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ABSTRACT

The CORE (sCience & human factOr for Resilient sociEty) project deals with human factors and social, societal, and organisational aspects for disaster-resilient societies. CORE aims to identify and use best practices, knowledge, and learnings from certain countries which experienced high levels of different hazards (e.g., seismic, and volcanic risks in Italy). The overall objective of CORE is to develop a harmonised vision of crisis management, awareness, and capability. Thereby, Work Package 4 (WP4) focuses on three types of cascades that impact the security of supply, including cascading events or disasters, cascading impacts of disaster risk reduction (DRR) decisions across sectors, and cascading through supply chain disruptions. The main aims of WP4 are to (1) map the causes of detrimental impacts on the security of supply through these cascades; (2) establish the directions and the links between events, sectors, and supply chain disruptions; (3) produce a framework that assesses the risks of potential cascades of DRR decisions across sectors events, and supply chains; and (4) raise awareness for the impact of supply chain disruptions on the security of supply. This report (Deliverable 4.2) presents a comparative analysis and case briefs of preparedness and security of supply. We map how the security of supply is organised within disaster management and discuss DRR frameworks of selected EU countries (i.e., Finland, Sweden, Italy, and Austria). This report presents the differences in preparedness and DRR mechanisms concerning pre-positioning, training, framework contracts, and supplier management. We also discuss how preparedness activities result in societal resilience in these case countries.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

Abbreviation / acronyms	Description
72h	72 hours campaign
AMR	Antimicrobial Resistance
CECIS	Common Emergency and Information System
CEP	NATO Civil Emergency Planning
CER	Critical Entities Resilience
CORE	sCience & human factOr for Resilient sociEty
COVID-19	Novel Coronavirus Disease
DG ECHO	Directorate-General for European Civil Protection and Humanitarian Aid Operations
DRR	Disaster risk reduction
EC	European Commission
ECI	European Critical Infrastructure
EU	European Union
EEA	European Environment Agency
EPCIP	European Programme for Critical Infrastructure Protection
ERCC	Emergency Response Coordination Centre
FAC	Federal Alarm Centre
FRC	Finnish Red Cross
GDP	Gross Domestic Product
HAN	Hanken School of Economics
HERA	Health Emergency Preparedness and Response Authority

HFA	Hyogo Framework for Action
HO	Humanitarian Operations
HUMLOG	Humanitarian logistics and Supply Chain Research Institute
IEA	The International Energy Agency
IFRC	International Federation of Red Cross and Red Crescent Societies
LWZ	Provincial alarm centres
MPK	National Defence Training Association of Finland
MSB	Swedish Civil Contingencies Agency (In Swedish: Myndigheten för Samhällsskydd och Beredskap)
NATO	North Atlantic Treaty Organization
NCI	National Critical Infrastructures
NESA	National Emergency Supply Agency
NGO	Non-governmental organisation
NIS-I	Security of network and information systems
OECD	Organisation for Economic Co-operation and Development
OGS	National Institute of Oceanography and Applied Geophysics
PfP	NATO Partnership for Peace
PPE	Personal Protective Equipment
rescEU	European reserve of resources
SDG	Sustainable Development Goals
SFDRR	Sendai Framework for Disaster Risk Reduction
SIZ	Safety Information Centres

SKKM	National Crisis and Disaster Management System (Austria)
SPEK	Finnish National Rescue Association
UN	United Nations
UNHRD	United Nations Humanitarian Response Depot
UNISDR	United Nations International Strategy for Disaster Reduction
Vapepa	Voluntary Rescue Service
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organisation

INTRODUCTION

In this report (deliverable 4.2), we present a comparative analysis and case briefs of preparedness and security of supply. We describe how the security of supply is organised within disaster management and discuss the DRR frameworks of selected EU countries, namely Finland, Sweden, Italy and Austria. This report presents the differences in preparedness and DRR mechanisms concerning pre-positioning, training, framework contracts, and supplier management. This deliverable also discusses how preparedness activities result in societal resilience of these case countries. This report consists of six parts: i) introduction giving the background; ii) methodology of our research effort; iii) literature review describing the main concepts; iv) cases summarizing the country-specific findings; v) comparative analysis of the cases; and vi) overall conclusion.

COVID-19 has shown gaps in European society's preparedness level for disasters, highlighting the importance of increasing risk awareness, which ensures a direct positive impact on citizens' and organisational resilience among people and decision-makers in Europe. There is indeed a need to strengthen disaster resilience at the level of municipalities, Member States and EU agencies, which must consider the diversity of European society and the variability of human and societal factors. The complexity of disaster preparedness and response is one of the most relevant challenges for people and organisations in charge of disaster risk reduction (DRR). An appropriate component of such complexity relies on the wide diversity in levels of vulnerability, risk awareness, safety culture, and social and scientific trust among interested populations either at a regional, national or European scale. The increase in risk is driven by more and more complex and interdependent urban systems and urban-rural inter-linkages. Population vulnerability is compounded by pre-existing and new risks such as climate change, terrorism, pandemics, cyber-attacks and hybrid threats. A lesson learned from the recent COVID-19 crisis is that risk is systemic, and crises are cascading. Disasters can have cascading effect and lead to secondary effects, threatening and jeopardising human lives. Furthermore, even if everyone is affected by the current crisis, not everyone is equally affected, for example, children, women, the elderly, people with disabilities, poorly educated people, and low-income are the most vulnerable categories that need to be considered during disaster preparedness.

The CORE (sCience & human factOr for Resilient sociEty) project deals with human factors and social, societal, and organisational aspects for disaster-resilient societies. The CORE project aims to identify and use best practices, knowledge, and learnings from certain countries threatened by multiple hazards. Thereby, WP4 focuses on three types of cascades that impact the security of supply, including cascading events or disasters, cascading impacts of disaster risk reduction (DRR) decisions across sectors, and cascading through supply chain

disruptions. The main aims of WP4 are to (1) map the causes of detrimental impacts on the security of supply through these cascades; (2) establish the directions and the links between events, sectors, and supply chain disruptions; (3) produce a framework that assesses the risks of potential cascades of DRR decisions across sectors events, and supply chains; and (4) raise awareness for the impact of supply chain disruptions on the security of supply.

