PathoCERT

# D3.1 — Stakeholder Mapping and Requirements Analysis

## WP3 — Requirement Analysis, Engagement of Professionals through Communities of Practice & Social Engagement

Authors:

Arlind Xhelili, Francesca Grossi, Livia El-Khawad, Dimitra Ioannidou, Luca E. Sander

CSCP, Wuppertal, 2021

The PathoCERT project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 883484.

## Document Information

| | | | | |
|---|---|---|---|---|
| **GRANT AGREEMENT NUMBER** | 883484 | **ACRONYM** | | PathoCERT |
| **FULL TITLE** | Pathogen Contamination Emergency Response Technologies | | | |
| **START DATE** | 1st September 2020 | **DURATION** | | 36 months |
| **PROJECT URL** | www.pathocert.eu | | | |
| **DELIVERABLE** | D3.1 – Stakeholder Mapping and Requirement Analysis | | | |
| **WORK PACKAGE** | WP3 – Requirement Analysis, Engagement of Professionals through Communities of Practice & Social Engagement | | | |
| **DATE OF DELIVERY** | **CONTRACTUAL** | 28/02/2021 | **ACTUAL** | 28/02/2021 |
| **NATURE** | Report | **DISSEMINATION LEVEL** | | Public |
| **LEAD BENEFICIARY** | CSCP | | | |
| **RESPONSIBLE AUTHOR** | Arlind Xhelili, Francesca Grossi, Livia El-Khawad, Dimitra Ioannidou, Luca E. Sander (all at the CSCP) | | | |
| **CONTRIBUTIONS FROM** | Cristina Fedato (CSCP), Sergio Iglesias Asenjo (SPEIS, Spain), Leon Kors (Waternet, the Netherlands), Demetris Eliades and Dimitrios Kouzapas (UCY, Cyprus), Eftychia Stokkou (CCD, Cyprus), Katerina Kadena (Satways, Thessaloniki), Peter Velinov (MOIB, Bulgaria) and Sujin Son (Sundosft, South Korea). | | | |
| **ABSTRACT** | The PathoCERT stakeholder mapping and baseline assessment report provides an analytical description of the emergency management system in 5 European countries / regions (Granada, Spain; Amsterdam, the Netherlands; Limassol, Cyprus; Thessaloniki, Greece and Sofia, Bulgaria) and Seoul, South Korea. The report analyses and explores the existing operational procedures, frameworks and resources within each country as well as the stakeholders operating within. Seeking to lay down the foundations for a multi-stakeholder, participatory and systemic approach to developing solutions, the report also identifies and puts forward opportunities and recommendations for action that could further improve and make the respective emergency management systems more effective and resilient. | | | |

## Document History

| VERSION | ISSUE DATE | STAGE | DESCRIPTION | CONTRIBUTOR |
|---|---|---|---|---|
| 1.0 | 12.02.2021 | Draft | A first complete draft of D3.1. is shared with partners for feedback, revision and information update. | CSCP |
| 2.0 | 22.02.2021 | Draf | The report received feedback from project partners | Fraunhofer (FhG), Waternet, Sundonsoft, MOIB, SPEIS, EYATH |
| 3.0 | 26.02.2021 | Final | The report has been revised and updated according the feedback received | CSCP |
| | | | | |
| | | | | |

## Disclaimer



## Copyright message

# TABLE OF CONTENTS

# LIST OF FIGURES



# LIST OF TABLES



# LIST OF BOXES

# ABBREVIATIONS/ACRONYMS

| | |
|---|---|
| AMC | Aerospace Monitoring Centre |
| APRS | Position Transmission Systems |
| CCB | Central Coordination Body for Civil Protection |
| CCD | Cyprus Civil Defence |
| CET | Crisis Expert Team |
| CoP | Community of Practice |
| DAKS | Digital Alarm and Communications Server |
| DPP | Disaster Protection Plans |
| EKBY | Goulandris Natural History Museum |
| ERP | National Framework on Emergency Response Plan |
| ERT | Emergency Response Team |
| EU | European Union |
| FNV | Federation of Dutch Trade Unions |
| FR | First responder |
| FSCP | Fire Safety and Civil Protection |
| GIS | Geographical Information System |
| GSCP | General Secretariat for Civil Protection |
| ICNP | International Ministerial Committee for National Planning |
| ITL | The Human Environment and Transport Inspectorate |
| KINAC | Korea Institute of Nuclear Non-Proliferation |
| KPN | Koninklijke PTT Nederland |
| KWR | Water Research Institute |
| MSD | Merck Sharp & Dohme Corp |
| NDRM | National Disaster Management Research |
| NOC | National Operation Centre |
| RIWA | Association of River Water Companies |
| RWE | Rheinisch-Westfälisches Elektrizitätswerk AG |
| SCADA | Supervisory Control and Data Acquisition |
| SME | Small and Medium Sized Enterprises |

| | |
|---|---|
| SOP | Standard Operating Procedure |
| SPEIS | Granada's Prevention, Firefighting and Rescue Services |
| UCPM | Union Civil Protection Mechanism |
| UCY | University of Cyprus |
| URS | Unified Rescue System |
| WSP | Water Safety Plans |

# Introduction

Together with the increasing progress and socio-economic and technical development, the world has also been experiencing and facing emergencies and disasters that threaten the well-being of its citizens and lead to increased mortality, morbidity and system disruptions. Such emergency events occur either due to natural events such as seismic activity, flooding, drought, natural forest fires and/or due to human activity that can be either accidental or intentional (malicious). The implications of these emergencies can materialise in a chain of global disruptions, putting our system's resilience to a test. The COVID-19 pandemic is the latest and most prominent example of a hazardous emergency that has disrupted our socio-economic systems. It is therefore pivotal for countries around the world, including the European Union (EU) and Associated Countries, to not only be prepared to effectively respond and recover from hazardous risk events but in an ideal scenario to mitigate and prevent them from taking place altogether. This could include forecasting potential threats and developing related prevention and mitigation strategies and tools, while establishing a qualified workforce to prevent, detect and manage emergencies and related consequences.

The EU H2020 funded **Pathogen Contamination Emergency Response Technologies (PathoCERT)** project works towards such a goal. Concentrating specifically on waterborne pathogen contamination incidents the **project aims** at increasing first responders' capabilities and coordination to respond and manage such emergencies in five project pilot regions (i.e., Granada, Spain; Amsterdam, the Netherlands; Limassol, Cyprus; Thessaloniki, Greece and Sofia, Bulgaria), as well as in South Korea. Emergencies leading to waterborne pathogen contamination can be extremely dangerous since waterborne pathogens are invisible and difficult to detect without the proper equipment. Additionally, when gone undetected, these pathogens pose a dire threat not only to the first responders (FRs) operating in an emergency situation, but also to the entire civilian population as the drinking water system could become contaminated. In light of this, **the project centres** on enabling the rapid and accurate detection of pathogens, improving FRs' situational awareness and improving their ability to control and mitigate emergency situations involving waterborne pathogens. To **effectively achieve this goal**, the project will research and demonstrate a collection of novel, cost-effective, easy-to-use and acceptable technologies and tools (summarized in Table 1) which will be field validated by first responders. Figure 1 provides an overview of the interlinkages between the different project technologies.

| PathoCERT technology | Description of technology |
|---|---|
| PathoSENSE | A set of internet enabled mobile sensing solutions for detecting the existence of pathogens and determining their type. It will be complemented by guidelines and smart interfaces to assist FRs in setting up the specialized sensing equipment in as little time as possible while reducing human errors. |
| PathoGLOVE | A wearable sensor to allow FRs to rapidly distinguish both if contamination has taken place and between multiple pathogens when touching a water source. |
| PathoSAT | Collects data and images of water bodies from satellites to identify water contaminations and their extent. |

| | |
|---|---|
| PathoTWEET | Analyses data and photos from social media to assess the occurrence, severity and extent of a water contamination events. |
| PathoDRONE | Monitor and collect water samples from water bodies that first responders are unable to reach. It supplies PathoSENSE with water samples for evaluation and identification. |
| PathoVIEW | Allows FRs to see relevant information from and communicate with PathoWARE through smart wearable interfaces and augmented reality systems. For example, FRs will be warned if an area poses a high risk to the FRs health through obstacles and possible hindrances. |
| PathoWARE | A platform that collects data from geographical information systems (GIS) as well as from water authorities and integrate it into the data generated by PathoSENSE, PathoDRONE, PathoSAT and PathoTWEET to provide the FRs with a complete picture of the emergency situation. |
| PathoIMS | Incident Management Software to facilitate the communication between FR's headquarters and the field Command and Control Centre. |
| PathoINVEST | Provides information to the incident commander (after a contamination has been identified), predicts the evolution of events and foresees possible impacts. This tool starts the epidemiological and criminal investigations of the water pathogen contamination. |
| PathoTHREAT | Provides information on the threat risk and on the proper course of action concerning specific pathogen contaminations by utilizing various databases to ensure the safety of the FRs and that of citizens. |

Table 1: Brief description of the PathoCERT technologies.

To ensure the design and deployment of better products, services and/or governance mechanisms with a higher likelihood of effectiveness, **the project will rely on participatory and co-creative approaches**. This approach allows for the optimal engagement and active participation of all stakeholders of a process such as the ones characterizing the management of disastrous events. Simultaneously this enables the deployment of solutions that are being shaped and respond to the needs of all concerned parties. The involvement of various stakeholders allows for a transdisciplinary and interdisciplinary approach and exploration of all available insights when developing strategies and solutions for action.

PathoCERT's multi-stakeholder engagement approach builds upon several interlinked activities broken down into 3 main stages:

**Stage 1: Developing an understanding of the state of affairs (baseline review)** through two complementing sub-activities. The first is the *identification and mapping of key local, regional and national stakeholders* including their relationships and operational procedures in each of the six PathoCERT regions (the Netherlands, Spain, Bulgaria, Greece, Cyprus and South Korea). The second is a *baseline (requirement) analysis* which aims developing a good understanding of the emergency management systems in the project regions, including technologies deployed, as well as main challenges and opportunities within. These insights will provide the basis for engagement and exchanges with the PathoCERT stakeholders. Stage 1 of this multi-stakeholder engagement process is the focus of this report.

**Stage 2: Engagement of stakeholders via the establishment of 6 Communities of Practice (CoP)** in each region. The activities of this stage will enable the development and implementation of a co-

creative and experiential learning environment with a comparative connotation. Relevant stakeholders come together to share information and knowledge in order to test and validate pathways, methods and novel technological solutions for improving the protection of FRs, enhancing their response capacities and identifying opportunities for improving the overall emergency management frameworks.

**Stage 3: Further outreach and replication of project learnings on a pan-European level.** The multi-stakeholder participatory approach the project follows enables the holistic consideration of needs and perspectives that are necessary for the development of effective solutions. In addition, and moving beyond, PathoCERT will seek to transfer, mainstream as well as contextualise the project learnings and outcomes from the local and regional level to a broader pan-European one. This will be achieved by establishing a pan-European CoP which will bring together stakeholders from the pilot countries, other EU Member States and Associated Countries as well as other key emergency management related (umbrella) organisations. Besides the aforementioned purpose, the pan-European CoP will act as a networking and innovation hub enabling key European stakeholders to exchange on similarities and trade-offs and further identify pathways for a more effective European emergency management system.

A more detailed overview of PathoCERT's multi-stakeholder engagement process can be found in the project's first milestone report which can be found the project website (www.pathocert.eu).

## What will you read in this report?

As highlighted, this report centres on the first stage of the project's multi-stakeholder engagement process. It focuses on developing a good understanding of the operational emergency management systems in each project target regions and lays down the foundation for further stakeholder engagement and exchange.

Following this *introductory section*, an overview and explanation of the methodology for conducting the stakeholder mapping and baseline requirement analysis is provided in *section 2*. *Section 3* is the main body of this report where the results and a detailed analysis of the stakeholder mapping and baseline requirement exercise for the 6 target countries is outlined. The report comes to an end with a concluding and outlook *section 4* where the main findings and insights of the report are summarised and discussed in a pan-European perspective.

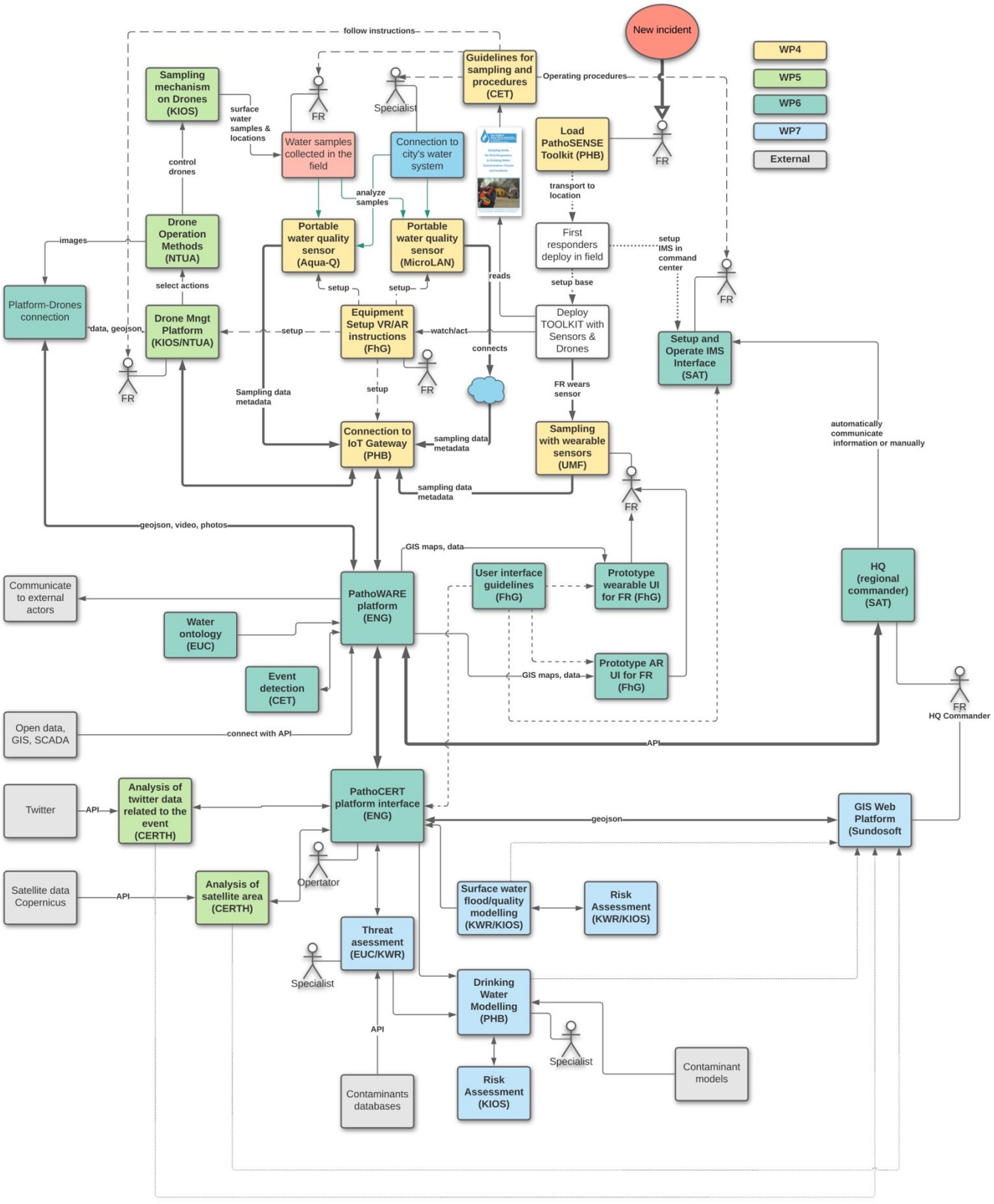


Figure 1: Interlinkages between the PathoCERT technologies. First draft overview, subject to potential changes in later stages (developed by UCY). For a detailed overview of the project, please visit www.pathocert.eu

# 2. Stakeholder mapping and baseline analysis approach

## 2.1. Stakeholder mapping

Stakeholder mapping is a widely implemented approach to identify relevant actors of a system and analyse their interconnections, relationships and interest within. The 'system' is an encompassing term that can be used to capture a sector, programme, project or even a product or service (Reed et al. 2009). The involvement of various stakeholders allows for a transdisciplinary and interdisciplinary approach and exploration of all available insights when developing strategies and solutions for action while allowing for the development of outputs that meet and reflect the needs of all related stakeholders.

In the case of the PathoCERT project, the stakeholder mapping focuses on the identification and mapping of all relevant actors operating in the target countries (Spain, the Netherlands, Cyprus, Greece, Bulgaria and South Korea) combined with an analysis of their operations, settings, relationships and interest for engaging in the emergency and disaster management sector.

