippines

The Philippines use SafePass and StaySafe. SafePass is an app for digital check-in, the user can do so via Facebook, messenger, SMS or QR-Code. For business owners it's a way to implement health and contact-tracing protocols within their physical spaces.

StaySafe¹⁷ is used for contact tracing. The users have to get registered. It uses the Google Apple Exposure Notification (GAEN) System via Bluetooth. Once the user opts into contract tracing in his phone, the system generates a unique ID per Smartphone and uses Bluetooth to detect other IDs in the area. It then notifies the user when it detects an ID associated with the phone of a COVID-19 positive case. The phone's ID changes every 10-20 minutes, to ensure privacy, and it also doesn't share personal or location information. The original GPS use was removed due to privacy concerns. The collected data is deleted after 30 days, and people who were in contact with a positive tested person get a notification via the GAEN.

Sri Lanka

The app Self Shield¹⁸ shall help people to keep track of their health and detect some early symptoms of COVID-19. It can detect changes in the breathing sounds and so potentially identifies complications at early stage, however it can't diagnose if someone has COVID-19 but it helps to decide when to contact a doctor. Therefore, an automated breathing analysis has to be done regularly. The app captures the breathing sound and the sounds from small simple tests. The user can also track their health status. It also helps managing quarantine, self-isolation and to keep workplaces safe, it also keeps the user updated and educates on how to deal with COVID-19. When a user enrolls the SelfShield program, it provides the link between persons in quarantine and agencies providing help (e.g. health services). It could be very helpful or businesses as well, as it can show which workers are on risk and so to minimise their exposure and protect them.

Brazil

The Brazilian Tô de Olho (TdO) platform consist of 3 parts: a mobile application, a web module and a dashboard. One can register as citizen, private institution or as a public agent, all of which may cooperate within the functionalities available. The platform has a strictly defined data protection policy. The platform helps with social isolation monitoring, but also approaches digital contact tracing using GPS and enables a selective infectious testing functionality for health authorities to schedule patients based on age, recent notification, comorbid diseases etc. Thus, health agencies can send free test opportunities to the users which can be accepted voluntarily with the

¹⁷<https://safepass.asia/about>; last access 24 Jan. 2023

¹⁸ <https://sshield.org>; last access 24 Jan. 2023

result being processed to their employer if they want. For this app, there were six main requirements: Public declarations, that can inform citizens about problems in the city; monitoring civic engagement, that help the authorities with decision making; digital contract tracing to inform potentially infected people; selective infectious testing, that health authorities can see people with a higher risk (only in a short period of time) and asks them to get tested; integration with private institutions to help businesses to reopen and not be a hotspot or not be able to open as the personal is all positive and integration with third-party city apps like a transportation app to achieve broader audience and avoid obsolescence (de Araujo et al., 2020).

UK

The UK uses an app called NHS COVID-19. It is a contact tracing app for England and Wales and uses Google/Apple Exposure notification technologies. This uses Bluetooth low-energy, sends and receives random identifiers to phones which are close by. When tested positive, one is asked to send those random identifiers from the past 14 days. They will receive a notification, without anyone knowing who they are. It is voluntary to install the app, and after installing, one receives an alert if it detects that another user of the app who has been tested positive has been in the proximity. All information is protected. The NHS (National Health Service) provides a full and in-depth description of data privacy (NHS, 2022a), including what is collected is available in the Privacy Notice (NHS, 2022b) and Data Protection Impact Assessment (NHS, 2022c).

Additional features of the app are regional risk score alerts, which tells the level of risk in your area based on the postal region submitted during the registration; a location check in where QR codes at participating venues can be scanned and an information will be send, if this venue was judged to be a 'high risk venue' within two weeks after the visit; a symptom recorder where symptoms can be recorded and medical advice and guidance accessed with those information not being shared; a testing service where an coronavirus test can be ordered and the result can be shared back to the user and a self-isolation countdown and advice part, where the app tells, how long the user has to continue the self-isolation and what one can do to protect others (NCSC, 2020)

The RiskPACC Consortium



FIGURE 10: THE RISKPACC CONSORTIUM