This is also in line with the recent EU directive for Critical Entities Resilience (CER), which was initiated partly owing to the challenges faced in the EU due to COVID-19 and, consequently, the need for new directives in the ever-changing risk landscape. The directive focuses on enhancing the resilience of critical entities, which provide essential services that are crucial for the maintenance of vital societal functions, economic activities, public health and safety, and the environment. These entities must be able to withstand hybrid attacks, natural disasters, terrorist threats, and public health emergencies. The sectors covered by the directive include energy, transport, health, drinking water, wastewater, and space, among others, and central public administrations may also be included in the coming years. According to the new directive, the EU member states are required to have a national strategy for enhancing resilience, conduct risk assessments every four years, and identify critical entities. These entities then must identify risks that may disrupt essential services, take appropriate measures to ensure resilience, and notify any incidents to the competent authorities. The directive also establishes rules for identifying critical entities of European significance, which are entities that provide essential services to six or more member states. The Commission may be requested to organize an assessment or propose one with the agreement of the member state.

METHODOLOGY

This report focuses on gathering evidence on disaster preparedness, security of supply and societal resilience across selected EU countries. This study was guided by the following overarching research question:

How is the security of supply organized within the disaster management and DRR frameworks of selected European countries?

The research team consisted of three project researchers and a principal investigator. Moreover, CORE partners were identifying and facilitating access to interviewees in their respective countries. The methodology of collecting data was divided into two stages. In the first stage, literature on disaster preparedness, security of supply, and societal resilience across various EU countries was sieved through to find all relevant information regarding disaster preparedness, security of supply, and societal resilience. In the second stage, semi-structured interviews were conducted with relevant personnel in the selected EU countries to gather missing information and validate information found in the literature. This research adopts an exploratory case study approach (Eisenhardt, 1989; Yin, 2009) using multiple cases. This is because, in supply chain management and operations management research, it is common to have a case study design with 3 to 11 cases (Pagell & Wu, 2009). In our study, we used four case countries, including Finland, Sweden, Italy, and Austria. The number of cases is determined by the theoretical saturation of information from the respondents (Eisenhardt, 1989). Of these cases, most interviews were conducted in Finland (10), followed by Sweden (7), Austria (2) and Italy (2). In total, 23 interviews with 26 interviewees, were conducted and out of those 20 interviews, from four countries, were included in the analysis. Only countries where data saturation was achieved are included in comparative analysis. In addition to interviewees, CORE project partners, involved in WP4, from Italy, Austria, Sweden and Finland contributed with their own, country-related expertise. Feedback from WP4 partners was also sought in the final stage of the report writing and validating the information provided on their countries. The final draft of the report was then reviewed by CORE partners. Comments from partners from each of the selected countries and internal project review were then incorporated before the final version was submitted.

Case selection

The strategy adopted for selecting cases is maximum variation among the cases to cover a wide range of sectors and to capture differences among the cases (Flyvbjerg, 2006). A theoretical sampling approach is adopted following the underpinnings of Eisenhardt (1989) and Miles & Huberman (1984) and examples of well reputed case studies (e.g., Pagell & Wu, 2009; Wu & Choi, 2005) in supply

chain management and operations research. The rationale behind choosing multiple countries was to make the findings relevant to different EU countries. Furthermore, focusing on a single country may not capture the wide spectrum of aspects related to disaster preparedness, security of supply, and societal resilience. Multiple cases enable a comparative approach and benchmarking for best practices among different countries. Table 1 presents the final set of case countries that are varied depending on area, population, and GDP.

In the global state resilience index, Finland and Sweden are on a shared top-2 position, Austria has 10th place, Italy is on the 26th place (Fund For Peace, 2022).

Table 1: An overview of the case countries (Source: Eurostat, 2020)

Countries	Area	Population size	Gross domestic product (GDP)	GDP Per-capita (in USD)
Finland	338,455 km^2	5,553,000	$267.61 billion	37240
Sweden	450,295 km^2	10,481,937	$603.92 billion	44820
Italy	301,230 km^2	58,853,482	$2.058 trillion	26700
Austria	83,871 km^2	9,027,999	$267.61 billion	36950

Data collection

The case study database was created using two principal sources of data. The first source was secondary data, including academic papers and reports on the countries' disaster preparedness, security of supply, and societal resilience. The second source was the data collected through semi-structured interviews. A comprehensive interview protocol (Appendix-1) was used for data collection and customised for each interview. The data was collected over a period of 11 months from April 2022 to January 2023. After the careful selection of cases, respondents were selected based on the following criteria:

- The first criterion was to identify organisations within a country that are responsible for ensuring the security of supply and disaster preparedness.
- The second criterion was to observe disaster preparedness at different levels. For at least one case country, i.e., Sweden, it could be ensured that the data were collected at multiple levels: local, regional, and national levels.
- The third criterion was to collect data from different organisations involved in disaster preparedness and response. This was ensured while collecting data from Finland, where data were collected from multiple organisations that ensure the security of supply and disaster preparedness.

Comparative analysis and case briefs of preparedness and
security of supply
D 4.2

A total of 23 interviews were conducted among 26 interviewees from six countries, namely Finland, Sweden, Austria, Italy, France, and Switzerland. The interviews were conducted between September 2022 and January 2023. From the initial list of six countries four were included in the analysis, including those with enough interview data or secondary data provided by the project partners to support the interviews. Their years of experience in the field of disaster preparedness ranged between 4 and 30 years of experience. Their organizations covered: municipal, regional, and national public organizations, expert organizations, volunteer organizations, training organizations, an educational institute and a public enterprise. An anonymised list of interviewees is included in Annex 2, as an appendix.