As a widely implemented approach, multiple methods for conducting stakeholder mapping exist in practice. Nonetheless, the majority of them share some common elements such as identifying stakeholders, differentiating and categorising them and lastly investigating their relationships with the system as well as one another (Reed et al., 2009). Such an approach has been utilised within the PathoCERT project. The mapping and analysis have been guided by aspects related to identifying all relevant stakeholders, categorising them by type, classifying and understanding their role in the disaster management cycle, their interests in the project and project outputs and participation in project activities. The last two aspects are not detailed in this report, since they will be more specifically considered during the on-ground stakeholder engagement activities.

To conduct the mapping, a template was developed on basis of the aspects above. More specifically the template consisted of several major categories ("*General details", "Previous exchanges", "Stakeholder's role in disaster management process", "Stakeholder's interaction with PathoCERT")* with each containing multiple questions. In '*general details'* information related to the organisation's name, information about a contact person, their location, type, and their potential to be engaged as a local champion or for in-depth interviews were identified. The '*previous exchanges'* centred on previous collaborations with the actor, while the '*stakeholder's role in disaster management process'* focused on the stakeholder's role within the management cycle by differentiating between different stages of action and further elaboration on their exact responsibilities in each stage. Lastly, the '*stakeholder's interaction with PathoCERT'* category assessed the potential interests of the stakeholder in PathoCERT technologies specifically, as well as the broad interest in participating in PathoCERT stakeholder engagement exercises (i.e., CoPs). A more detailed overview of the template can be found in the Annex.

The mapping was conducted by local partners of each target region by means of desktop research. Desktop research was chosen as a preferred approach mainly because of its flexibility but also to enable partners to utilise their expertise in the field to create a comprehensive overview of the most important stakeholders and their role and relevance in their target region.

Further, partners outside of the target regions (i.e., Sweden and Germany) were asked to carry out desktop research and fill in the template. These stakeholders can then later on be engaged as experts in one of the target regions or invited as stakeholders and experts to the pan-European

CoPs. There the similarities and differences in the disaster management frameworks throughout Europe will be discussed and pathways for increasing their resilience will be identified. In addition, these stakeholders will be consulted and informed about various project learnings and outputs.

## 2.2. Baseline requirements analysis

Baseline (requirement) analysis is a method utilised to form an understanding of the current situation or status quo of a system (referring to the same concept as above) (Reed et al. 2009). Baseline analysis, besides enabling the development of a good understanding, also allows for a comparison or assessment of situations once change has been introduced, as a means to understand the impact of that change on the system (WMO, 2016).

Within PathoCERT the baseline requirement analysis aims at developing a good understanding of the current emergency response and disaster management systems in each target city or region, including applied technologies, and main challenges and opportunities of improvement within. The examination and analysis of requirements, needs, challenges and opportunities are central to ensure that the project develops and tests appropriate solutions that contribute to improving and advancing the emergency and disaster management system.

To conduct the exercise, a baseline requirement analysis template was created. Similarly, to the stakeholder mapping, the baseline requirement analysis was conducted by local partners of each target region by means of desktop research and utilising their in-depth expertise on the sector.

As for the analysis, partners were asked to provide '*general data*' on their city. This included information on the demography as well as the types of disasters that occur in the region. This was followed by a description of the '*current standard operating procedures (SOPs) and related technologies*' being utilized in each region. Getting a detailed understanding of the emergency response management systems and technologies in place shows how the PathoCERT solutions can fit into the current systems and structures. Accordingly, this allows for conflicts between the status quo in emergency management systems and the PathoCERT solutions to be identified at an early stage in the project and solved during the project duration. The template also addressed the status of the '*legislation*' in the target regions in regard to operations and emergency management. Here, legislation that supports or hinders the effective operation during the different response stages: mitigation, preparedness, response, and recovery (see Table 2 for a definition of stages) was identified. By identifying relevant legislation, PathoCERT activities can be adjusted accordingly to adhere to the existing legislation and/or identify opportunities for change. As a successful management of disaster or emergency events require citizen engagement, a focus was also placed on the '*social awareness and engagement activities*' taking place to inform people about appropriate conduct during an emergency situation as well as keeping civilians up to date with ongoing emergency situations. Project partners were also asked to record any '*promising practices*' that they were aware of concerning emergency management systems and procedures as well as social awareness raising and engagement activities. A more detailed overview of the template can be found in the Annex.

| Emergency Response Stages | Definition |
|---|---|
| Mitigation/Prevention | The mitigation stage includes activities that reduce or eliminate the risk of an emergency situation from occurring and at the same time minimize possible consequences of said emergency situations. |
| Preparedness | In the preparedness stage emergency operation plans and standard operating procedures that address the management of diverse potential hazards are developed. In addition, this stage covers all activities dealing with planning for emergencies, training first responders, ensuring the availability of food, water and medical supplies in case of an emergency event or to install alarm systems. |
| Response | The response stage begins as soon as the disaster occurs or shortly after it has occurred. This stage includes short term activities such as the coordination of emergency first responders, the activation of the emergency operation plans, and any other plans that are pertinent to the emergency response effort. Activities here are also meant to reduce the risk of other damages resulting from emergency event (e.g., looting, water supply contamination). During this stage assessments are also being made about the recovery process following the emergency event. |
| Recovery | The recovery stage addresses the short- term basic needs of those affected by the disaster and deals with the restoration of the community to pre-incident conditions or as close to pre-incident conditions as possible. Long term activities such as community redevelopment or the rebuilding of destroyed property are also part of the recovery from an emergency event and may continue for several years. |

Table 2: Description of the Emergency Management Stages (Baird, Malcom E., 2010)

Whereas the stakeholder mapping provides knowledge about the relevant stakeholders and their significance for the project, the baseline requirement analysis focuses on the environment of stakeholders' operations. The stakeholder mapping sheds light on the relations of the stakeholders and their specific role, the baseline requirement analysis provides the essential context to assort and comprehend the needs, challenges and opportunities which provide leverage points for improving and designing better solutions. Thus, the stakeholder mapping and baseline requirement analysis are interlinked, as both seek to better understand the operations within the emergency and disaster management system / sector of the project target regions.

In the next section a detailed analysis of each of the target countries is provided following the results from the stakeholder and baseline requirements analysis. Important to highlight is that the partners' input to the stakeholder mapping and baseline requirement analysis exercises has been complemented with some additional research to build a more comprehensive overview of the emergency management systems in the targeted countries. The literature consulted has been summarised in the Reference section divided per country respectively. The knowledge gained through these exercises will be used to guide the stakeholder engagement measures and other PathoCERT project activities as elaborated in the previous sections.

# 3. PathoCERT's target regions' state of affairs

## 3.1 Granada, Spain

The province of Granada is located in the southern part of Spain, home to 914.678 inhabitants, out of which 234.462 live in its capital Granada, that could be affected by contaminated water in case of an emergency / disaster event. Historically, the most common types of disasters the region and city of Granada have encountered in the past are floods, forest fires, earthquakes and hillside movements that could damage the water distribution and waste water collection network as well as cause a mixture of water types, leading to cases of water contamination.

### 3.1.1 General conditions of the emergency response and disaster management system

The emergency / disaster management framework in Spain is comprised of 5 stages and reflect the general approaches or stages of disaster management as described in Table 2 above. This framework is applied and followed nation-wide and further tailored according to the territorial / administrative division, disaster types and degree. Accordingly, the mitigation stage is broken down into two steps, namely, **anticipation**, which covers risk assessment and analysis activities, followed by **risk prevention** that looks at measures and actions to prevent or mitigate the negative impacts and consequences of risks and hazardous threats before these take place. **Planning** includes the development of emergency and/or civil protection plans which in Spain are organised in three territorial and administrative divisions: local, regional, state or national. Complementing these organisational divisions and of non-binding character is the social division. In case a disaster event takes place, the **intervention** stage is activated which includes activities to manage the disaster and provide relief by respective operational groups. Coordination is shifted from local to the state level according to the principle of increasing gravity. The last stage is **rehabilitation** which centres on implementing and deploying aid measures for the restoration of normality in the disaster areas after the successful management of the emergency situation during the response stage.

As highlighted above, **the general emergency / disaster management framework is regulated according to territorial divisions (national / state, regional and local)** with binding guidelines and regulations for the preparation, approval and homologation of the different territorial levels of planning to ensure an adequate correspondence between the different plans. At the state level, the framework is defined by means of the *'Law of the National Civil Protection System'*; at the regional level through the *'Territorial Emergency Plan of Andalusia'*; and at the local level the planning is regulated on basis of the *'Territorial Emergency Plan of the Municipality of Granada'*. The level of detail increases from one stage to the other, with the local management frameworks being more detailed due to the scale of the area to be covered, while the national ones provide more general guidelines that ensure the correct interrelationship of subsequent plans. In conjunction, this approach ensures the effective functioning of the system as a whole. The autonomy of implementing the guidelines lies with the individual organisations, however, interdependent on one another depending on the specific emergency and its severity.

**The Spanish emergency / disaster management framework, besides the territorial planning, differentiates and plans according to the specific type of risk or disaster event.** Such specific planning is regulated through the national legislation *'Basic Civil Protection Standard'* which establishes and regulates guidelines for the implementation of emergency plans in the different territorial divisions for specific risks. Nuclear emergencies, war situations, floods, earthquakes, chemical outbreaks, transport of dangerous good, forest fires, volcanic eruptions are type or risks / hazardous events that are subject to specific planning.

| Name and year | Level | Description |
|---|---|---|
| Law of National Civil Protection System (2016) | National | This law brings the existing legislation on Civil Protection in Spain (Law 5/1985) into line with European legislation. It ensures the coordination, cohesion and effectiveness of all lower territorial legislation concerning public civil protection policies. It enshrines civil protection as part of national public security and obliges the various state administrations to assume responsibility for its implementation. |
| Territorial Emergency Plan of Andalusia (2002) | Regional | The plan is a regulatory instrument through which the functional framework of the Andalusian emergency management is organized. In the Plan the organization, planning, coordination and management of the public and private services that play a role during an emergency are organized. It also focuses on establishing coordination between the different Public Administrations and private parties across the autonomous territory of Andalusia to ensure cooperation and coordination during an emergency event effecting the entire territory. Guidelines and requirements for the various Emergency Plans in Andalusia at the regional level are also provided. |
| Territorial Emergency Plan of the Municipality of Granada | Local | The plan enables the local administrations to deal with emergency situations independently. It supports the design of local emergency plans based on the preceding regional plan and ensures the coordination and management of emergencies by local actors. |
| Basic Civil Protection Standard (1992) | National | This standard constitutes the fundamental framework for the integration of the Civil Protection Plans into an operational package that is eligible for rapid implementation. The standard determines the content of what should be planned and sets out the general criteria to be met by such |

| | | |
|---|---|---|
| | | planning, in order to achieve the necessary coordination of the different public administrations. Different emergency plans are created for various emergency situations. |

Table 3: Guidelines and regulations influencing the emergency management system in Spain

The general and specific emergency plans (territorial and topical) in Spain are updated annually, to ensure and account for the most recent developments (i.e., hazards, resources, tools, operational methods, stakeholders). This contributes to Spain being well-prepared and up to date with the status quo.

Box 1: Levels of emergency / disaster severity in Spain

In Spain three levels of emergency severity are recognized. Depending on the level, different actors and disaster management mechanisms will be activated.

- Level 0 to 1 correspond to emergencies of low to medium risks that can be solved by regular means and strategies elaborated in the local plans, including means of other existing administrations in the area of the disaster.
- Level 2 corresponds to emergencies that require extraordinary means not previously assigned to the corresponding plan. These means can be collected from the Administration of the State, from other Autonomous Communities, Local Government or even international means requested by the Ministry of the Interior.
- Level 3 corresponds to emergencies where there is a prior declaration of national interest for example nuclear risk, war situations or any other emergency affecting two or more regions.

The emergency / disaster management in Granada is done through the city's Emergency Control (Communication) Centre. The latter is connected to the Emergency Control Centre of Andalusia and the Control Centre of EMASAGRA, a water utility company in Granada, allowing to receive and distribute direct and real time warning of risks either through remote devices such as rain gauges, water level control sensors or from citizens themselves. Granada's Emergency Control Centre, besides anticipating potential emergencies, also serves as a coordinating, monitoring and control point for responding to an emergency and its developments, from the departure of response operational actors until their return to base.

To ensure the effectiveness and collaboration / coordination of operational actors in following the emergency plans as well as increase their (future) capabilities, simulated exercises and (continued) joint trainings are taking place for various disaster types and/or resources in use. Such capacity building activities are important also due to the fact that not many incidents take place in Spain, which could contribute to the operational actors' uncertainty in responding to as well as deploying the necessary resources for managing a disaster.

### 3.1.2 Social awareness and engagement activities

The social awareness and engagement activities in Spain about emergency / disaster management frameworks and appropriate social behaviours in such instances is minimal. The purpose for this approach is the preference of the national authorities to limit the distribution of information on hazards and risks stemming from various disaster events as a way to protect its

population from unnecessary alarm and panic. Knowledge and training on potential disasters, consequences and management approaches is lacking, which could potentially endanger the social resilience to such events.

Existing activities involve the inclusion and participation of the general population in self-protection plans. Mandatory drafting and compliance plans exist for premises (e.g., schools, public centres) or risk-generating activities (e.g., industries) in which the risks that may stem from an activity must be foreseen and initial responsive action, until the emergency services arrive, need to be undertaken. This individual level planning and implementation of self-protecting plans are guided and advised by the Granada's Prevention, Firefighting and Rescue Services (SPEIS) agency, complemented by periodical simulations, training and retraining activities to carry out the self-protection procedures and plans. From practical, expert observations carried out by SPEIS, it has been deduced that the organisations who carry out such self-protection plans are more resilient to threats, indicating the positive impact such awareness and preparation activities could have.

### 3.1.3 Stakeholder mapping

The design of the Spanish emergency / disaster management framework, elaborated in the sections above, already hints at the key stakeholders that are involved in creating and carrying out the foreseen activities and the relationships between them. As elaborated above, the general emergency / disaster management framework in Spain is regulated according to territorial divisions (national / state, regional and local). The foreseen activities within the different stages of the framework (i.e., anticipation, risk prevention, planning, intervention and rehabilitation) are carried out by autonomous actors / stakeholders, but dependent on one another in managing emergencies according to the principles of increasing gravity. In addition, the stakeholders could be differentiated by those that form the organisational chain and are the main responsible actors for coordinating and delivering the activities and those who support the delivery of the service by the main stakeholders.

At the top of the organisational chain is the Government of Spain and the Ministry of the Interior who are responsible for devising the general frameworks and legislation for managing emergencies. These are then tailored, adapted and implemented on the regional and local level. Besides this, the Ministry of the Interior is also responsible for managing and coordinating emergencies of a national scope, risk and interest. In severe emergencies, besides the technical and health service operators which are activated in all kinds of emergencies, the Military Emergency Unit and the National Police and Guardian Civil Units will also be activated.

Following a pyramidical structure, at the regional level, it is the Department of Emergency and Civil Protection of the Andalusian Governments, with the Direction of the Regional Plan, that is responsible for managing and coordinating emergencies and related action plans, with three operating bodies: Direction of the Regional Plan, the Regional Advisory Committee the Cabinet of Regional Information. The work of the Department is supported by the Regional Operations Committee and the Regional Operational Coordination Centre.

A similar organisational configuration is followed on the provincial and local / municipal territorial division(s). Please see Figure 4. At the local level, the Local Operational Coordination Centre is supported by the Advanced Command Post(s) with the various operational groups within (i.e. intervention groups (first responders), security group, sanitary group, logistics support group and the technical monitoring group). These are the actors who are deployed on the ground when the

disaster occurs. PathoCERT will seek to involved these stakeholders as a means to capture their needs and requirements and accordingly design products and services.

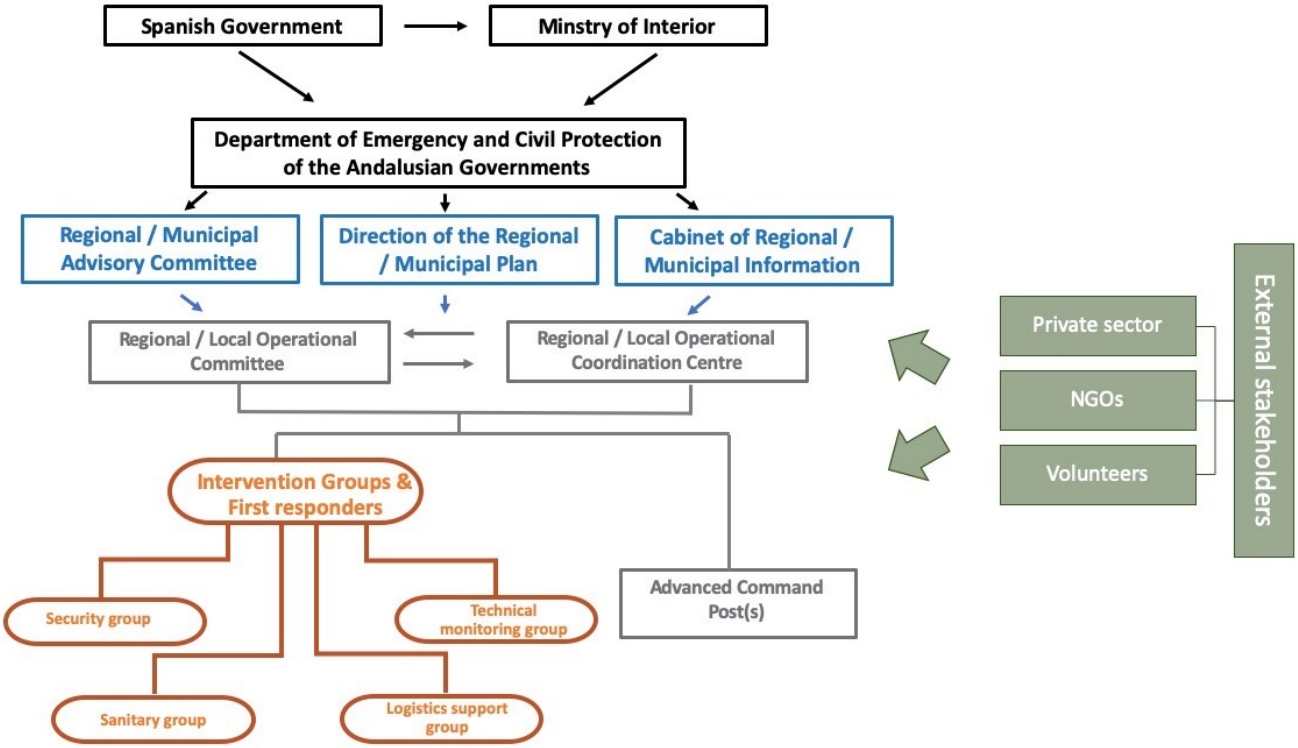


Figure 2: Overview of the stakeholders mapped in the Spanish emergency management system (created by the authors, adapted from PTEAnd, bulletin No. 236, 2011)

The emergency / disaster management in Spain is operating on the basis of the principle of increasing gravity to enable the efficient management of emergencies and actor activation. Accordingly, most emergencies will be resolved at the local level, with a timely support from the regional and/or state resources, and only in the cases where the emergency is affecting multiple localities and/or beyond, the regional and/or state levels (actors and strategies) will be activated.

The stakeholder mapping exercise revealed that despite the promising potential, it is a seldom practice in Spain to connect and collaborate with other stakeholders (e.g. universities such as the University of Granada, research institutions, businesses (large or SMEs) as well as other innovators (i.e., projects) who could support the coordination and management of emergencies by the main stakeholders. All of these actors through their research efforts, empirical studies or introduction and testing of new products / services could support the development of forecasting, prevention and reaction capabilities of operating actors. This aspect is an opportunity ready to be leveraged which can contribute towards improving the already well-advanced emergency sector in Spain.

### 3.1.4 Leverage points for a more effective emergency / disaster management system

The emergency and disaster management framework in Spain is well advanced and in line with the most recent developments. Nonetheless, the baseline requirement exercise has led to a few

challenges and/or gaps which represent leverage points for further improvement of the system for a more effective management. These are summarised below:

**Increase the intra and inter coordination among operational actors.** Overall the effective coordination among the different administration groups is provided for. To further ensure a resilient and even more systematic management framework, measures to increase the coordination and resource allocation and usage among the different administrative divisions and could be designed and implemented.

**Expand the operational actors' practical experience with different incidences.** Fortunately, in Spain the share of scaled up hazardous disasters and incidents is low; however, this also contributes to operational actors' scarce experience with on the ground management of such disasters. This could lead to FRs potentially not being ready to manage a disaster on the ground. To offset such shortcomings, trainings, simulations and mock exercises, with using tools and resources have been conducted and for an optimal preparation such trainings and simulations should continue and/or be conducted more often. In addition, these could be designed to match the gravity scale of a real events, with the help of technological solutions such as virtual or augmented reality.

**Integrate the operational actors' needs and requirements into the technological / technical solutions.** To enable the optimal and effective utilisation of the technical / technological solutions by all first responders and other actors, such solutions still need to meet some further requirements and/or conditions. The latter would include: a) the integration of the anticipated warnings into one management platform where data will be collected and translated into useful and easy to understand information by first responders; b) increase the availability and training of operators would could manage the platform as well as invest in training and increase the willingness of the veteran staff members to accept new tools and solutions as complementary to the traditional working methodologies.

**Enlarge the funding and financial resources for improving the emergency management sector.** The innovation, introduction and implementation of new resources and solutions for a better crises management requires research and development efforts as well as accompanying financial resources. Accordingly, establishing and/or seeking new financial streams beyond the existing ones would increase the likelihood of innovative ideas materialising in practice and emergency management approaches being even more successful.

**Increase social awareness and engagement in the emergency / disaster incidents and related management frameworks.** The successfulness of emergency management plans is to a large degree dependent on society's capabilities to understand and follow the necessary procedures and precautions during an emergency crisis. Therefore, information and awareness raising campaigns as well as formal and informal educational activities are necessary to enable citizens to exhibit the appropriate behavioural patterns in such crises. In addition, other efforts could include making citizens more aware about the proceedings of the emergency frameworks and related strategies by not only disclosing information, but also by involving and increasing citizens' participation in their design and development.

**Connect and collaborate with stakeholders outside the immediate organisational chain.** The stakeholder mapping exercise revealed that the emergency management framework in Spain already accounts for the key stakeholders that need to be involved when managing emergencies and related implications. Nonetheless, the reliance on external stakeholders such as universities

or businesses who could provide additional insights and expertise for improving the overall effectiveness of the sector is minimal and provides an opportunity ready to be leveraged.

## 3.2 Amsterdam, the Netherlands

Amsterdam is located in the province of North Holland, one of the 12 provinces in the Netherlands which are in turn subdivided into 431 municipalities. It is the most populous city with a population of 872,80 inhabitants within the city, 1,558,755 in its urban areas and 2,480,394 in the broader metropolitan area. Influenced by the geographical location and characteristics, Amsterdam and the Netherlands are exposed to disaster incidents such as heavy winds, water high tides, fires as well as industrial accidents or infrastructural failures which in turn could affect the city's and/or country's water supply.

### 3.2.1 General conditions of the emergency response and disaster management system

The emergency management system in the Netherlands is coordinated and regulated by the country's three governance levels, namely, central / national, regional and local level, with the degree of operational details and guidance increasing by each passing level. Nonetheless, the on the ground management of the disaster is organised bottom up, meaning the initial responsibility to respond and provide relief is allocated to the actors operating at the local (i.e., municipal level). Depending on the scope and risk of the disaster as well as managing capabilities, support to manage the disaster is sought and provided by other municipalities and/or the management responsibility shifts to regional actors and to central national institutions in cases of high-degree disasters.

Important to highlight is that this approach is followed for emergency events that are categorised as disasters. The Netherlands distinguishes between disasters and crisis. Please see Box 2 for a definition on which emergencies are counted as disasters or crisis. If an emergency event is categorised as a crisis, the management responsibility shifts to national level institutions such as Ministries, while as regional and local actors provide support and execute actions directed from the central actors.

Box 2: A definition of the emergency differentiations in the Netherlands

**Disasters** cover natural or manmade incidents or accidents that pose a danger to the well-being of citizens, environment and property. Disasters are usually handled bottom-up, namely, the emergency is initially managed by the authorities and operational actor within the affected area and only escalated to the higher governance structures depending on the magnitude and the hazardous degree of the disaster.

**Crisis** relates to situations that pose a danger or incriminate the well-being and interests of the whole society. Crises are handled top down and coordinate by central governmental

This emergency management system and related operations in the Netherlands is guided by the *National Manual on Decision Making in Crisis Situations* and regulated by other several acts. For example, The *Fire Service Act* that establishes the need of operational fire brigade structures operating at the municipal level. In the Netherlands, the fire brigades are mainly civilian volunteers due to shortages in professional firefighters; *The Disasters Act* contributes by differentiating three type of plans to disaster management, namely disaster management,

disaster contingency and disaster coordination plans; The *Security Region's Act* on the other hand regulates the activities and services of the operational actors within the various safety regions (i.e., fire services, medical support, crisis / disaster management) with the goal of establishing a more effective and efficient system and structures within.

In the Netherlands operational actors are quite effective in following and coordinating around the (organisational) procedures as well as flexible in integrating new technological solutions, tools and/or protocols/procedures. Continuous training efforts, to a large degree simulated, contribute to the operational actors' effectiveness and good experiences in managing emergencies.

### 3.2.2 Social awareness and engagement activities

In the Netherlands, citizens are informed and made aware about emergencies and appropriate behaviours by means of two streams of information, one focusing on preparedness and one on response. Online communication channels such as various institutions' websites, brochures and mailing are utilised to inform citizens about different preparatory means that have been undertaken for managing an emergency event and expected appropriate behaviours from the citizens' side. In addition, online and offline campaigns are organised to keep citizens informed. Besides, through various institution websites, citizens are regularly and continuously updated on potential threats and risks. In case a disaster or crisis has taken place, citizens will be informed by telecommunication, audio and visual channels (e.g., telephone, radio and TV) as well as by the local alarm system, in addition to special websites being established where crisis live updates will be provided. Operational actors (such as police forces, fire or medical services) will also provide on-site information.

In addition to information provision, in the Netherlands citizens are offered first aid trainings by the Dutch Red Cross and other organisations to increase their management capabilities.

As highlighted in the preceding sections, the fire brigades in the Netherlands are mainly staffed by civilians. Interested citizens are offered the opportunity to participate in the engagement training and educational programmes conducted for these volunteers.

Nonetheless, despite these efforts to inform and increase citizens awareness on emergency management, majority of citizens in the Netherlands have indicated not being sufficiently aware and/or informed about these preparatory actions and that they themselves are not sufficiently ready to handle a disaster (TNS, 2009, Special Eurobarometer 328).

### 3.2.3 Stakeholder mapping

The national, regional, and local governance systems described above already gives a hint at the groups of actors central to the planning and implementation of actions during the various stages of emergency management.

At the top of the organisation chain in the Netherlands is the Council of Ministers comprised by relevant ministries that are responsible for emergency management within their areas. The Council is headed by the Ministry of the Interior that is responsible for the overall emergency management throughout all stages as well as ensuring public safety, well-being and order. Special decision-making crisis centres are established within relevant ministries to support the management of crisis / disasters if one emerges. In case more than one ministry needs to be involved, due to the need to manage an emergency that covers more than one area, a National Crisis Centre will be established to support the management.

The National Operational Centre, within the Ministry of Interior supports the management of emergencies by coordinating all public communication and information provision as well as

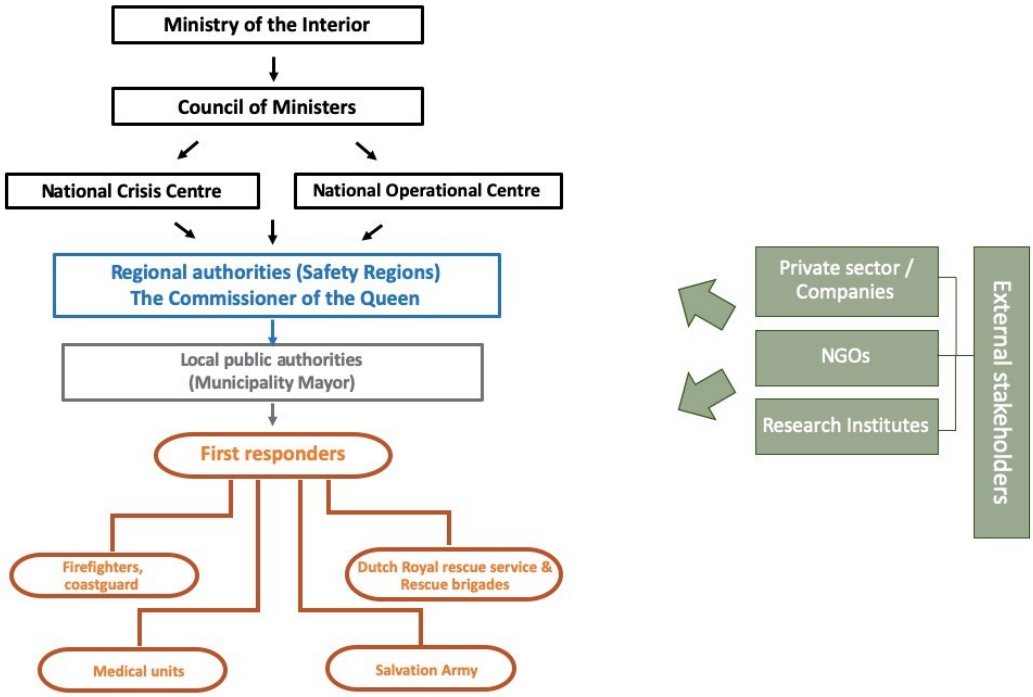


Figure 3: Overview of the stakeholders mapped in the Dutch emergency management system (created by the authors, adapted from Vademecum, 2017a)

coordinating the provision of response measures across the various governance levels and operational units.

As highlighted in the previous section, the Netherlands adopts a decentralised approach to emergency response and relief, thus, regional authorities are responsible for managing emergencies that cover and affect the territorial area of more than one municipality and cannot be handled on the local level. The Commissioner of the Queen will act as the overall command of disaster management and communicate with the Ministry of the Interior for further instructions.

In all other instances, the responsibility to deal with an emergency lies at the local level, namely the Mayor(s) of the municipality affected.

Various operational actors, depending on the emergency level, are activated and provide their support and services in handling an emergency including first responders (i.e., firefighters, coastguard, medical units), the Dutch Red Cross, the Dutch Royal Rescue services, the Rescue brigades, the Salvation Army, the military and similar.

In addition, the private sector as well as non-governmental organizations also play a key role during the management of an emergency in the Netherlands, including actors from the energy sector (e.g., RWE, Eneco, Oxxio); the telecommunication sector (e.g., T-mobile, KPN, Orange); transportation and chemical industry (e.g., Connexxion, Veolia, AKZO-Nobel, Solvay) as well as NGOs (e.g. FNV).

When specifically looking at the city of Amsterdam as a pilot city /region, among the key stakeholders which are and will be closely cooperating with above identified local/regional and

national stakeholder are the local PathoCERT project partners such as Waternet, KWR Watercycle Research Institute and MicroLAN a Dutch SME, and other organisations such as the Association of River water companies (RIWA); The Human Environment and Transport Inspectorate (ITL) closely connected to the Ministry of Infrastructures and Water; the National Coordination for Security and Counterterrorism under the Ministry of Justice and Security; the team of the Safety Region of Amsterdam (Veiligheidsregio Amsterdam – Amstelland); the Crisis Expert Team Milieu en Drinkwater (CET Crisis Expert Team – MD); and the National Institute for Public Health and the Environment under the Ministry of Health, Welfare and Sport.

### 3.2.4 Leverage points for a more effective emergency / disaster management system

The presented emergency and disaster risk management in the Netherlands is well advanced and accounts for the peculiarities of the country´s territory by applying a multi-layered approach. Nonetheless, the baseline requirements analysis has enabled the identification of the following leverage points for further enhancement and/or improvement of the system, already identified in other target cities/regions as well.

**Enlarge the funding and financial resources for improving the emergency management from a technological point of view.** Throughout the years, the Netherlands has continuously introduced changes to ensure a highly effective emergency management framework, also in view of the innovation and integration of new technological solutions. Nonetheless, the baseline assessment revealed that continuous streams of financial resources to enable such innovation are not readily available on a country level and mostly available on the different organisation's level. Introducing country level investments to fund technological and other resources innovation and introduction of new solutions could support the continuous research and development efforts which in turn would lead to further improvement of the sector and the capabilities of the operational actors within.