Data analysis

The data analysis was conducted in two stages including a within-case analysis and a cross-case analysis. During the within-case analysis, the data was reduced by structuring the data in a more understandable manner (Miles & Huberman, 1984). All the interviews were conducted in English and afterwards transcribed verbatim. In one interview, both English and Finnish were used. Each interviewee was assigned a participant code P (P1 - P14) or R (R1 – R11) according to their country of origin. For this research, the transcription files for each case country were substantiated by interview notes and publicly available information. The interview length averaged around 60 minutes. As most of the data are text-based, the within-case analysis had several components according to the interview protocol used and customised for each interview. First, data about the respondents and the organizations they represent were sought from the interviews and secondary sources. Second, information was sought on disaster preparedness. In this step, how a case country prepares for disasters using strategies such as prepositioning, training, supplier management, and framework contracts were identified. Third, how the security of supply is ensured at the country level is jotted down. This step is cross-referenced with the literature review section to recognize already identified security of supply strategies at the country level. Fourth, respondents were asked about COVID-19 and how they have activated various preparedness mechanisms. Last, the respondents were asked to add any further information that the interview protocol missed. The end process of the within-case analysis was to prepare a concise description of disaster preparedness for each case country. Verbatim quotes from interviewees were used to illustrate the findings and analysis. The cross-case analysis was conducted comparing preparedness systems, citizens' home preparedness, prepositioning, training, framework contracts, and supplier management in the case countries.

Overview of the case study design and methodology

The research process was as follows.

- *Data collection*
  - Literature review: consisting of A) Academic literature: disaster preparedness, security of supply and societal resilience and B) Country specific reports: disaster preparedness, security of supply and societal resilience
  - Interviews: semi-structured interviews
    - Interview protocol prepared
    - CORE partners contacted to provide interview contacts and/or access to country specific secondary data in their countries via email, in CORE consortium meeting and CORE monthly meetings
    - Interviewees contacted
    - Interviews conducted
- *Data analysis and write up.*
  - Interviews transcribed
  - Analysis of the literature
  - Analysis of the interview data: consisting of A) within case analysis, and B) cross-case analysis
  - Reporting findings from the literature and interviews, including quotes from the interviewees
  - CORE partners contacted to cross-check, validate, and expand the country-specific findings

The study is comparative in nature and besides contributions has also several limitations. First, only in few countries enough interviewees could be reached to achieve data saturation. Moreover, because of this, numbers of interviewees per country are not equal neither do they represent the size nor the complexity of the countries' disaster preparedness systems. There are several potential reasons for this. First, due to the urgency and timeliness of the topic, experts in this field are busy with operational issues and were not available for research-based interviews. This was especially related to ongoing involvement of different agencies in the response to the full-scale Russian invasion in Ukraine. Some data were also restricted due to confidentiality aspects. Second, the research team in WP4 was based in one of the countries (Finland) which led to a difficulty in identifying and contacting relevant personnel for interviews in other case countries. While the primary authors of this report did reach out to other CORE project partners in respective case countries to establish contacts with

interviewees in their countries, issues related to language, accessibility, time constraints etc. led to a fewer number of interviews conducted in other case countries with respect to Finland. Furthermore, the profiles of the experts interviewed in each country differed. This is also due to the fact each country has a different way of organizing their disaster management system with specific legal and administrative structures which are often not ideal for a one-to-one comparison. This has also been a challenge while drawing comparisons to achieve generalisability of finding as well as the transferability of the recommendations to other countries.

LITERATURE REVIEW

This section reviews literature about the core concepts of deliverable 4.2, which are disaster preparedness, security of supply, and societal resilience. Security of supply is described across the health-energy-food-water nexus. We also subscribe to the idea that disaster preparedness is ensured by strategic prepositioning of inventories, training of personnel, supplier management, and framework contracts. Therefore, in this section, we also review the literature on these four aspects.

Disaster Preparedness

Definitions and terms used for 'disaster' in the crisis preparedness systems vary from one country to another. The European Environment Agency (EEA) defines a disaster as a severe event that disrupts the functioning of society and causes material, human, and environmental losses. A disaster typically impacts the ability of inflicted society to cope with the disaster relying only on its own resources. Disasters are often classified according to their cause (natural or man-made) (European Environment Agency, 2021). DG ECHO's definition (DG ECHO, 2021) of the term disaster includes all events, as follows:

- Natural hazards such as earthquakes, cyclones/hurricanes, storms, tsunamis, floods, and droughts.
- Conflict and violence.
- Disease outbreaks, epidemics, and pandemics such as Ebola or Covid-19.
- Technological and industrial hazards such as chemical accidents.

DG ECHO (European Civil Protection and Humanitarian Aid Operations) considers both man-made and natural disasters (DG ECHO, 2023). The European Commission (EC) understands them as events or series of events which represent a critical threat to the health, safety, security or well-being of a community or other large group of people. A humanitarian crisis can have natural or human-induced causes, can have a rapid or slow onset and can be of short or long duration. (DG ECHO, 2023.)

The concept of preparedness, on the other hand, emerged from military operations during the Second World War and the Cold War and was first applied to civilian affairs in the 1970s (Hémond & Robert, 2012). According to Hémond & Robert, (2012), preparedness is a continuous process of improving interventions and ensuring recovery in the context of disaster management or emergency measures.

According to DG ECHO (DG ECHO, 2021), disaster preparedness consists of a set of measures undertaken by governments, organisations, communities, or individuals to better respond and cope with the immediate aftermath of an anthropogenic or natural disaster. The objective of preparing for a disaster is to reduce the loss of life and livelihoods. Initiatives that go a long way in

preparedness are training for search and rescue, establishing early warning systems, developing contingency plans, and stockpiling equipment and supplies. These preparedness activities play a vital role in building the resilience of communities towards any disaster.

Preparedness can also be used as a response capability or as a tool for emergency measures management (Hémond & Robert, 2012). Although preparedness does not address the structural causal factors of disasters, it complements the longer-term risk management strands (Prevention and Recovery) that sit within a developmental approach and are within the remit of other services of the EC (DG ECHO, 2021).