**Further improve citizens awareness about appropriate behaviours throughout an emergency management cycle.** Despite the diversity of channels and efforts to keep citizens engaged and aware, as highlighted above, a Eurobarometer poll (TNS, 2009, Special Eurobarometer 328) revelated that citizens in the Netherlands are not sufficiently aware and/or informed about emergency preparatory actions and appropriate behaviours if an emergency occurs. Accordingly, increasing the efforts to keep citizens engaged and informed and diversifying or complementing already existing measures with more on the ground practical tips and hints for appropriate behaviours throughout an emergency cycles is a recommended action.

**Building a workforce composed by draftee operational officers.** As highlighted in the baseline description, the operation officers directly handling emergencies during the response stage, are, to a large degree civilian who volunteer (upon receiving training) in related structures. Such an approach appears to be working well for the country's emergency management system, nonetheless, the possibility for building up a workforce that is entirely composed by draftee professionals is a recommended action that could further enhance the country's effectiveness in managing emergencies.

## 3.3 Limassol, Cyprus

Limassol is a city on the southern coast of Cyprus and capital of the eponymous district. Limassol is the second largest urban area in Cyprus after Nicosia, with an urban population of 183,658. In the past, Limassol and Cyprus have faced several disaster events, including fires, floods, earthquakes and droughts.

### 3.3.1 General conditions of the emergency response and disaster management system

The **general emergency management framework** in Cyprus is regulated by the *National Framework on Emergency Response Plan (ERP) "ZENON"* which sets the basic guidelines and the overarching framework for all government approved national ERPs for specific types of risk and disaster events. Accordingly, the management of emergencies in Cyprus is regulated by means of ERPs, 23 in total covering a multitude of natural and manmade risks that build upon Zenon and are in alignment with the Law of Civil Defence. For example, Egkelados and Polyvios are the ERPs that regulate the management of earthquakes. The ERPs mostly account for the preparedness, response and, to some extent, recovery stages of the emergency management cycle, however, prevention is not sufficiently addressed.

The emergency management system in Cyprus is **highly distributed** with different ministries and departments responsible for the development, evaluation and adaptation of ERPs. This comes as a result of Cyprus's decentralised governing approach with six administrative districts. As such the enactment and implementation of ERPs lies either with the national or local authorities. The ERPs are updated regularly and are enforced on a national scale.

The level of **coordination and cooperation of the different bodies** responsible for implementing the different ERPs is in general good and allows for the establishment of a good emergency response system. All implementing bodies and operational actors undergo regular training (offered at national, regional and local level) for the correct use of technological tools and participate in simulated exercises (e.g., earthquake exercises, search and rescue exercises, telecommunication exercises, etc.), to improve their performance and capabilities in the case of a disaster event. To facilitate an efficient and effective emergency response in case of disaster events and coordination of the communication among the FRs, a wireless communication network is in place. This network is essential in case other communication channels and networks are disrupted by a natural or man-made disaster. Additionally, a network of sirens in urban areas is set up which acts as an early warning system to alert and transmit messages to the wider population. Other technological tools that are available to the first responders include drones, thermal cameras, pro-eye cameras and a plethora of other digital means.

Nevertheless despite these good practices**, new technologies are often not fully integrated** in Cyprus' emergency response system due to several reasons such as: lack of financial resources to purchase more innovative and recent technological tools; bureaucratic hindrances (e.g., each time drones are recording one needs to acquire a specific license for gathering private data); lack of expert personnel who is more innovative driven either to innovate or suggest the acquisition of new technologies complemented by the lack of training for more enhanced technological skills; as well as the lack of and the reluctance or unfamiliarity of more senior staff members to use different tools.

### 3.3.2 Social awareness and engagement activities

In Cyprus the awareness and engagement of citizens about appropriate measures and behaviours throughout an emergency management cycle is conducted by the Cyprus Civil Defence (CCD). In this context, the CCD organizes and runs awareness raising campaigns and disseminates communication material to citizens to further engage them in topics of emergency response. All communication material is available online and accessible to everyone. Activities and seminars dedicated to educating the public are organized regularly and are open to the public. In collaboration with public and other authorities, lectures are given at schools, municipalities and organisations. Citizens can additionally call designated hotlines to get informed about steps and measures to be taken in case of an emergency, as well as the location of the nearest shelter. Despite the efforts made by CCD and other authorities, the current level of knowledge and information is not sufficient for the general population to respond effectively to emergency events, as there is a general lack of understanding of the importance for prevention and preparedness in emergency situations. Further knowledge dissemination and training on potential disasters, consequences and management approaches would increase the social resilience in Cyprus.

### 3.3.3 Stakeholder mapping

The structure of the National Framework on Emergency Response Plans ZENON, as well as the structure of the individual ERPs, already indicate the stakeholders involved in the application and execution of the plans. As outlined in the previous section, the stakeholders comprising the emergency response system in Cyprus can be differentiated by those at the organisational level and those at the operational level constituting the country's response mechanism. These form the main stakeholders in the organisational chain.

At the top of the organisational chain is the Ministry of Interior. The Ministry of Interior coordinates and supervises the implementation of the Civil Defence Law and the relevant regulations and directives and is also responsible for the coordination and control of the overall

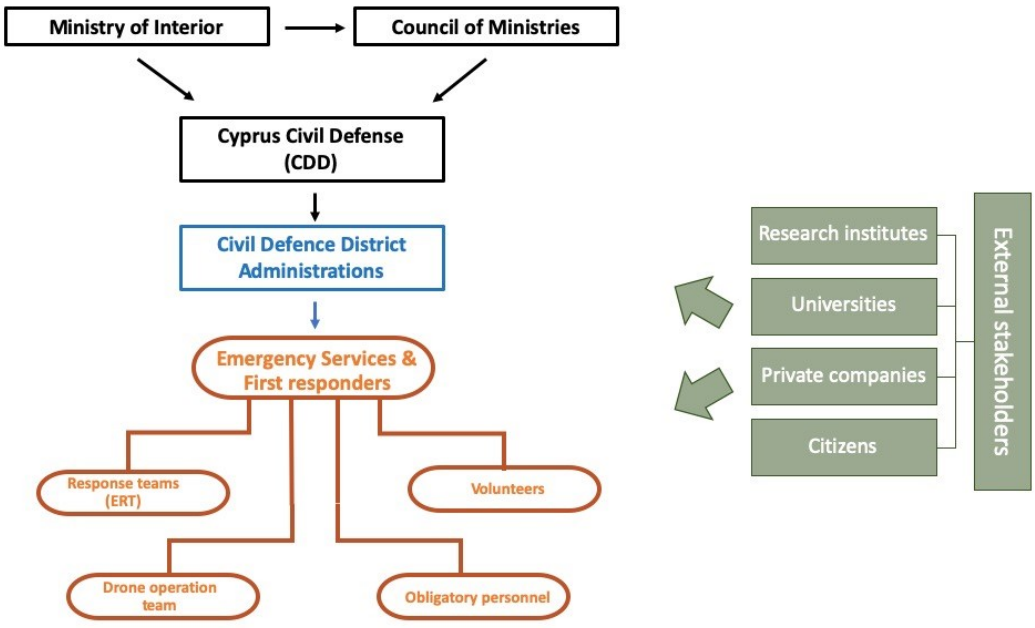


Figure 4: Overview of the stakeholders mapped in the Cyprian emergency management system (created by the authors, adapted from Vademecum, 2017b)

civil defence system in Cyprus. The Ministry of Interior chairs the Council of Ministers which is composed of ministries relevant to the national emergency management system. The activities and responsibilities of the Ministry of Interior are complemented and supported by the central Cyprus Civil Defence (CCD), a department of the Ministry of Interior which undertakes actions to protect the population and rehabilitate the situation after disastrous events. The central CCD is supported by the Civil Defence District Administration and the various units that are deployed throughout the six district administrations. Besides its permanent personnel who are engaged in the central and district offices, the operations of the CCD units are undertaken by volunteers and conscripts as part of their civil obligation to serve in the Civil Defence Force.

As highlighted, Cyprus is divided into six districts, each governed by their respective District Administration. The six District Administrations are an integral part of the Ministry of Interior and it is their responsibility to supervise the preparation, revision and modification of the local plans and the policy statement.

On the operational level of the disaster management system, Cyprus's response mechanism consists of the emergency services and first responders, such as the Police and Fire Services, the Medical services and the CCD. These services are coordinated by different ministries, namely the Ministry of Justice and Public Order, the Ministry of Health and the Ministry of Interior. The emergency services operate in the six Cypriot districts, and perform their tasks and routine work independently. In the event of a major emergency event, the respective department is responsible for organizing and coordinating intervention efforts.

The first responders operating on the operational level of the pyramid, can be clustered in the following categories: response teams (ERT) are composed of permanent personnel and are operating in each of the six Cypriot regions. They have access to all technical equipment available to the CCD and are coordinated by the CCD command centre, a body activated ad hoc during an emergency, depending on the magnitude of the crisis; the drone operation team that is composed of permanent personnel and volunteers, responsible to operate the CCD drones; volunteers who are trained citizens to lead fellow civilians in case of an emergency. They form smaller groups, operating at the local level. They are authorized to operate CCD or requisition vehicles and have access to different pieces of equipment such as radios, medical supplies, etc.; and obligatory personnel comprised by Cypriot citizens are obligated to serve twice per year in CCD.

The main stakeholders, both on the organisational and operational level are supported by other actors, such as utility operators (for example the Public Health Service, responsible for monitoring and controlling the quality of the drinking water intended for human consumption and the Water Board of Limassol who regulates the water supply for domestic, commercial and firefighting purposes), consultancy services and volunteer organizations. The project will seek to involve these stakeholders in all the activities, but will also seek to create more synergies with external stakeholders that would contribute to the achievement of the project's overall objectives.

### 3.3.4 Leverage points for a more effective emergency / disaster management system

The emergency/ disaster management framework in Cyprus is extensive and covers a multitude of natural and man-made disasters. However, the baseline analysis indicated areas for future improvement in order to reinforce the country's emergency response system. These are summarised below:

**Design and integrate activities corresponding to the prevention stage of the emergency cycle.** Currently, the elaborated ERPs mostly focus on the preparedness, response and recovery stage of the emergency management cycle. By addressing and integrating activities and measures related to the prevention stage within the ERPs, the overall emergency management system will be improved and the entire emergency management cycle be addressed. The latter would be strengthened through the proactive mitigation of potential hazards and avoid related negative impacts and consequences, thus offering more protection to the population and relieving the country's response mechanism.

**Extend the funding and financial resources for improving the emergency management sector.** Currently, financial resources for investment in new technological tools and equipment is limited. The main financing for the improvement of the emergency response sector is derived from the state budget and funding through participation in European projects. Investigating efforts in diversifying the funding streams would enable the innovation of new innovative tools, services and operation models. This in turn would lead to the improvement of the capacities of actors on the organisational and operational level and enable them to prevent and/or respond to emergency events with more efficiency and higher degree of effectiveness.

**Increase the integration and acceptance of new technologies.** The integration of new, improved technologies is pivotal for a more effective and coordinated response during an emergency event. However, in Cyprus there are still hindrances towards the adoption of new technological solutions, because of the complicated legal processes for acquiring and operating new equipment but also because of a lack of expert scientific personnel. Furthermore, there is a lack of understanding on the decision-making level of the necessity for new tools to support first responders, and the reluctance to change functioning, yet inefficient structures. Raising awareness and familiarity with technologies but also solidifying their integration within a new legal framework, will improve the response capacities necessary to build a more resilient system.

**Increase social awareness, engagement and citizen participation in the emergency management framework.** Engagement and awareness activities such as training yield positive results in Cyprus and increase the number of people who later volunteer to join the first responders and participate in the transfer of knowledge. However, the lack of permanent training personnel disrupts the engagement process, since volunteers cannot commit fully to this due to lack of time. Recruiting additional permanent staff to conduct the training would positively contribute to increasing awareness and active engagement, thus reinforcing both citizen participation and engagement, as well as the country's emergency response capacities. In addition, the further dissemination of educational campaigns, as well as including training on emergency prevention and response in school curricula can be steps towards increasing public awareness on topics of the role of citizens/ society in the disaster management cycle, and enable citizens to develop the appropriate behaviour patterns for crisis management.

## 3.4 Thessaloniki, Greece

Thessaloniki is located in the northern part of Greece and is the capital of the geographic region of Macedonia and second largest city in Greece, with 1,1 Million inhabitants in the wider metropolitan area of Thessaloniki. In the past, the city of Thessaloniki and Greece have faced earthquakes, floods, fires and industrial accidents exposing its inhabitants to potential waterborne pathogen contamination.

### 3.4.1 General conditions of the emergency response and disaster management system

The general emergency / disaster management framework in Greece is regulated on the national level by the *National Civil Protection Plan "Xenokrates"*. The framework aims to protect the human life, health and properties from the hazardous implications of various emergencies. Following the general stages of emergency management, the framework sets out prevention, preparedness, response and rehabilitation activities, related operating procedures and defines the accountable and responsible organisations for undertaking the activities of each stage. As part of the **prevention** activities, the framework includes risk assessment, planning as well as communication on those risks and awareness raising. Training, (mock) exercises / drills as well as early warning systems are implemented as part of the **preparedness** stage, besides the development of operating procedures and action plans if a disaster occurs. The **response** stage covers the coordination of actors and implementation of planned measures if a disaster occurs, while **rehabilitation** focuses on re-establishing the status quo and/or providing relief after the disaster has passed.

In emergency management, Greece relies on a top down approach. Accordingly, Xenocrates is applied to the whole country, coordinated by the General Secretariat for Civil Protection (GSCP). The need to recognize and plan according to different emergencies is considered and as such GSCP, building up on Xenocrates, issues specific national plans for different types of emergencies. Regional and local divisions are then invited to design their specific operating procedures based on the national plan(s) as suggested by GSCP. These plans and any further changes need to be approved by GSCP before being implemented in practice. Example of such plans are the Water Safety Plans (WSP) that are being developed and implemented by water distribution companies and they pertain to drinking water regulation and surveillance. The WSPs are tailored to various disastrous incidents (flooding, biological and organic pollution etc) that may degrade drinking water quality.

**Emergency management actors are generally effective in following the established plans and there is a good degree of coordination among them.** Nonetheless, this effectiveness is not always to the expected degree, diminished by factors such as scale or timing of a disaster, number of involved first responders, bureaucracy and/or lack of clarification of each actor's role and responsibilities. In addition, the frequent staff changes in the involved authorities and lack of specialised rescue equipment and reduced human resources are other factors that diminish the effectiveness of emergency management.

**Several tools and technologies are being utilised to support operating actors in the management of emergencies**. Early warning systems such as risk maps, weather (meteorological) radars, sensors and thermal cameras are established for the early detection of emergencies or hazards. For example, in the context of immediate water emergencies, the established Supervisory Control and Data Acquisition (SCADA) system complemented by online monitoring devices is able to

detect residual chlorine, toxicity, bacteria and other pathogens that could pose a risk for human health. The first responder organisations are also equipped with their individual Command and Control system that enables not only the notifications for different emergencies but the coordination of its staff. In addition, a digital tool 'Engage' provides real time data of the emergency development and related responses that enables the facilitation of a quick and effective reaction. This is complemented by drones, position transmission systems (APRS) and other applications facilitating radio telecommunications via the Internet. Nonetheless, an identified shortcoming is the low degree of integration of new innovative technological tools by public authorities. This is due to low financial resources complemented by the overall bureaucratic nature of the country's system (for example, the utilisation of certain online monitoring devices is limited by law).

**Training, both theoretical and practical, are conducted to increase the actors' effective utilisation of these resources.** However, besides being conditioned by some of the factors above, the reliance on new technologies is hindered by the reluctance of some of the more veteran staff members to accept and utilise these solutions.

### 3.4.2 Social awareness and engagement activities

The broader population in Greece receives information about emergency plans through the media, local authorities' websites and associated training courses. Awareness raising activities are being organised by civil protection authorities and include national media campaigns and the distribution of informative materials to citizens. Additionally, voluntary civil protection organizations often carry out training courses (e.g., in schools, provide relevant courses to students or teachers or deliver seminars and presentations) and/or disseminate information through social media channels to improve people's response to emergency and/or disaster situations. However, even though there are many voluntary initiatives and trainings offered to the broader public by the rescue teams, the level and quality of information provided to the population is generally still very low due to the lack and/or insufficiency of coordinated governmental information mechanisms for provision of information. Up to now, very limited national planning is foreseen to advance the broader public's awareness regarding emergency situations.

### 3.4.3 Stakeholder mapping

The overall disaster management framework in Greece, outlined in the previous section, already provides an understanding of the key stakeholders involved in the emergency management. The organisation chain of the emergency management sector follows the national administrative structure and is, thus, regulated according to territorial divisions (national, regional and local). Similarly, to the other countries, stakeholders could be differentiated according to those that form the organisation chain and are responsible for coordinating, planning and delivering activities and those who support the delivery of the service by main stakeholders.

Accordingly, following a pyramidical visualisation at the top of the organisation chain is the Inter-Ministerial Committee for National Planning (ICNP). ICNP is the overarching organisation for approving the national emergency plans and the emergency management budget of the different relevant ministries. The latter are also the integral component of the ICNP as a body. Besides, ICNP is also responsible for reporting on the governmental activities that have been undertaken to rehabilitate the situation after a disaster has passed. Complementing and supporting the ICNP is the Central Coordination Body for Civil Protection (CCB). The latter is composed of the secretary

general of the relevant ministries that participate in the INCP and is headed by the General Secretary for Civil Protection (GSCP). CCB supports the INCP by disclosing the yearly national plan and related budget for its approval as well as monitoring and evaluating the national planning process. In addition, it is also responsible for coordinating the response and rehabilitation disaster management activities.

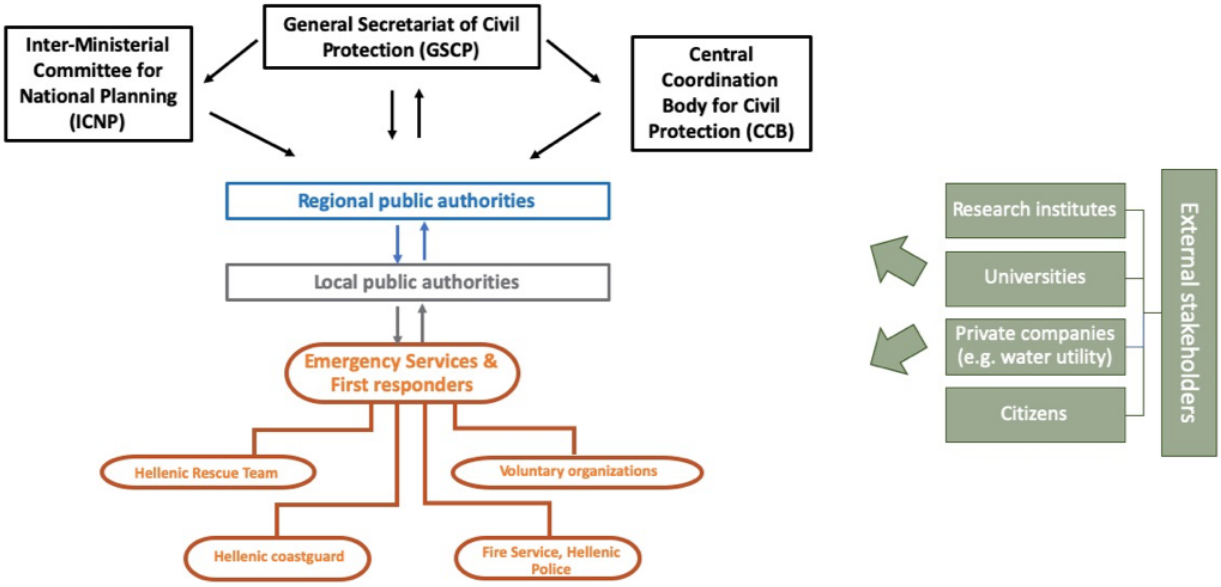


Figure 5: Overview of the stakeholders mapped in the Greek emergency management system (created by the authors, adapted from Vademecum, 2017c)

The General Secretary for Civil Protection (GSCP) is the most important actor of the emergency management system in Greece, since it acts as the mediator and coordinator of activities between the competent ministries and the other actors down in the chain such as regional and local public authorities and the operational actors. Together with the regional and local authorities (e.g., Region of Western Macedonia, Department of Civil Protection), the GSCP coordinates the on the ground operating actors across the various stages of emergency management depending on the scale of the emergency i.e. national, regional, local.

The first responders (e.g., Fire Service, Special Unit for Mass Destructions), the Hellenic police, the Hellenic coast (i.e., Hellenic Coast Guard Marine Environment Protection Department), the armed forces, health authorities (e.g., Directorate of Public Health and Social Welfare), voluntary organisations located in the operational layer of the pyramid (e.g., Hellenic Rescue Team) are the actors who are deployed to the affected areas and are responsible for responding to an emergency and taking actions to provide relief.

As highlighted, the main stakeholders of the organisational chain are supported by other organisations and institutions, such as universities and companies (e.g., the water utility company in Thessaloniki — EYATH); associations such as the Hellenic Association of Municipal Water and Sewerage Company E.D.E.Y.A. which acts as the umbrella organisation for other Municipal Water and Sewerage Companies throughout Greece. All these institutions contribute to advancing the

knowledge and insights on emergency management resources and tools. In addition, the stakeholder mapping exercise identified research institutions such as the Goulandris Natural History Museum (EKBY) who also support the sector by building up knowledge, but also on raising public awareness as well as promoting environmental education and training.

These stakeholders are the target groups that the project will seek to involve in its activities and processes.

### 3.4.4 Leverage points for a more effective emergency / disaster management system

The emergency and disaster management system in Greece is already well advanced and keeps track of the most recent developments. Nonetheless, as outlined in the preceding sections, there are some perpetual shortcomings which represent opportunities for change and further improvement. These are summarised below:

Increase the coordination among operational actors. In general, operational actors are effective in following and implementing the emergency civil protection plans throughout the various levels of implementation. Nonetheless, factors such as scale or timing of disaster, reduced human resources, frequent staff changes, improper definition of each actor's role and responsibilities as well as bureaucracy can diminish this effectiveness. Accordingly, providing relevant clarification to each actor involved on their roles and responsibilities in emergency management would support in addressing part of the identified shortcomings complemented by expansion of human resources. In addition, revising and identifying points where bureaucracy could be minimised would also contribute to alleviating some of the shortcomings related to the effectiveness of operational actors.

Expand on financial resources and increase acceptance towards new technologies. The adoption of new, updated, innovative technologies is of high importance to advance and improve the management of emergencies and support FRs in conducting their work in an effective and safe manner. However, in Greece the uptake of new technologies is not always successful, as a result of limited financial resources but also because of the reluctance of public authorities to test and make use of new technologies. In addition, the utilisation of new technologies in practice is hindered by the reluctance of some of the more veteran staff to integrate those in their daily work. Accordingly, a two-fold opportunity could be exploited for this shortcoming. On the one hand public (governmental) bodies could invest in expanding the financial resources that would lead to research, development and promotion of new technologies. On the other hand, raising awareness, training and supporting FRs familiarisation with these technologies could show them how such solutions could support them in their work and keep them safer.

Further improve citizens' understanding and engagement in emergency events. The success of managing an emergency, besides effective planning and coordination by operational actors, is also heavily dependent on citizens engagement and exhibition of appropriate behaviour. The Greek baseline assessment revealed that citizens' awareness levels are still on the lower end of the trajectory, therefore, presenting an opportunity to implement measures that will aim at changing that. A potential identified cause for this shortcoming is the limited national planning on the governmental level for citizen engagement activities. Accordingly, based on such developments, it is recommended for the governmental stakeholders, in cooperation with the operational actors, to conduct informal and formal capacity building activities as well as further

invest in educational and informative campaigns (by utilising the power of social media as well) to increase citizens' awareness levels.

## 3.5 Sofia, Bulgaria

The city of Sofia, capital of Bulgaria, is located in the western part of Bulgaria, home to approx. 1,3 million inhabitants. Historically, the most common types of disasters the region and city has encountered in the past are floods, fires, snowstorms and earthquakes.

### 3.5.1 General conditions of the emergency response and disaster management system

The **general emergency / disaster management framework** in Bulgaria is regulated by the *Disaster Protection Act*. The latter regulates public measures related to ensuring the protection of human life and health as well as the protection of the environment and property in case of emergencies and/or disasters that can be caused by natural causes or human activity. Complementing the disaster protection act in setting out the key elements of the national disaster management framework are the Rulebook on the organisation and activity of the Ministry of the Interior, *The Water Act, The Environmental Protection Act, The Safe Use of Nuclear Energy Act, The Forest Act, The Regional Development Act and Regulation No.9 on the Quality of Water intended for Drinking and Household Purposes.* Table 4 provides a brief summary of each of these acts and their contributions to the national framework.

In addition, the Disaster Protection Act is also complemented and informed by the *National Disaster Risk Reduction Strategy (2018 - 2030),* which centres on the identification of the key priority areas for disaster risk reduction and accordingly inform and guides their planning and implementation in the different territorial divisions.

| Name and year | Level | Description |
|---|---|---|
| Spatial Development Act (2019) | National | The Act creates the framework for the management of the territory of the Republic of Bulgaria to enable living, work and recreation. The Ministry for Regional Development and Public Works is responsible for the coordination on a state level and the regional administrations will execute the Act on a regional level. Designation, development and regulation of the territories as well as infrastructure management, energy, water and waste management are all organized under this act. The process of creating development plans and the regulations for construction sites are also specified and outlined. |
| Water Act (2021) | National | The Water Act is in place to ensure integrated water management in the public interest and to protect the health of the population. This entails the protection of water bodies and general reduction of water pollution and emissions into water bodies. Measures are put in place in order to achieve the objectives of the law. These include, among other, risk assessments, improvement and protection of the aquatic ecosystems, increase water usage efficiencies and reducing water pollution. In addition, the Act accounts for preventive measures against water floods, by for example defining the methodology on creating flood risk maps. |

| | | |
|---|---|---|
| Environmental Protection Act (2020) | National | This Act concerns itself with environmental protection in Bulgaria through the regulation and control of public actions in regard to the environment and the institution of monitoring and protection strategies. It is also clarified what roles and obligations the state, the municipalities and the individuals have in protecting the environment. The goals of this law are achieved through environmental monitoring and control as well as development of related methodologies, scoping of pollution and damage sources, environmental impact assessments and similar. |
| Safe Use of Nuclear Energy Act (2020) | National | This Act organizes the safe use of nuclear energy and the management of the radioactive waste. The rights and licenses in connection to using nuclear energy are specified to ensure the safe use of nuclear energy, radiation protection and physical protection. The Nuclear Regulatory Agency is an independent specialized executive authority who is tasked with implementing the rights and licenses. |
| Forest Act (2020) | National | The Act entails the protection, management and usage rules for forests in Bulgaria to ensure the sustainable management of the ecosystems. This is done by increasing the forest space, protecting existing forests, instating natural management of forests, increasing diversity, creating recreational areas for the populations and implementing European commitments of forest protection. The act also manages the ownership rights, the functions of the forests, construction in forest areas and sets repercussions when not adhering to the act. |
| Regional Development Act (2020) | National / Regional | This law regulates the planning, programming, management, resource provision, monitoring, control and evaluation of the implementation of the system of documents for strategic planning of regional and spatial development. Through the policy, conditions for balanced and sustainable regions and municipalities are created by instating legislation to reduce the economic and social differences between regions. The structure and responsibilities of the regional development council are outlined as well as the financial coverage for regional development. |
| Regulation No. 9 on the Quality of Water intended for Drinking and Household Purposes (2018) | National | This Regulation sets out the requirements for the quality of water intended for drinking and household purposes in order to protect human health against the negative impacts of drinking polluted water. |

Table 4: Guidelines and regulations influencing the emergency management system in Bulgaria

The Disaster Protection Act sets the general frameworks and indicates the requirements for the design and implementation of *Disaster Protection Plans (DPP)* that will be carried out at national (i.e., National DPP), regional (i.e., regional DPP) and municipal (i.e., Municipal DPP) levels. The foreseen activities within these Disaster Protection Plans, reflect the overall emergency / disaster management stages, namely: activities that focus on **preventing** a disaster, including measures to anticipate, map, assess and mitigate potential risks, those focusing on **preparedness** such as the development of action plans, programmes and management strategies; **protective or response** activities and other measures in case the disaster takes place; and the deployment of **relief and**

**recovery actions.** In addition, it regulates the **insurance of resources** and the dissemination and distribution of **relief funds**.

Besides calling for the implementation of protection plans specific to the territorial division, the Disaster Protection Act also highlights and regulates the need for **specific consideration and accounting of certain types of risks or disaster events pertaining to that area.** Obligatory considerations are for risks related to earthquakes, floods, nuclear and radiological accidents. The Disaster Protection Act and the respective territorial (national, regional, municipal) disaster protection plans are updated every year, usually in the first quarter of the year.

In general, there is a **satisfactory degree in following the prescribed plans and procedures**. The effectiveness in following these frameworks can be attributed to the good coordination between the operational actors, compliance with the prescribed procedures and acts, good communication and exchange across teams and institutions as well as professional theoretical and practical trainings. Trainings are offered and coordinated by training centres, namely, the Centre for Specialisation and Professional Training in Fire Safety and Rescue and the Centre for Professional Qualification in Montana. In addition, representatives of the Fire Safety and Civil Protection (FSCP) Directorate participate regularly in the Union Civil Protection Mechanism (UCPM) training programme. To increase and ensure the continuous effectiveness of managing emergencies and disasters, there is still a need of a more detailed special operation procedures among the different institutions depending on the types of disasters.

In terms of resources and technological means, **various instruments are at the disposal of operational actors for the management of emergencies.** A siren system is deployed to ensure the early warning of the population and the operating actors about the occurrence of a disaster or emergency management event. The siren can be operated by the local Fire Safety and Civil Protection (FSCP) centres and/ or the National Operation Centre (NOC). A Digital Alarm and Communications Server (DAKS) system for informing the Government and components of the Integrated Rescue System is also implemented. in their field work the rescue teams mainly use the radio communication network of the Ministry of Interior. The Aerospace Monitoring Centre (AMC) supplies the operational actors with near to real time data from the ground meteorological radars, satellite images, situational maps, weather forecasts from external sources, damage assessment maps (after the event), activation of rapid mapping services from the Copernicus programme (if needed).

At the municipal level, the Emergency Aid and Prevention Directorate monitors input from various software systems and information from on the ground cameras (e.g., more than 1500 cameras located throughout the territory of the Municipality of Sofia). In addition, other actors who operate within the region or municipality also provide further resources to anticipate, monitor and support the effective management of disaster events. This occurs for example in the form of online monitoring of drinking water and air pollution and subsequent triggering of alarms in case of deviations from set values.

Despite the optimal deployment and utilisation, an identified shortcoming is the amount of time that it is required to familiarise with the functions of the existing instruments and developing a routine in utilising these technological resources.

### 3.5.2 Social awareness and engagement activities

The social awareness and information provision in Bulgaria regarding disaster and existing contingency plans as well as appropriate behaviour from the citizens side is ensured by various

means. At the national level, this is achieved through mass media channels (such as TV, radio and/or social media) as well as the websites of the respective institutions. For example, during the COVID-19 pandemic, the governmental institutions relied on bot features on their website to answer citizens questions individually.

At the regional and municipal level, training grounds with regular training sessions and exercises are provided by the regional and municipal Emergency Aid and Prevention Directorate. In addition, informative events are organised to increase the awareness of the population as well as enhance their skills and capabilities about the appropriate behaviours and necessary measures to be taken during a disaster or other accidents. Other materials such as brochures and videos are also created and distributed to help citizens become more familiar with such events and what needs to be done to effectively rectify or minimize its negative consequences. Furthermore, trainings for disaster awareness and management are integrated into the curricula of the different educational stages. These however are limited in hours and for better results the numbers of hours focused on such activities could be increased.

Accordingly, one can deduce the awareness of the Bulgarian population and means for achieving it are at adequate levels, with one identified shortcoming, namely, the potential delays when it comes to the elderly demographic groups receiving the information.

### 3.5.3 Stakeholder mapping

The operational actor / stakeholder structure of the Bulgarian disaster management sector follows the same hierarchical structure / division that is applied in its national disaster management framework i.e. national, regional to local (municipal). The general structures established at the national level are replicated, tailored as well as further specified from one level to the other (from top to bottom).

Accordingly, at the national level, the National Disaster Protection Plan is determined, implemented and monitored by the Council of Ministers. The latter is comprised by representatives of various relevant ministries, including the Ministry of Interior, the Bulgarian Academy of Sciences, universities, local government authorities the Bulgarian Red Cross and other organisations working in the field of disaster risk reduction. The Council of Ministers is supported by the Disaster Risk Reduction Council that also monitors the national disaster risk reduction platform also.

The response to an emergency and/or a disaster event is coordinated by the National Operational Centre (NOC) of the Fire Safety and Civil Protection (FSCP) which operates within the broader unified rescue system (URS). The NOC FSCP serves as point of information, connection and coordination of the 28 regional operation centres in Bulgaria. Members of the unified rescue system that are activated when the disaster occurs are ministries, municipalities (i.e. Municipality of Sofia), the voluntary formations, first responders (e.g., from the Regional Health Inspectorates, Regional Inspectorates for Environment and Water), firefighters, specialised rescue teams and the military.