Prepositioning

Prepositioning means positioning strategic resources, supplies, and assets before a disaster strikes so that the supply chain burden is reduced and response to disasters can be accelerated (Sabbaghtorkan et al., 2020). According to Sabbaghtorkan et al. (2020), prepositioning is a complex concept. Therefore, it is important to define it in the disaster response and humanitarian operations (HO) context. It is also elemental to distinguish between national and international contexts and understand the complexities of prepositioning.

Prepositioning of resources and supplies happen during the preparedness phase for either a short or long term. Resources may be broadly classified as equipment, supplies, and personnel. For instance, prepositioning of equipment and personnel to be used for search and rescue at strategic place is a form of prepositioning. Another example can be that of critical supplies, which on the other hand, include things that need to be replenished after a while like water, food, medicines, and blankets (Sabbaghtorkan et al., 2020).

The primary role of prepositioning in a disaster is to improve preparedness. Preparedness activities have been undertaken at various levels, such as national, regional, local, and individual levels within a country and may or may not be supported by or linked to other countries and/or international aid organisations. The key challenge here is varying definitions and standards between national and international regulations. Therefore, decisions to locate items as well as allocate resources are key for prepositioning relief items (Kovács & Spens, 2009).

While each country might decide on the preparedness plans based on their own requirement, the international agencies take a more generic approach while making strategic plans for the preparedness activities especially in terms of stocking up supplies. It is often observed that a network of humanitarian aid organisations can also store items together and place them strategically important locations across the globe. For instance, United Nations Humanitarian Response Depots (UNHRD) hold blanket stocks, and when a disaster strikes, these items are allocated to specific organisations (Jahre et al., 2016).

Kitting is another essential concept that needs to be considered for prepositioning resources and supplies (Balcik et al., 2010). Kitting means putting items that would be required for a particular activity (e.g., vaccination) together. So, for instance, a vaccination kit will contain items such as gloves, masks, syringes, vaccines, needles, and alcohol pads. An example of such kitting is inter-agency-health-kits prepared by organisations such as World Health Organisation (WHO) (Vaillancourt, 2016). Other examples are hygiene, medical, and test kits (di Pasquale et al., 2020). While kitting is an important concept in prepositioning and preparedness, it is imperative to ensure the usability of items along with standardisation, modularisation, and perishability of different items, while ensuring the wastage to be minimal (Sabbaghtorkan et al., 2020).

Prepositioning has several benefits. Prepositioning of items reduces emergency response times as well as costs associated with the procurement of goods during an emergency (di Pasquale et al., 2020). Prepositioning can also help to overcome shortages of supply. For instance, during the COVID-19 pandemic, severe shortages of items such as personal protective equipment (PPE), test kits, and vaccines were incurred (Kumar et al., 2022). Prepositioning also helps to overcome inadequate capacities. For instance, the capacity to produce test kits or vaccines can be limited. In such cases, prepositioning tests and vaccines can minimise the adverse effects of capacity inadequacies. However, prepositioning also generates costs, requires stock monitoring, management, and replenishment to avoid obsolesce of goods stored.

Training

Education and training are integral to emergency preparedness. Professionals such as fire brigades, emergency medical services, and search and rescue operation personnel need training to better prepare for disaster response (Ingrassia et al., 2014). Acquiring knowledge about disasters and using knowledge to combat disasters is one of the most effective ways to minimise the adverse effects of disasters, as well as an effective way to prevent disasters (Adiyoso, & Kanegae, 2012). Training can be defined as a process of acquiring knowledge, skills, and abilities systematically and developing the necessary competencies for performing effectively in the work environment (Nazli et al., 2014).

During a disaster, the role of first responders and professionals is essential, which emphasises the need for educational programs that are standardised. According to Ingrassia et al. (2014), there were at least 141 educational training programs for disaster management in different member states of the European Union. For instance, the European Union Civil Protection Mechanism and the Emergency Response Coordination Centre (ERCC) use a web-based platform, namely the Common Emergency and Information System (CECIS), to exchange information with participating states. An exercise programme and training are provided to support CECIS functions (European Commission, 2021b).

According to Torani et al., (2019), target groups for a disaster training program can be categorised into three classes: (1) vulnerable people; (2) second-line teachers; (3) rescuers and first responders. Vulnerable people include women, children, seniors, and people with disabilities. The second-line teachers are governors, policymakers, personnel from local authorities, schoolteachers, and university professors. The rescuers and first responders are doctors, nurses, firefighters, police force, and volunteers.

According to the guidance note of DG ECHO (2021), education activities on disaster preparedness can include the following:

- Identification of threats and crises as well as how to prepare and reduce risks,
- How to plan for disaster as well as how to develop safety management, emergency response, disaster preparedness, and disaster risk reduction (DRR) plans?
- How to teach children lifesaving skills?
- How to create gender and age-appropriate messages?
- How to preposition materials?
- How to incorporate hazard related features in buildings and rehabilitation centres?
- How to evacuate on time?

Apart from the above training contents, other training materials can include knowledge of:

- Disaster and their impacts.
- National arrangements for disaster preparedness.
- How various disaster preparedness organisations work individually, collectively, and with national authorities during an emergency?
- How to source supplies and services (Prizzia, 2008).

The EU has set up Union Civil Protection Mechanism Training Programme, which since 2004 has trained over 8000 participants in EU member states and third countries. The participants are disaster management and civil protection personnel as well as national contact points during a disaster. The principal objectives of the training program are to teach the participants disaster management principles and introduce them legal framework for civil protection and humanitarian aid. The program also provides information on logistical challenges during international deployments within and outside the EU (European Union, 2016).

Supplier Management

Supplier management in humanitarian and disaster response operations is different from that of the commercial supply chain (Wagner, 2020). Humanitarian and disaster response operations are performed under uncertain conditions because disasters vary in scale, nature, geographic area, and requirement for assistance, which in turn makes the supply chain challenges unique in comparison to commercial operations. Furthermore, operational environment of a disaster-stricken is highly uncertain because of damaged infrastructure, roads, and broken communication systems (Keshvari Fard & Papier, 2021). Hence, organisations and governments while planning for disasters often need suppliers who can manage the uncertainty and scarcity of items in the aftermath of a disaster.