At the regional level, the guidelines and the system set by the Council of Ministers are tailored, adapted and implemented by the Regional Governors supported by the Regional Disaster Risk Reduction Councils.

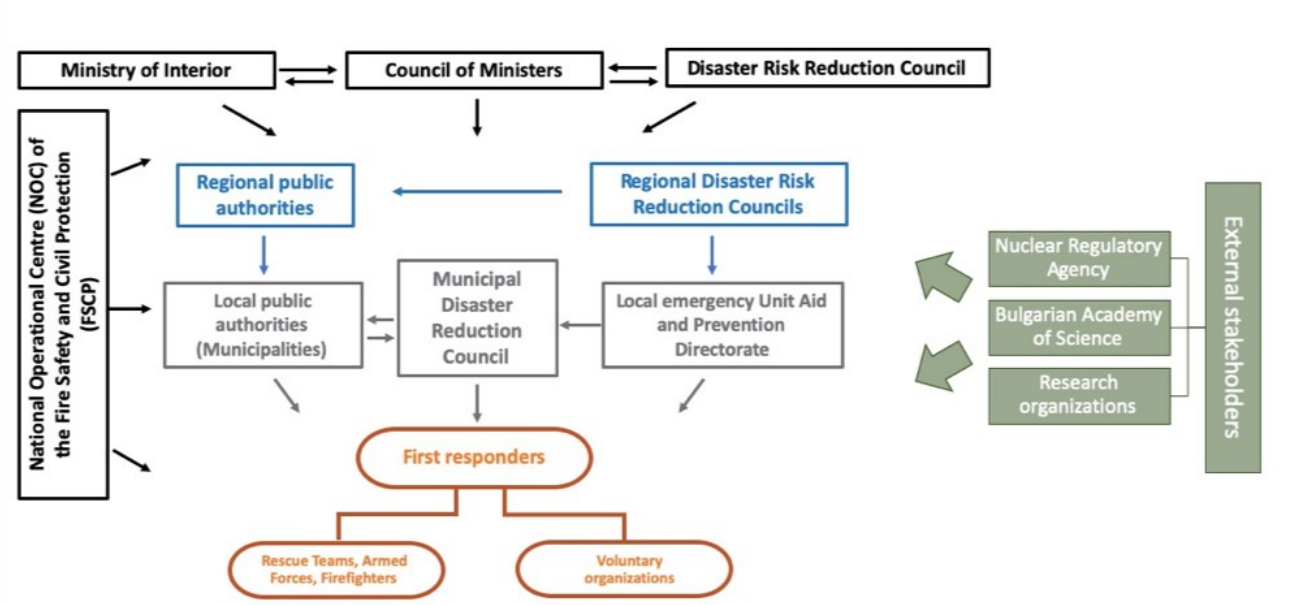


Figure 6: Overview of the stakeholders mapped in the Bulgarian emergency management system (created by the authors)

Similarly, the guidelines provided by the Council of Ministers, are also tailored, adapted and implemented on the municipal level by the Mayors (e.g., Mayor of Sofia) who are assisted by the Municipal Disaster Reduction Council and the local Emergency Unit Aid and Prevention Directorate. The latter are responsible for the local coordination of the emergency responders and for the implementation of the SOPs and overall management of disasters and emergencies. At the municipal / local level, voluntary formations, who are directed by the Mayor and part of the country's unified rescue, support the management of emergencies (in the response stage).

As highlighted the Bulgarian national disaster management framework puts a specific focus on key risks, with an obligatory consideration of those in the national, regional and municipal plans. In this context, there are several appointed actors who are responsible for carrying out risks mapping, analysis and assessment. These are, the Regional Development and Public Works Minister for seismic and geological risks; the Chairman of the Nuclear Regulatory Agency for nuclear and radiation accident risks, the Environment and Water Minister for flood risk; and the Agriculture, Food, and Forestry Minister for the forest fires risk. Especially important for the PathoCERT project are the Regional Development and Public Works Minister for seismic and geological risks and the Environment and Water Minister for flood risk.

### 3.5.4 Leverage points for a more effective emergency / disaster management system

The baseline assessment exercise revealed Bulgaria's emergency management framework is well defined and established as well as implemented / applied accordingly to the largest degree. Very few shortcomings have been identified which could present leverage points for further improvements. A general recommendation is to keep these good levels of planning and

implementation by means of continuous innovation and experimentation in practice. These are summarised below:

**Further define roles and responsibilities within the emergency management system.** Despite well designed organisational chains within the emergency management system, the involvement and consideration of many institutions across different fields, could potentially lead to unclear roles and responsibilities for particular types of disasters. Therefore, a general recommendation is the need for a more detailed and specific definition and allocation of responsibilities among the different institutions depending on the type of disasters.

**Invest resources in the quick uptake of technological resources.** The emergency management system in Bulgaria relies on a diversified set of technological solutions and resources which sets a good example for other countries. Nonetheless, an identified shortcoming is the amount of time that is required to familiarise with their functions and developing a routine in utilising these technological resources. Accordingly, further trainings, simulated ones as well, on more frequent intervals, could be deployed to ensure operating actors will be able to utilise those in an effective manner as quickly as possible.

**Diversify means of social awareness and engagement for a more effective reaching of vulnerable groups.** Similarly, to the previous aspects, the awareness of the Bulgarian population and means for achieving it are at good levels with a drawback related to the potential delays when it comes to the elderly demographic groups receiving the information. Accordingly, actors operating in the management sector, incentivised by governmental actions, could diversify the means of communication to the broader public to ensure that all socio demographic groups are aware about the measures in place and appropriate behaviours.

## 3.6 Seoul, South Korea

The capital of South Korea, Seoul, is located in the north-western corner of the southern Korean peninsula. Seoul is by far the largest city in South Korea with 9,3 million inhabitants that could be potentially exposed to various emergency situations / threats, including waterborne pathogen contaminations. Among other emergencies, South Korea is affected by the East Asian monsoon season causing heavy rainfalls (on average 383 ml) and typhoons between June and September. These events frequently trigger flooding and landslides in the country's mountainous landscape posing a severe risk to its water supply.

### 3.6.1 General conditions of the emergency response and disaster management system

The emergency management framework in South Korea is developed, coordinated and overseen by the central government, providing the organisation and planning framework for the different levels of organisation i.e., national, regional, local and actors operating within. This is achieved through the *Disaster and Safety Management Act*, which prescribes the necessary measures for the prevention, preparation and response to emergencies and disaster events as well as restoration activities and other matters necessary for disaster and safety management, reflecting and mirroring the overall stages of disaster management as described in the beginning of this report.

Building upon the Disaster and Safety Management Act, the particularities of the disaster management sector are regulated by means of three types of emergency management manuals. The first ones are the **emergency management standards manual** written by the central

government organisation, specifying the overarching general procedures, roles and responsibilities that need to be accounted for and implemented by the subsequent territorial divisions and organisations operating within. These general guidelines are then specified and further detailed by the regional and local operating governmental organisations in their own **working emergency manuals**. Complementing the latter manuals, are the **on-field action manuals**, which are developed and implemented by on the ground operating actors, describing the specific procedures and actions to be undertaken for various emergency situations. These three manual groups enable an effective communication and coordination between the relevant actors before, during and after an emergency event.

Box 3: Emergency situations covered in the on-field action manuals

**Natural disasters:** including damage by storms and floods, earthquakes, volcanic eruptions, drought, green tide, red tide, tidal waves, cosmic radio wave disasters, landslides and lightning.

**Social disasters:** forest fires, mass water contamination, mass marine pollution, epidemics, hazardous chemical leakage accident, joint traffic accident, dam collapse, major subway accident, high-speed rail accident, large fire in multi-sealed facilities, adjacent country radiation leakage, ocean ship accident, large scale accident in business establishments, large-scale collapse of multi-complex building, correctional facilities disaster and accident, livestock disease, information and communication disaster, financial disaster, nuclear safety disaster, electric power disaster, crude oil supply and demand disaster, healthcare disaster, edible water disaster, land freight transportation disaster, GPS radio interference, accident involving oil establishment by the sea and accidents of stadiums or concert halls.

To further the effectiveness of the emergency management sector, the on-field action manuals are organised according to specific disaster types, each subjected to different ministries in the South Korean governments. Accordingly, South Korea identifies 37 disaster types which are clustered under two major categories, namely, natural and social, reflecting the cause of the disaster also. For a detailed overview of the emergencies in each cluster please see Box 3.

All manuals and related procedures are regularly revised and updated by the responsible organizations enabling South Korea to be up to date with the newest operating methods and resources. These updates are then followed by further information and training of the targeted operating actors, usually undertaken by the National Disaster Management Centre. The clear organisation structure and procedure allow for a good coordination among the operating actors, however, this effectiveness also depends on the actors' familiarity with the prescribed measures.

The central planning and consideration of disasters could potentially be considered a shortcoming, since each disaster could be unique and challenging on its own terms. As such, first responders ideally would be equipped to act and apply their relevant technical skills without following the manuals when necessary. The country administration should allow for enough legal and logistical space for the first responders to reasonably address the unique features of impending emergency situations.

In order to facilitate a quick and efficient emergency response reaction various tools and technologies are in use. An Integrated Disaster and Safety Information System is in place that is used for internal and external communication purposes. Internally the Disaster Management Portal and the Mobile Disaster Management Portal are used to deal with mitigation and preparedness phases as well as the recovery phase of an emergency situation. The Public Disaster

and Safety Portal and the Emergency Ready App are used for external communication during the response and recovery phases.

In addition to this system various other instruments are at the disposal of first responders to effectively deal with emergency situations. The Safety e-Report enables citizens to directly communicate risk situations over the website or an app which are then directly forwarded to the relevant responding organizations (i.e., live monitoring and reporting of incidents). In addition, the extensive Disaster and Safety Communications Network enables the communication and coordination of first responders and relevant institutions / organisations in an emergency situation. Continuous training is provided to first responders to ensure the effective utilisation of these technologies. In broad terms, in South Korea, annually, 76 million euros are annually made available to improve the emergency management mechanisms and technologies in South Korea.

### 3.6.2 Social awareness and engagement activities

The broad public in Korea is informed about emergency situations through several conventional means such as disaster safety announcement texts, mass media (i.e. public television and radio channels), government websites and press releases. In addition, technological solutions are also utilised to keep citizens informed and aware. Examples of the latter include the Public Disaster and Safety Portal and the Emergency Ready App. A Public Safety Map Service provides real time information using the GPS of the mobile devices, to inform citizens on the risk situations in their vicinity regarding the following 8 categories: crime, traffic, natural disasters, safety for the vulnerable, facilities, industries, public health, and man-made disasters; while as a Flood Outbreak Forecast & Warning System warns the population about areas that are at high risk of flooding.

Nonetheless, the distribution of information concerning emergency situations and emergency plans to the public is considered not sufficient. The Korean population is concentrated in highly urbanized areas, making it crucial for the population to know how to react in emergency situations without creating panic and chaos. Existing manuals for disaster management are available online as well as offline, but most citizens are not aware that they can access these emergency action plans in the disaster safety portal. This results in citizens not being prepared for emergency situations and being unaware of appropriate behaviours in case such an emergency event occurs. Moreover, the catastrophic implications of an emergency are quickly forgotten as soon as the former has passed. This could be offset and further improved through more commitment to educate the public from an early age by means of integrating the topics of emergency management and citizens behaviours in the educational curricula.

### 3.6.3 Stakeholder mapping

Corresponding to the baseline analysis, actors/stakeholders on a national, regional and local level contribute to the four different stages of the emergency response and by doing so enable a holistic emergency management. While actors/stakeholders on a national level are responsible for the overall creation of operating procedures and management, the local actors/stakeholders are tasked with the operational aspects of emergency event management.

On a national level the Presidential Secretary Office conducts an evaluation of the emergency situation and activates an initial strategic response group. This office also coordinates any national stability measures. The Central Safety Management Committee is responsible for coordinating the policies concerning disaster management. They also develop the national safety management basic plan, as well as declare, consult and coordinate emergency events. Also operating on a national level is the Central Disaster and Safety Countermeasure Headquarters.

This organization is responsible for the management and coordination of aspects related to prevention, preparation, response and recovery. For example, they develop disaster preparedness plans, coordinate response at the emergency event site and develop preventive measures. If an emergency event occurs, it is in exchange with the Central Safety Management Committee concerning the declaration of an emergency event and is in charge of the financial measures needed by relevant disaster management agencies. If an emergency is not manageable at a local or regional level, or the emergency is nationwide, the organizations at a national level will lead the coordination of the emergency effort with support of the regional and local organizations.

At the regional level the Regional Accident Control Headquarters supports in the creation of preventive emergency measures as well as in the recovery effort following an emergency event. By coordinating with the Regional Disaster and Safety Countermeasure Headquarters and the Disaster Site Integrated Support Headquarters, they assist in the response and recovery phases. The other organization at the regional level is the Regional Disaster and Safety Countermeasure Headquarters, who creates and implements necessary emergency plans concerning prevention, response and recovery. In the case of a waterborne pathogen related emergencies, they investigate possible causes and sources and initiate appropriate measures to control the pollution. The Regional Emergency Rescue Control Group is in charge of the management and coordination of local emergency rescue activities and has the command and control of emergency rescue and support organizations.

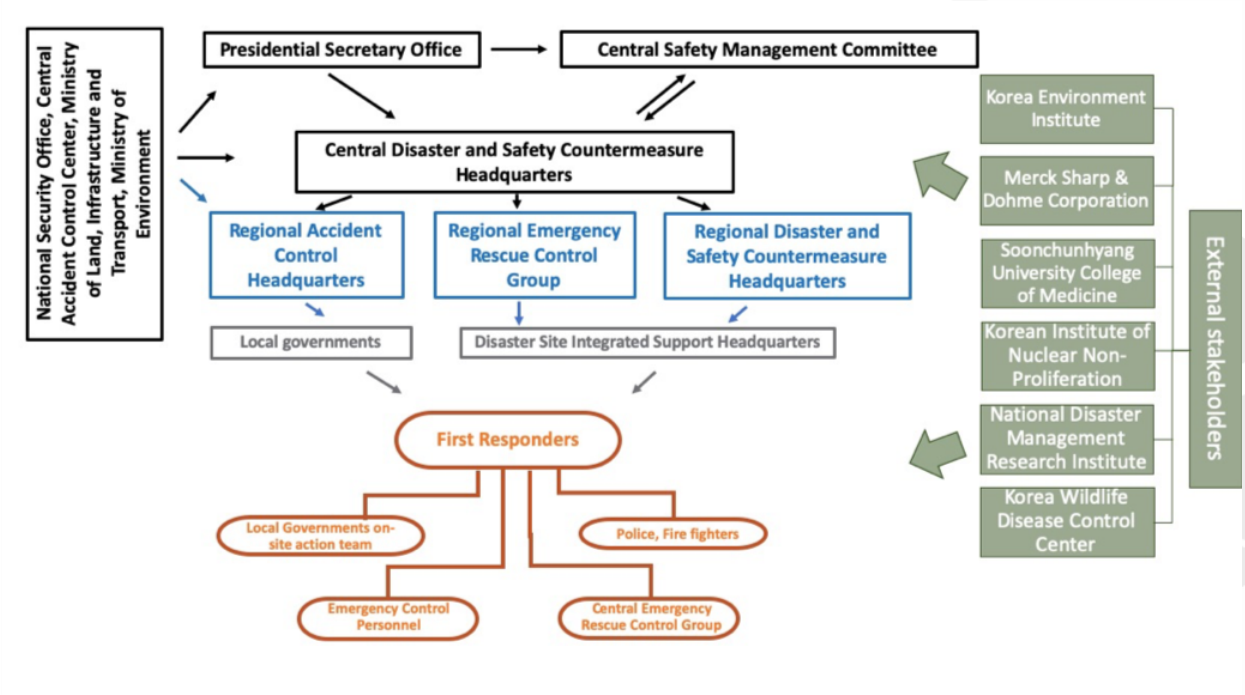


Figure 7: Overview of the stakeholders mapped in the South Korean emergency management system (created by the authors)

At the national and regional level various other organizations inform and support the main mentioned actors/stakeholders. The Central Accident Control Centre manages policies and systems related to preventing water pollution accidents as well as the response and recovery if an event should occur. If necessary, they facilitate the cooperation between administrative agencies and also support the Regional Disaster and Safety Countermeasure Headquarters. Other

institutions such as the Ministry of Land, Infrastructure and Transport, the Ministry of Environment or the National Security Office also support during the four phases of emergency events.

Going one step further to the local level, two organizations are responsible for managing the emergency response effort: the local government and the Disaster Site Integrated Support Headquarters. Once an emergency event has occurred, the local government dispatches an on-site action team to deal with the emergency at the site. The Disaster Site Integrated Support Headquarters is also present and is responsible for the overall management of the emergency on the ground. The latter is also in close communication with the Regional Accident Control Headquarters and the Regional Disaster and Safety Countermeasure Headquarters.

When it comes to the response on site, local First Responder groups will respond to emergencies. The already mentioned on-site action team from the local government may be at the emergency site as well as the police and the fire department. Then there are the emergency control personnel and the Central Emergency Rescue Control Group. The latter support the emergency response effort at the site and control the emergency rescue activities.

Other external stakeholder organizations exist that contribute to the entire emergency management organization. The National Disaster Management Research (NDMR) Institute and the Korea Institute of Nuclear Non-Proliferation and Control (KINAC) both conduct activities that are relevant for disaster management by contributing to the mitigation of emergency events. The Korea Environment Institute is a leading organization dedicated to solving environmental and sustainability issues. In the emergency management cycle KEI is involved in the recovery process from large disaster events for wildlife and humans. MSD (Merck Sharp & Dohme Corp) Korea is a relevant stakeholder/actor as they provide medical supplies, medicine and professional medical information. MSD Korea is involved in the recovery phase by providing medical equipment after an emergency event. The Korean Wildlife Disease Control Centre and the Soonchunhyang University of Medicine are also relevant stakeholders/actors. The former conducts studies to protect the environment and public health, predicting and detecting wild animal diseases and diagnosing them. Mainly involved in the response stage, the latter detects common infectious diseases and works towards stopping their large scale spread. These external stakeholders/actors portray that in South Korea non-governmental institutions are involved and actively participate in the emergency management organization.

### 3.6.4 Leverage points for a more effective emergency / disaster management system

The emergency management system in South Korea is already quite extensive and detailed. Nonetheless, during the baseline analysis several leverage points have been identified that could even further improve the overall emergency management in the Republic. They are as follows:

**Cultivate trust in FRs towards new technologies and procedures.** Introducing new technologies into existing emergency management procedures is important to advance and improve the way FRs and other relevant actors operate during an emergency. This however is only feasible if the FR who will actually use the new solutions trust their functions and are willing to use them in the field. Thus, raising awareness for the new technologies and procedures and communicating their functions transparently to FRs in South Korea is critical for improving the way emergencies are dealt with.

**Enable FRs flexibility of action in following the manuals during an emergency situation.** The existence of emergency management manuals (standard operating procedures) is important to organize the emergency response effort and ensure optimal effectiveness. However, clauses or norms for a rigid reliance on those manuals regardless of the situational factors could be counterproductive, especially when emergencies could lead to unforeseen unfolding of events. Accordingly, enabling the flexibility and space for FRs to be able to react to emergencies according to the specific circumstances while relying on their technical skills and good judgment could increase the degree of success in managing emergencies and increase FRs productivity and sense of responsibility.

**Increasing the social awareness concerning proper behaviour during emergencies.** The successful management of an emergency situation is to a large degree dependent on the appropriate behaviour and collaboration of citizens. In South Korea emergency management manuals are available online and offline, but most of the population is not aware of this. Consequently, they do not make use of the information on how to react in emergency situations and are unprepared when an emergency actually arises. Ensuring that the population is aware of and use the information made available to them is a key aspect to ensure successful emergency management.

**Integrating education on correct behaviours during emergencies into public educational curricula.** In conjunction with the need to increase social awareness, is the prerequisite to include in the educational curricula knowledge on how to behave during emergency situations from a young age onwards. This would allow for a sustainable awareness to be conveyed to the people that is not immediately diminished after an emergency event has passed. Ensuring the inclusion in educational structures would ease the work for first responders later on when emergency events occur, as the population is already educated about certain procedures and can actively participate in the emergency management efforts instead of hindering it.

# 4. Conclusion & Outlook

The stakeholder mapping and baseline assessment exercise in the six target regions / countries (Granada, Spain; Amsterdam, the Netherlands; Thessaloniki, Greece; Limassol, Cyprus; Sofia, Bulgaria and Seoul, South Korea) showcases the differences in the regulation, structure and composition of the emergency management system across countries, despite these operating under the umbrella framework of the European Union (besides South Korea). The analysis of the emergency management systems shows that each of the PathoCERT target regions / countries are well advanced in establishing the necessary structures and procedures for the effective management of emergencies. Nonetheless, despite the well-founded frameworks and the organisational differences, the countries share some common challenges or opportunities of complementary nature that hold a great potential for even better and improved frameworks. The recommendations below summarise these challenges and opportunities ready to be leveraged.

**Complement existing operations and resources with new technological and other procedural solutions.** Despite the overall well-performing emergency management system, there is always the opportunity and more often the general rule to regularly update and revise the emergency management framework for the purpose of accounting and being up to date with the most recent developments (within particular countries but also beyond on a European and international

level). The PathoCERT project can further contribute to such local and regional processes by supporting the development, testing and deployment of technological solutions and procedural solutions (see Figure 1). The project could support its target countries and beyond to at least experiment with potential novel innovations and solutions that could improve the resilience of the emergency management frameworks.

**Enhance the pool of financial resources to stimulate the continuous research, development and innovation**. As highlighted in the preceding sections of this report, the chain of progress is highly dependent on continuous research, development and innovation efforts. In the emergency management sector, such efforts could target and support activities that foremost focus on the prevention and mitigation of potential risks and hazardous threats, but also towards increasing the capabilities and safety of operational actors when handling or situated in such potentially dangerous scenarios. Nonetheless, such research and innovation efforts are only possible when there is a continuous, stable and diversified pool or stream of financial resources. Accordingly, this recommendation proposes the establishment and/or further enhancement of funding streams foremost on a national / state and EU level as overarching governance actors as well as the further enticement of such funds across different organisations.

**Increase operational actors' acceptance and integration of new technologies and procedural methods.** New solutions and operational methods are not always immediately accepted by the corresponding actors, mainly due to people's hesitance to accept change and preference for the status quo but also because of the lack of skills to appropriately and effectively utilise and rely on newly introduced solutions and/or approaches. Consequentially, this leverage point centres on the need for further capacity building activities complementing the introduction of new solutions. These activities could be both in the form of skill development as well as further information provision and awareness on the benefits and advantages such solutions could bring to these (operational) actors, their (safety at) work and overall for the emergency management system.

**Improve citizens awareness on appropriate conduct and behaviours during as well as on their role in the successful management of emergencies.** As highlighted throughout the report, the successful management of emergencies besides the need for well-founded procedures and coordination of operational actors, it requires the cooperation of citizens also. This relates to citizens being aware and informed about appropriate conduct and behaviours throughout an emergency cycle that could support their and fellow citizens' well-being but also the one of first responders as well. The report cumulatively showcases that citizens are somehow informed about potential threats, emergencies and appropriate conduct, however, there is still room for improvement. Elevating citizens understanding could be achieved by diversifying and increasing information provision through various channels, but also by complementing the former with some more practical recommendations, according to different disaster scenarios also. This would help in bridging the gap between information and know-how provision as well as actual behaviour / action. In addition, to allow for more long-lasting capabilities built from young age, it is highly recommendable to consider the further integration of mandatory emergency management courses in the country's educational curricula.

**These challenges and opportunities should not be considered as final**, but rather as preliminary findings of the baseline requirement analysis. As such, **these leverage points will be the subject of discussion and exchange within the PathoCERT project and stakeholder engagement activities** within (i.e., the country specific CoPs as elaborated in the Introduction) with the aim of further identifying pathways, partnerships and collaborations that would work towards bridging existing

gaps to the extent possible. The findings of this report will serve as basis to initiate joint discussions and exchanges with project partners and external stakeholders and ultimately lead to uncovering trade-offs and synergies for increasing the effectiveness and resilience of the emergency management systems across Europe, related established structures and the societies where these are being undertaken.

# References

## Introduction & Stakeholder mapping and baseline analysis approach


Baird, M.E. (2010): The "Phases of Emergency Management". Intermodal Freight Transportation Institute. University of Memphis.

Reed, M.S-; Graves, A.; Dandy, N.; Posthumus, H.,; Hubacek, K.; Morris, J.; Prell, C.; Quinn, C.H.; Stringer, L.C. (2009): Who's in and why? A typology of stakeholder analysis methods for natural resource management. In: Journal of Environmental Management, 90(2009), 1933-1949.

World Meteorological Organization (2016): Project Management Guidelines and Handbook. Switzerland. Available at: https://library.wmo.int/doc_num.php?explnum_id=6434.


## PathoCERT's target regions' state of affairs

Besides the stakeholder mapping and baseline requirement exercise conducted by the project partners, the following sources have been consulted to develop each country profile.

### Granada, Spain


European Civil Protection and Humanitarian Aid Operations (ECHO) (2019): Spain – Overview of the National Disaster Management System. Brussels, Belgium.

LEY 2/2002, de 11 de noviembre, de Gestión de Emergencias en Andalucía. Bulletin No. 138. Spain. Available at: https://www.juntadeandalucia.es/boja/2002/138/1

Ley 17/2015, de 9 de julio, del Sistema Nacional de Protección Civil. Jefatura del Estado. Spain. Available at: https://www.boe.es/buscar/act.php?id=BOE-A-2015-7730

Plan Territorial de Emergencia de Andalucia 2011 (PTEAnd). Consejeria de Presidencia, Administracion Pública e Interior. Spain. Available at: https://www.juntadeandalucia.es/organismos/sobre-junta/planes/detalle/13531.html

Real Decreto 407/1992, de 24 de abril, por el que se aprueba la Norma Básica de Protección Civil. Bulleting No. 105. Ministerio del Interior. Available at: https://www.boe.es/buscar/act.php?id=BOE-A-1992-9364


### Amsterdam, the Netherlands


Kuipers, S.; Boin, A. (2014). Crisis and disaster management in the Netherlands. A description of structures and processes. Crisisplan BV, The Netherlands. Available at: https://www.preventionweb.net/files/Netherlands-country-report-2014.pdf

TNS Opinion and Social (2009). Civil Protection. Special Eurobarometer 328. Directorate-General Environment & Directorate-General for Communication. Available at: https://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_328_en.pdf

Vandemecum. (2017a). Netherlands – Disaster management structure. Available at: https://ec.europa.eu/echo/files/civil_protection/vademecum/nl/2-nl-1.html

## Limassol, Cyprus

European Civil Protection and Humanitarian Aid Operations (ECHO) (2019): Republic of Cyprus – Overview of the National Disaster Management System. Brussels, Belgium.

Vandemecum. (2017b). Country profiles – Cyprus. Available at: https://ec.europa.eu/echo/files/civil_protection/vademecum/cy/2-cy.html

## Thessaloniki, Greece

European Civil Protection and Humanitarian Aid Operations (ECHO) (2019): Greece – Overview of the National Disaster Management System. Brussels, Belgium.

Vandemecum. (2017c). Country profiles – Cyprus. Available at: https://ec.europa.eu/echo/files/civil_protection/vademecum/cy/2-cy.html

## Sofia, Bulgaria

Acts on Water (amend. and suppl. SG. 12/3 Feb 2017). Ministry of Regional Development and Public Works Bulgaria. Available at: https://www.mrrb.bg/en/act-on-waters/

Disaster Protection Act (amend. SG. 80/14 Oct 2011). Ministry of Economy Bulgaria. Available at: https://www.mi.government.bg/en/library/zakon-za-zashtita-pri-bedstviya-304-c25-m258-1.html

Environmental Protection Act (amend. and suppl. SG. 54/16 Jun 2020). Ministry of Environment and Water Bulgaria. Available at: https://www.moew.government.bg/en/environmental-protection-act-7628/

EU / Good Governance. (2018). Republic of Bulgaria. Advisory Services on a National Climate Change Adaptation Strategy and Action Plan. Assessment of the disaster risk management sector.

European Civil Protection and Humanitarian Aid Operations (ECHO) (2019): Bulgaria – Overview of the National Disaster Management System. Brussels, Belgium.

Forestry Act (SG No. 17/23.02.2018). Ministry of Regional Development and Public Works Bulgaria. Available at: https://www.mrrb.bg/bg/zakon-za-gorite/

Ministry of Environment and Water (2018): Advisory Services on a National Climate Change Adaptation Strategy and Action Plan. Assessment of the Disaster Risk Management Sector. Bulgaria.

Regional Development Act (suppl. SG. 13/7 Feb 2017). Ministry of Regional Development and Public Works Bulgaria. Available at: https://www.mrrb.bg/en/regional-development-act/

Regulation No. 9 on the quality of water intended for drinking and household purposes (State Gazette No. 30, 28 March 2001). Bulgaria. Available at: http://www.fao.org/faolex/results/details/en/c/LEX-FAOC033621/

Safe Use of Nuclear Energy Act (State Gazette No. 26/29.03.2011). Ministry of Energy Bulgaria. Available at: https://me.government.bg/en/library/safe-use-of-nuclear-energy-act-313-c25-m258-1.html

Spatial Development Act (suppl. SG. 62/6 Aug 2019). Ministry of Regional Development and Public Works Bulgaria. Available at: https://www.mrrb.bg/en/spatial-development-act-82421/

## Seoul, South Korea

Ministry of the Interior and Safety (n.d.): Disaster and Safety Communications Network. URL:https://www.mois.go.kr/eng/sub/a03/bestPractices7/screen.do

Ministry of the Interior and Safety (n.d.): Flood Outbreak Forecast & Warning System. URL: https://www.mois.go.kr/eng/sub/a03/bestPractices6/screen.do

Ministry of the Interior and Safety (n.d.): Integrated Disaster and Safety Information System. URL: https://www.mois.go.kr/eng/sub/a03/bestPractices1/screen.do

Ministry of the Interior and Safety (n.d.): Public Safety Map Service. URL: https://www.mois.go.kr/eng/sub/a03/bestPractices5/screen.do

Ministry of the Interior and Safety (n.d.): Safety e-Report. URL: https://www.mois.go.kr/eng/sub/a03/bestPractices2/screen.do

# Annex


## Work Package 3: Requirement analysis, engagement of professionals through Communities of Practice & social engagement

### TASK 3.1.1 Stakeholder Mapping and Analysis

(NAME PILOT CITY)
(DATE of last update to this document + NAME of who last worked on it)

This template aims to facilitate the identification of stakeholders that are relevant to the PathoCERT project and its Communities of Practice (CoP) in the context of the project's multi-stakeholder engagement activities. Through filling out the tables, information will be gathered about the types of stakeholders, their role in emergency management situations and their interaction with PathoCERT.

The template is divided in to different sections:

1. Guidance
2. General details, previous & existing collaborations / contacts
3. Stakeholder's role in the disaster management cycle / processes
4. Stakeholders' interactions with & engagement in PathoCERT

Please fill this questionnaire to the best of your knowledge. If you have any questions, comments or feedback on the questionnaire, please also get back to us anytime!