Consequently, sourcing aid items are unpredictable and require three steps. First, it is essential to identify what (e.g., vaccines, PPEs, shelters) is needed, where and how much is needed. If the existing suppliers and use of prepositioned goods cannot cover the required items, then the second step is to identify alternative suppliers. The third step is to order and ensure that the items necessary reach the location of the disaster at the right time and in the right quantity (Wagner, 2020).

Due to the nature of operational characteristics of disaster environment, mechanisms, and tools to manage suppliers in commercial supply chains cannot be implemented directly. For instance, penalty fees and over-booking are generally not observed in the relationship between humanitarian aid organisations and suppliers. As a result, risks and costs are not shared between suppliers and aid organisation as it is shared in commercial supply chains (Berenguer & Shen, 2020).

Furthermore, most humanitarian and disaster response organisations in this space follow public procurement rules and regulations. Consequently, suppliers are also required to follow a set of guidelines and must be given equal access and opportunity. Transparency of the sourcing process is important as well as equitable and fair treatment of suppliers is essential. General guidelines include clauses like at least three qualified suppliers must participate in the bidding process, a committee should select the winning bid, and the contract is given based on cost and quality as well as the capacity of delivery of the supplier. The strict nature of public procurement often makes the procurement process slow and less responsive (Wagner, 2020).

Moreover, in the aftermath of disasters, relief organisations also often receive in-kind donations from individuals or local businesses. However, relief organizations cannot depend on these donations since they are highly uncertain and can affect the regular sourcing of procured supplies. Uncertainty is not only in terms of availability of the in-kind donations but also the nature and quality of the material being donated. Often it can be seen that the in-kind donations do not meet the

product specifications and might clog up the supply chains or storage depots. Thus, in the disaster response situations there is need to balance in-kind support, local procurement, and cash interventions (Piotrowicz, 2018). Another aspect of the disaster related procurement is the timing. Often, the bulk of required quantities are procured after a disaster occurs. Thus, the responsiveness and the dependability of the supplier become paramount considerations during the supplier selection and procurement process (Berenguer & Shen, 2020).

Additionally, to get the necessary buying power, joint procurement is often conducted in disasters (Keshvari Fard & Papier, 2021). For instance, during COVID-19, the EU purchased the vaccine jointly and then allocated vaccines to the member states (Vogler et al., 2021). Although joint purchasing has a multitude of benefits, such as lowering costs and enhanced supplier selection process, it also has the disadvantage of the procurement process taking a long time (Herlin & Pazirandeh, 2015).

Framework agreements and contracts

Framework agreements are a form of long-term agreement with suppliers for streamlining procurement processes, ensuring the availability of emergency stocks, quick delivery, and cost-effective procurement to hedge against the uncertainties in the humanitarian and disaster procurement. Framework agreements with suppliers is a standard practice in humanitarian and disaster procurement (Wang et al., 2019). Such agreements with suppliers can be of great advantage during an emergency. These agreements often specify the location of warehouses for prepositioning emergency supplies, as well as how much inventory needs to be maintained, the type, packaging, labelling, etc. Location and inventory level are directly proportional to how swiftly disaster response need to be performed (Ali Torabi et al., 2018). Framework agreements could be top level agreements between parties and might include further detailed contracts negotiated later, with conditions already specified within the framework agreements (price calculations, number of units delivered, delivery conditions). However, in some cases framework agreement and framework contract are used as synonymous terms.

There are several benefits of having a framework agreement with suppliers. Firstly, such agreements avoid the need to go through a lengthy tendering process again and again, as framework agreements are for a longer period (several years). The second one is procurement can be done at a much lower cost. This is because of the pre-agreed price between suppliers and a procuring agency which is not affected much by price fluctuations, especially in times of emergency. The third benefit is also to get the required items in a much shorter time, as there is no need to repeat procurement/tendering process. Consequently, such agreements facilitate faster response and an agile operation (Keshvari Fard & Papier, 2021). Moreover, there may be competition for certain goods among countries and regions (e.g., the EU, the USA, or the UK) or

international humanitarian aid organisations during a disaster. A pre-agreed contract can ensure which regions or organisations are prioritised (Balcik & Ak, 2014).

There are ample examples in the literature of such established agreements. For instance, Eftekhar et al., (2014) note aid vehicle procurement along with the delivery of service considering maintenance costs and planned usage. At the EU level, there are framework contracts for services (EC, 2020) and joint procurement (EC, 2008), among many others. OECD, (2014) has developed a manual for a framework agreement. The manual defines framework agreements as well as provides guidance for how to design and manage framework agreements, manage suppliers, and boost competition. In the manual, the framework contract is defined as "A framework agreement (FA) is an agreement with one or more economic operators for the supply of goods, services and, in some cases, works, the purpose of which is to establish the terms governing contracts to be awarded by one or more contracting authorities (CA) during a given period, in particular with regard to maximum price, minimum technical specifications and, where appropriate, the quantities envisaged"(OECD, 2014).

The OECD (2014) manual for framework also describes four types of framework agreements or contracts. The contracts are differentiated by four factors as follows:

- Number of suppliers
- The terms and conditions
- Call-offs
- Consolidation of needs

The number of suppliers can be one, or many and terms and conditions can be complete where either all the terms and conditions are laid down or incomplete where not all the terms and conditions are laid down. Call-offs are mini-agreements where a purchase order is enough to procure items. So, framework agreements can vary with whether there are provisions for call-offs or not. Lastly, framework agreements can also vary on whether the requirements are gathered for several contracting authorities or one contracting authority.

Security of supply in the EU

The security of supply is a term typically used in the energy sector (Chiaramonti & Maniatis, 2020). However, there has been recent development in supply chains and other sector where security of supply has been receiving attention, especially in the EU. Figure 1 summarizes the various directives in the EU which have dealt with security of supply.