## 1. GUIDANCE

In this section you will find guidance on how to fill out each of the following tables in sections 2-4. If you are unsure of what information is required from you, please refer back to this guidance section.

| General Details | |
|---|---|
| Name (first name, last name) | Here we would like to collect information on a particular individual within an organised entity (stakeholder). It could be the case that for the same organization/institute/NGO etc. you have more than 1 contact. So always please list all of them. |
| Position in the organisation | It is important to always indicate their position and role in the organisation. This will help to better identify the stakeholders that we want to invite to the different Community of Practice meetings. |
| Is the organisation and/or related contact person a potential candidate for an in-depth interview? | Here we would like you to potentially estimate the stakeholder's understanding and information about the whole sector (also in a systemic manner). It will help us to identify key actors who can provide us more in-depth insights for the baseline analysis and other issues we want to address within the project. Moreover, please try to reflect on the skills and availability of the stakeholder in order to better understand if we could reach out to him/her for a possible interview. For example: is this person fluent in English or not; is he/she easily reachable online and/or via phone; has he/she the time to engage with us in this activity etc. The reason for this is that not all the stakeholders that you will include can be considered best candidates for an interview exercise. |
| Is the organisation and/or related contact person a potential candidate as a local champion? | In the PathoCERT project, "local champions" are defined as citizens and/or non-technical actors known in the local communities already knowledgeable and somehow active in the operating field of FR (e.g. firefighting volunteers) |
| Under which stakeholder cluster would you categorise this stakeholder? | Please choose one or multiple of the listed stakeholders |
| Please describe the organization´s main fields of work/tasks/activities on a more detailed basis. | Every or almost every stakeholder will be affiliated to a specific organization. Accordingly, in this section we would like to gather specific information about the organization´s key fields of work, responsibilities and role. Usually this information is also available on the organization's main webpage. Please note: if this information is only available in the local language, we kindly ask you to translate it. |

| | |
|---|---|
| Please briefly describe previous and/or ongoing collaborations with this stakeholder (if any) | Here we would like to understand the extent to which you have been working with the mentioned stakeholder and under what circumstances. The closer your relationship with them is the easier it might be to reach out/engage the stakeholder in the PathoCERT project activities. |
| Please share any information related to previous and/or current collaborations with the indicated stakeholder | In relation to the above point, it would be great if you could list examples or resources reflecting the specifics of the collaboration. For example, if you have collaborated through a project or activity or just occasionally exchanging and updating each other via newsletters or other communication channels. |

| Stakeholder's role in the disaster response management /cycle process | |
|---|---|
| In which of the 4 stages of the disaster management cycle are they involved in? | The 4 stages are:<br>• **Mitigation** refers to any activity that can reduce or eliminate the risk of a potential hazard occurring.<br>• **Preparedness** refers to developing emergency operation plans and standard operating procedures, including training and other educational activities that address potential hazards.<br>• **Response** begins as soon as the disaster occurs. This stage includes the coordination of emergency first responders, the activation of the emergency operation plans, and any other plans that are pertinent to the emergency response effort.<br>• **Recovery** addresses the basic needs of those affected by the disaster and restoration of the community to pre-incident conditions or as close to pre-incident conditions as possible. |
| What activities does this stakeholder undertake during the mitigation phase? | Based on the definition above, please provide us with specific activities this stakeholder undertakes that can impact or influence the overall mitigation strategies. |
| What activities does this stakeholder undertake during the preparedness stage? | Based on the definition above, please provide us with specific activities this stakeholder undertakes that can impact or influence the overall preparedness strategies. |
| What activities does this stakeholder undertake during the response phase? | Based on the definition above, please provide us with specific activities this stakeholder undertakes that can impact or influence the overall response strategies. |
| What activities does this stakeholder undertake during the recovery phase? | Based on the definition above, please provide us with specific activities this stakeholder undertakes that can impact or influence the overall recovery strategies. |

| | |
|---|---|
| What other activities does the stakeholder undertake that are not directly connected to the disaster management cycle? | Under this category we would like you to include any other field of activity that the indicated stakeholder could undertake which is not directly linked to the disaster management cycle and which is actually linked to its role and status, such as: volunteers supporting local communities affected by the disaster; gatekeepers in the form of "cultural mediators" active in marginal communities and refugee and immigrant populations; civil society organizations etc. |

| Stakeholder's interaction with PathoCERT | |
|---|---|
| Please rate the level of influence that this stakeholder could have on the PathoCERT activities in general and specifically on CoP events and activities in your pilot area | Please reflect about how crucial it is to involve this stakeholder for the PathoCERT activities in order to guarantee the successful implementation of the project´s objectives and achievement of impacts. |
| In which way could the indicated stakeholder contribute to the success of PathoCERT activities in your pilot area? | Linked to the previous evaluation of the stakeholder influence, can you indicate and explain why the stakeholder is important and how he/she could contribute to the project activities in your pilot area. |
| Please rate the level of PathoCERTS's impact on the stakeholder | Please try to estimate what degree of impact PathoCert could have on the stakeholder's operations. |
| Can you please explain why the PathoCERT project is relevant and beneficial to this specific stakeholder? | Linked to the rating of PathoCERT impacts on the stakeholder, we would like to better understand the rationale/reasons of why project´s activities are relevant and beneficial. This mainly depends on to which extent the project´s activities affect their operational settings, roles etc. |
| Which engagement tools are already in use to contact/inform the stakeholder? | With this question we would like to better understand what kind of communication and dissemination tools and channels the stakeholder normally uses to reach out to other stakeholders or citizens, which kind of tools his/her organization normally used to keep itself informed and/or to actively coordinate work on the ground: e.g. app, radio channels, WhatsApp groups, newsletters, Facebook and other social media, tailored websites etc. |

## 2. GENERAL DETAILS, PREVIOUS & EXISTING COLLABORATION / CONTACT

| General details | | |
|---|---|---|
| Contact details | Organisation | |
| | Name (first name, last name) | |
| | Contact details (e-mail address, phone number | |
| | Position in the organization | |
| | City | |
| | Website of the organisation | |
| | Is the organisation and/or related contact person a potential candidate for an in-depth interview?<br>*Please indicate yes or no.* | |
| | Is the organisation and/or related contact person a potential candidate to be a local champion?<br>*Please indicate yes or no.* | |
| Type | Under which stakeholder cluster would you categorise this stakeholder:<br>First Responder, Civil Protection, Public authorities/agencies, utility (water) operators, research, other category<br>If 'multiple' or 'other' apply please describe your categorisation closer in the next row. | |
| | If multiple types apply or you chose "other category", please further define the type | |
| Previous & existing collaborations/ contacts | Please briefly describe previous and/or ongoing collaborations with this stakeholder (if any exist) | |
| | Please share any information related to previous and/or current collaborations with the indicated stakeholder | |

## 3. STAKEHOLDER'S ROLE IN THE DISASTER MANAGEMENT CYCLE / PROCESS

Brief definition of each stage:

- **Mitigation** refers to any activity that can reduce or eliminate the risk of a potential hazard occurring.
- **Preparedness** refers to developing emergency operation plans and standard operating procedures that address potential hazards.
- **Response** begins as soon as the disaster occurs. This stage includes the coordination of emergency first responders, the activation of the emergency operation plans, and any other plans that are pertinent to the emergency response effort.
- **Recovery** addresses the basic needs of those affected by the disaster and restoration of the community to pre-incident conditions or as close to pre-incident conditions as possible.

| Stakeholder's role in the disaster management cycle /process | | |
|---|---|---|
| What is their role in different stage of the disaster management cycle? | In which of the 4 stages of the disaster management cycle are they involved?<br>Please choose one or multiple: Mitigation, Preparedness, Response, Recovery | |
| | What activities does this stakeholder undertake during the mitigation phase? | |
| | What activities does this stakeholder undertake during the preparedness phase? | |
| | What activities does this stakeholder undertake during the response phase? | |
| | What activities does this stakeholder undertake during the recovery phase? | |
| | What other activities does the stakeholder undertake that are not directly connected to the disaster management cycle? | |

## 4. STAKEHOLDER'S INTERACTION WITH & ENGAGEMENT IN PATHOCERT

| Stakeholder's interaction with & engagement in PathoCERT | | |
|---|---|---|
| Benefits for the PathoCERT activities | Please rate the level of influence that this stakeholder could have on the PathoCERT activities in general and specifically on CoP events and activities in your pilot area. | |
| | In which way could the indicated stakeholder contribute to the success of PathoCERT activities in your pilot area? | |
| Benefits for the stakeholder | Please rate the level of PathoCERTS's impact on the stakeholder.<br>Please indicate: High, Medium, Low | |
| | Can you please explain why the PathoCERT project is relevant and beneficial to this specific stakeholder? | |
| | In which PathoCERT technologies could the stakeholder be particularly interested in?<br>Please choose one or multiple: PathoSENSE + PathoGLOVES, PathoTHREAT, PathoSAT, PathoINVEST, PathoTWEET, PathoVIEW, PathoIMS, PathoDRONE, PathoWARE, All of pilot/CoP technologies, other | |
| | Could you please further explain why this stakeholder is interested in the selected PathoCERT technologies/procedures? | |
| Envisioned role of the stakeholder in PathoCERT | What do you think is the best way to collaborate/engage with this stakeholder in PathoCERT?<br>Please indicate one or more of the following:<br>1. In the local CoP activities<br>2. In other PathoCERT activities (e.g. WP8)<br>3. Only relevant for outreach/informing them about PathoCERT activities | |
| | Which engagement tools are already in use to contact/inform the stakeholder? | |


# Work Package 3: Requirement analysis, engagement of professionals through Communities of Practice & social engagement

## TASK 3.1.2 BASELINE REQUIREMENT ANALYSIS

(NAME PILOT CITY)
(DATE of last update to this document + NAME of who last worked on it)

This questionnaire aims at enhancing our knowledge of the current emergency response and disaster management system in each pilot city or region that are involved in the PathoCERT project. From the main actors involved, through to the main management processes of emergency response processes.

The questionnaire is divided in to different sections:

1. Pilot city - general data
2. Current Standard Operating Procedures (SOPs) & related technologies
3. Legislation
4. Local & regional social awareness & engagement activities
5. Other relevant data

Please fill this questionnaire to the best of your knowledge. If you have any questions, comments or feedback on the questionnaire, please also get back to us anytime!

## 1. PILOT CITY - GENERAL DATA

| | | | |
|---|---|---|---|
| *Name of the pilot city* | | | |
| *Population* | | | |
| *Demographic distribution* | | male | female |
| | 0-17 years | | |
| | 18-64 years | | |
| | 65+ | | |
| *What are the most common types of disasters the city or region has faced in the past?* | | | |

## 2. CURRENT STANDARD OPERATING PROCEDURES & RELATED TECHNOLOGIES

In this section, we want to take a closer look at the emergency response management system/strategies in your pilot city or region as well as at Standard Operating Procedures (SOPs), and related existing practices.

***Please note: For each question, please elaborate by providing as much information and details as possible.***

| *Standard Operating Procedures (SOPs)* | |
|---|---|
| *Are there existing government approved standard operating procedures (SOPs) in place? If yes, please list them and provide some more information on how they are structured, and what they entail.* | |
| *Please include specific links/documents in English (if available) or in the local language, of all listed SOPs above.* | |
| *Are the SOPs general or are they tailored according to specific disaster types and related magnitude? If yes, please indicate which type of disaster and magnitude the listed SOPs address (i.e. biological pollution, organic etc.).* | |
| *Are these SOPs up to date (i.e. accounting and considering of all* | |

| | |
|---|---|
| *new resources/tools, new ways of operating, stakeholders etc.)? When was the last time these SOPs were revised and updated?* | |
| *Is the organizational structure and operating system (including roles and responsibilities of various actors) defined in the SOPs?* | |
| *Are the existing and applied SOPs the same in the whole country and/or do they differ depending on the region/city? If the latter is the case, please describe in which aspects they are different and why.* | |
| *How effective are targeted actors in following and implementing the SOPs when dealing with a disaster management and/or any other emergency situation? What contributes to their degree of effectiveness?* | |
| *Is there a good coordination and collaboration among first responders and other actors when dealing with an emergency situation? What are the main reasons for it?* | |
| *What, in your opinion, are further shortcomings in the current disaster management operation procedures (if not touched upon the previous questions)? What are the main reasons for them?* | |

| *SOPs - related technologies & information* | |
|---|---|
| *What technological tools are already available for easing and making the management of emergency responses more effective for FRs?* | |

| | |
|---|---|
| *How are the respective / targeted actors trained in the use of such technologies and related procedures?* | |
| *What are the main existing shortcomings for an effective utilisation of technological and other available resources? (please think in terms of economic, legal, technological, usability by different actors and/or similar)* | |
| *What is the level of flexibility for integrating new technological and other solutions into existing emergency response operational plans?* | |
| *What barriers could limit the integration of new technologies and procedures? (please think in terms of economic, legal, technological, usability by different actors and/or similar)* | |
| *What kind of financial resources (yearly, bi-annually etc.) are available for improving the emergency situation response mechanisms and technologies? (e.g. buying of new devices, organizations of local trainings, participation in international trainings etc.)* | |

## 3. LEGISLATION

In this section please include the information related to current relevant legislation that supports or hinders the effective operations within the emergency response system from mitigation, planning, response to recovery stage.

Brief definition of each stage:

- **Mitigation** refers to any activity that can reduce or eliminate the risk of a potential hazard occurring.
- **Preparedness** refers to developing emergency operation plans and standard operating procedures that address potential hazards.

- **Response** begins as soon as the disaster occurs. This stage includes the coordination of emergency first responders, the activation of the emergency operation plans, and any other plans that are pertinent to the emergency response effort.
- **Recovery** addresses the basic needs of those affected by the disaster and restoration of the community to pre-incident conditions or as close to pre-incident conditions as possible.

If you are aware of potential future legislation that is currently under discussion, please also refer to them.

*Please note: use one table per law or regulation in case the provided tables will not be sufficient please create additional ones by copying-pasting an empty table.*

| *Title of the legislation* | |
|---|---|
| *Level of application level (local/ municipal/regional/national/EU)* | |
| *Date that it came into force* | |
| *Goals of the legislation* | |
| *What are the implications for your pilot city and related emergency response strategies?* | |
| *Has it already been effectively implemented and enforced in your pilot city? If not, what are the barriers?* | |
| *Other remarks* | |

| *Title of the legislation* | |
|---|---|
| *Level of application level (local/ municipal/regional/national/EU)* | |
| *Date that it came into force* | |
| *Goals of the legislation* | |
| *What are the implications for your pilot city and related emergency response strategies?* | |

| | |
|---|---|
| *Has it already been effectively implemented and enforced in your pilot city? If not, what are the barriers?* | |
| *Other remarks* | |

| | |
|---|---|
| *Title of the legislation* | |
| *Level of application level (local/ municipal/regional/national/EU)* | |
| *Date that it came into force* | |
| *Goals of the legislation* | |
| *What are the implications for your pilot city and related emergency response strategies?* | |
| *Has it already been effectively implemented and enforced in your pilot city? If not, what are the barriers?* | |
| *Other remarks* | |

| | |
|---|---|
| *Title of the legislation* | |
| *Level of application level (local/ municipal/regional/national)* | |
| *Date that it came into force* | |

| | |
|---|---|
| *Goals of the legislation* | |
| *What are the implications for your pilot city and related emergency response strategies?* | |
| *Has it already been effectively implemented and enforced in your pilot city? If not, what are the barriers?* | |
| *Other remarks* | |

| | |
|---|---|
| *Title of the legislation* | |
| *Level of application level (local/ municipal/regional/national/EU)* | |
| *Date that it came into force* | |
| *Goals of the legislation* | |
| *What are the implications for your pilot city and related emergency response strategies?* | |
| *Has it already been effectively implemented and enforced in your pilot city? If not, what are the barriers?* | |
| *Other remarks* | |

## 4. LOCAL & REGIONAL SOCIAL AWARENESS & ENGAGEMENT ACTIVITIES

| *Existing Awareness & Engagement Activities* | |
|---|---|
| *How is the broader population usually informed/made aware about existing emergency plans?* | |
| *In your opinion, does the current level of knowledge and information enable the population to behave properly in emergency situations? Please elaborate on your reasoning.* | |
| *What kind of engagement and awareness-raising activities have been carried out or are currently being executed in your pilot city or region to improve peoples response to emergency / disaster situations?*<br><br>*Who is responsible for planning and carrying out these activities?* | |
| *What influence did past activities have on people's understanding and response in past emergency / disaster management situations?* | |
| *In your opinion, what are key shortcomings in the current awareness and engagement activities and what are the main reasons for it?* | |

## 5. OTHER RELEVANT DATA

| *COVID-19 impacts*<br><br>*Please list and describe existing and potential COVID-19 related impacts in your pilot city-region with respect to the four stages of a disaster management, including the impact on respective stakeholders and/or local communities.* | |
|---|---|
| *Mitigation* | |
| | |
| | |
| | |
| *Preparedness* | |
| | |
| | |
| | |
| *Response* | |
| | |
| | |
| | |
| *Recovery* | |

| | |
|---|---|
| | |
| | |
| | |
| | |
| | |

| *Promising Practices*<br><br>*Are you aware of other cities or regions in your country which can be considered success stories in terms of effective and successful emergency response planning and procedures? If yes, please describe it/them and also share related information in the forms of links/documents. Please feel free to provide information and consider activities that go beyond the management of water-borne disaster emergency cases.* | |
|---|---|
| *Description of promising practice* | Website, links, documents |
| | |
| | |
| | |
| | |
| | |

| *Social Awareness Raising & Engagement: Promising Practices*<br><br>*Are you aware of promising social awareness and engagement activities from other cities or regions in your country? If yes, please list all of them including references to website links. Please feel free to provide information and consider activities that go beyond the management of water-borne disaster emergency cases.* | |
|---|---|
| *Description of promising practice* | Website, links, documents |
| | |
| | |
| | |
| | |
| | |
| | |

| *Additional Aspects*<br><br>*Are there any additional aspects on the emergency response management system in your pilot city or region you would like to mention that are not sufficiently covered above? Please list them here.* | |
|---|---|
| *Description of additional aspects* | Websites, links, documents if available |
| | |
| | |
| | |
| | |
| | |
| | |