2004	2005	2007	2008	2014	2022
Call for Critical Infrastructure (CI) Protection	Proposal for EPCIP	EPCIP adopted	Directive on ECI	Directive on network and information systems (NIS-I)	CER Directive
Fight against Terrorism to protect the CI in EU	Justice and Home Affairs (JHA) called the commission to make final proposal for EPCIP	Objective of EPCIP is to improve the **protection of CI in the EU**	Cannot be sufficiently achieved by the Member States alone	Impact of **security incidents** represent a major threat to the functioning of network and information systems	Focus on **critical services** rather than critical infrastructure
Proposed a European Programme for Critical Infrastructure Protection (EPCIP)		Create EU framework concerning CI	Critical sectors: **Energy and Transport**	Essential to economic and societal activities and functioning internal market	Added ten different sectors including food and banking
Set up Commission of a CI Warning Information Network (CIWIN)		**Recognize threat from terrorism as priority**		Critical sectors: Energy, Transport, Banking, Financial markets, Health, drinking water supply and distribution, digital infrastructure	Focus on **supply chains** for the first time
		Transport and energy sectors will be among the first priorities			

Figure 1: Evolution of security of supply in the EU (Source: Authors)

In the aftermath of a series of terrorist attacks in the first part of the 21st century, the European Council asked for the preparation of an overall strategy to protect critical infrastructures. They identified that the potential for catastrophic terrorist attacks that affect critical infrastructures is increasing. The consequences of an attack on the industrial control systems of critical infrastructure could however vary widely. The call identified that critical infrastructures consist of those physical and information technology facilities, networks, services, and assets which, if disrupted or destroyed, would have a serious impact on the health, safety, security or economic well-being of citizens or the effective functioning of governments in the Member States. Critical infrastructures extend across many sectors of the economy, including banking and finance, transport and distribution, energy, utilities, health, food supply and communications, as well as key government services. Some critical elements in these sectors are not strictly speaking 'infrastructure', but are in fact, networks or supply chains that support the delivery of an essential product or service. (EU, 2004).

In 2005, Justice and Home Affairs called for final proposal for European Programme for Critical Infrastructure Protection (EPCIP). The general objective of EPCIP was to improve the protection of critical infrastructures in the EU through the creation of an EU framework concerning the protection of critical infrastructures which is set out in this Communication. The framework consists of procedure for the identification and designation of European Critical Infrastructures (ECI), measures designed to facilitate the implementation of EPCIP, support for Member States concerning National Critical Infrastructures (NCI), contingency planning to ensure security of supply and accompanying financial measures (EU, 2006).

Finally, it was decided that even though it began as a counter terrorism measure, an all-hazard approach would be much better. Under this approach, anthropogenic, technological threats and natural disasters should be considered in the critical infrastructure protection process, but the threat of terrorism should be given priority. This Directive constituted a first step in a step-by-step approach to identify and designate European Critical Infrastructure (ECI) and assess the

need to improve their protection. As such, this Directive concentrates on the energy and transport sectors and to ensure the security and operations (EU, 2008). ECI directive also mentioned each member state should come up with Operator security plans (OSPs) or equivalent measures comprising an identification of important assets, a risk assessment and the identification, selection and prioritisation of counter measures and procedures should be in place in all designated ECIs (EU, 2008).

In 2016, the EU passed another directive called Directive on security of network and information systems (NIS-I). NIS-I identified that network and information systems and services play a vital role in society. Their reliability and security are essential to economic and societal activities, and to the functioning of the internal market. NIS-I expanded the purview from just energy and transport to other sectors including, banking, financial markets, health, drinking water supply and distribution, and digital infrastructure. In addition to the cross-sectoral factors, NIS-I also discussed sector-specific factors that should also be considered to determine whether an incident would have a significant disruptive effect on the provision of an essential service (EU, 2016).

In the wake of COVID-19 pandemic in 2020, the ECI (2008) directive was revisited to evaluate the standing considering the new challenges. A 2019 evaluation of the ECI (2008) directive concluded that existing European and national measures face limitations in helping operators confront the operational challenges that they face today and the vulnerabilities that their interdependent nature entail. Some of the most pertinent reasons were, firstly, operators are not fully aware of or do not fully understand the implications of the dynamic risk landscape within which they operate. Secondly, resilience efforts diverge significantly between Member States and sectors. Thirdly, similar types of entities are recognised as being critical by some Member States but not by others, meaning that comparable entities receive varying degrees of official capacity-building support (in the form of, e.g., guidance, training, and exercise organisation) depending on where they operate in the EU, and are subject to different requirements.

The new Critical Entities Resilience (CER) identifies that given the increasing interconnection among infrastructures, networks, and operators delivering essential services across the internal market, it is necessary to fundamentally switch the current approach from protecting specific assets towards reinforcing the resilience of the critical entities that operate them. Thus, implications of this are clear – a disruption affecting the service provision by one operator in one sector has the potential to generate cascading effects on service provision in other sectors, and potentially in other Member States or across the entire Union. Keeping this in mind, the new CER directive focusses to prevent incidents from occurring, including through DRR and climate adaptation measures; ensure adequate physical protection of sensitive areas, facilities and other infrastructure, including fencing, barriers, perimeter monitoring tools and routines, as well as detection equipment and access controls; resist and mitigate the consequences

of incidents, including the implementation of risk and crisis management procedures and protocols and alert routines; and recover from incidents, including business continuity measures and the identification of alternative supply chains (EU, 2020).

In the CORE project, the security of supply is explored about the energy, food, healthcare service and water sectors. Therefore, what security of supply means for these sectors is also briefly noted here.

Security of energy supply

The International Energy Agency (IEA) is mandated to promote energy security amongst its 29 member countries. (International Energy Agency, 2014). According to IEA, energy security means energy sources are available uninterruptedly and at an affordable price. The timeframe of energy security is essential. In the short term, the energy system must be able to react to sudden changes in supply and demand. In contrast, in the long term, it is elemental that investments to supply energy is timely and fit with the development goals and sustainable environmental needs (Larsen et al., 2017).

There are three dimensions of energy security: sources of risks, the scope of impact measurement, and the severity filter. Sources of risks can be further categorised into technical, human-made, and natural risks. Technical risk sources include risks such as the failure of transmission lines, power plants, or transformers. In contrast, human-made risks include demand fluctuations, withholding of suppliers, terrorism, wars, and export embargos. Natural risks include risks such as natural disasters and the depletion of fossil fuel stock. The scope of the impact measure refers to how the measurement of energy security is performed and consists of components such as continuity of commodity supply, continuity of service supply, and continuity of the economy, environment, and society. Severity filters include speed, size, sustention, spread, singularity, and sureness of impact. A detailed description can be found in Winzer (2012).

Technology advancements, shifting market trends, and environmental issues all contribute to the ongoing evolution of the risk environment for the energy sector. Threats can be measured along with their effects and vulnerabilities to estimate the value of risk mitigation strategies. Many times, the effects could even cascade to other important infrastructures. The interdependencies among the vital infrastructures have been greatly increased by technical advancements in digital information and telecommunications in recent times. All other vital infrastructure sectors require fuel to function correctly, and the energy infrastructure provides that fuel. The interdependence of the essential infrastructures and the services they deliver, and use is depicted at a high level in figure 2. As depicted in the figure 2, the communications, transportation, and water sectors depend on the electricity critical infrastructure for power, and the two subsectors in turn depend on them for fuel delivery (transportation),

electricity generation (water for production and cooling), as well as for control and operation of infrastructure (communication) (Drossos, et al., 2017).
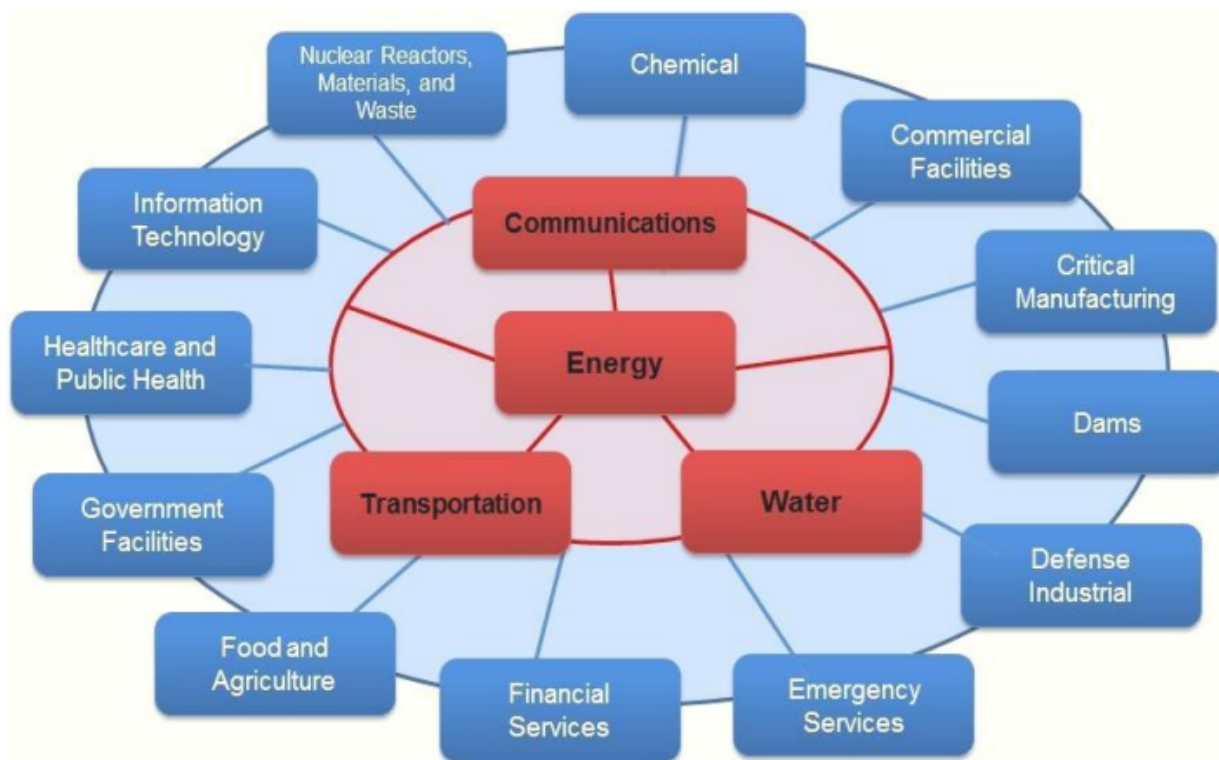
Figure 2: Interdependencies of the energy sector with other sectors (major critical services in red and associated industries and infrastructrue in blue)
(Source: Drossos, et al., 2017)

The EU's energy security pillars are efficiency, sustainability, and security of energy supplies (Winzer, 2012). The EU has several regulations in place to ensure that member states cooperate during an energy crisis. For example, regulation (EU) 2019/941 in the electricity sector on risk preparedness ensures that electricity goes to the state where it is needed the most during an energy crisis (e.g., health care facilities, transport sector, communications, etc.). The other regulations include the security of Gas Supply Regulation (EU 2017/1938). This regulation provides the basis to support countries during an emergency. For instance, during the recent Russia-Ukraine war, the Regulation (EU) 2017/1938 acts as the link for better regional cooperation and a mechanism of solidarity among EU member states to safeguard supply security for gas (European Parliament, 2022).

Security of food supply

The EU uses the United Nation's definition to define food security of supply, which is "food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (European Commission, 2021b, S.

xx). According to European Commission (2021), concepts related to food security include food availability, access, utilisation, stability, safety, resilience, self-sufficiency, and sovereignty. Food availability refers to enough food of an appropriate quality that is supplied through domestic production, aid, or imports. In contrast, food access is people's access to sufficient resources to acquire foods of nutritious value.

Food utilisation means using food to meet all physiological needs by having a nutritional diet, clean water, appropriate sanitation, and health care. Food stability refers to "adequate access to food at all times" for an individual household and the entire population (European Commission, 2021b). In contrast, food safety means handling food items that prevent infection and keep the nutritional value of food intact. The resilience of the food system means the ability to withstand and cope with challenges as well as go through changes in a fair, sustainable, and democratic manner. A food system can be defined as "(food) system that encompasses the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption, and disposal of food products that originate from agriculture, forestry or fisheries, and food industries" (von Braun et al., 2021, pp ii).

Food self-sufficiency refers to the ability to cater to the food consumption need of the population from a country's own production instead of relying on food imports. In comparison, food sovereignty comes from the ability to define food and agricultural policy without the involvement of third countries. In the policies, local agriculture is prioritised to produce food to feed citizens, and access is given to farmers, producers, and landless people to water, land, credit, and seed (European Commission, 2021b).

Food systems worldwide face three significant challenges. The first challenge is to ensure food security and nutrition for all, due to increasing size of global population and change in diet. The second challenge is providing livelihoods to farmers in the food supply chain, and the third is ensuring environmental sustainability (OECD, 2020). The sustainability of a food system is influenced by both human and natural factors that interact with each other. For instance, water availability and land for agriculture are dependent on human actions, whereas individual choices are dependent on environmental conditions (The World Bank, 2015).

Security of healthcare services

The World Health Organisation (WHO) defines health security as "the activities required, both proactive and reactive, to minimize the danger and impact of acute public health events that endanger people's health across geographical regions and international boundaries" (WHO, 2022, np). According to WHO (2020), human health, animal health, and environmental sectors are interlinked

and must be considered under an "one health approach" to prepare for health emergencies. This is because human health is impacted by zoonotic diseases such as SARS, pandemic influenza A (H1N1), avian influenza (H5N1), Middle East respiratory syndrome, and Ebola (Mghamba et al., 2018). Health security in the context of emergency preparedness is also closely linked with access to sanitation and safe water, food security, and safeguarding and building resilient communities and livelihoods (World Health Organization, 2020).

COVID-19 has certainly tested the healthcare capabilities of different EU member states (Alemanno, 2020). Consequently, the prevention and control of infectious diseases evolved as the most significant areas of health cooperation at the EU level (Bengtsson & Rhinard, 2019). In 2020, the EC formed a new authority titled Health Emergency Preparedness and Response Authority (HERA) (Forman & Mossialos, 2021). In November 2022, HERA published its first report concentrating on preparedness capabilities to counter health threats (European Union, 2022).

According to this report (European Union, 2022), the main objectives of HERA in 2023 are to support the ability of EU member states to prepare for health crises as well as to ensure accessibility and availability of medical countermeasures. HERA has taken four flagship initiatives. The first one is to develop an IT system (HERA MCMI platform) for gathering intelligence, mapping medical countermeasures availability, threat assessment, and establishing a system of management for stockpiling. The second is to develop medical countermeasures against biological, chemical, nuclear and radiological hazards, and antimicrobial resistance (AMR), and contribute to the vaccine 2.0 strategy. The third one is to reserve manufacturing capability for the vaccine. The fourth one is to develop a mechanism for financing called "HERA INVEST" to facilitate the development of innovative medical countermeasures.

There are several challenges that affect health security. Rapid urbanisation, population growth, inappropriate use of antimicrobials, and environmental degradation are disrupting the microbial world's equilibrium. Furthermore, diseases such as COVID-19 and their new variants are evolving at exceptional rates which in turn disrupt not only the health of the world population but also cause economic and social impacts. Moreover, due to globalisation, billions of passengers travel around the world each year using different transportation modes, which increases opportunities for the international spread of infectious diseases (WHO, 2022).

According to WHO (2022), several stakeholders, including ministries of interior and defence, national parliaments, the private sector, non-state actors, foreign policymakers, and international regulators, must come together for health emergency preparedness and ensure health security. Cooperation between these stakeholders can provide the necessary expertise, intelligence, resources,

and assistance to engage local authorities in responding to complex public health emergencies.

Security of water supply

Water security refers to the protection and sustainable use of water systems. The protection means safeguarding against disasters such as droughts and floods as well as developing water resources sustainably. Moreover, water services and functions for the environment and humans must also be protected, and access to water resources must be ensured (Schultz & Uhlenbrook 2008). According to JRC (2019), water supply is critical to national security because of its vulnerability to threats such as sabotage, and contamination.

Water security can be improved by human interventions in water systems and utilising the water wisely. Measures to improve water security are aimed at sustainable water usage for purposes such as hydropower, irrigation, navigation, water supply, drainage, and environmental control, as well as building protection against droughts and floods (Schultz & Uhlenbrook, 2008). Research suggests that standard measures to ensure a continuous water supply during a disaster are underground wells, backup storage tanks and additional pipelines. Building permanent external hook-ups for piping and water hoses also helps during an emergency (van der Heijden et al., 2022).

According to JRC (2019), developing a water security plan is important. A water security plan can achieve the following:

- Minimise the chance of a contamination incident not being identified.
- Enable an adequate and effective response to emergencies and reduce the risk to the population.
- Ensure quick restoration of water supply.
- Providing a clear presentation of roles and responsibilities for all authorities during an emergency.
- Encourage moving from reactive to preventive maintenance.
- Facilitate improved usage of real-time data.
- Give insights on water quality.
- Define communication procedures for internal and external stakeholders such as the public.
- Enable cooperation between agencies, authorities, external entities, and the public.

The EU is a donor of water, sanitation, and hygiene (WASH) assistance worldwide. The EU provides financial aid to projects that support WASH components such as access to clean water, sanitation, capacity building for resilience and recovery and prevention of water-borne diseases (EC, 2022). According to EC, (2022), the EU prioritises three areas: speed of response, coordination, and working with civil

protection actors. Regarding speed of response, the EU provides logistics support to the onsite experts and equipment. The EU coordinates with the Global Wash Cluster, which is the principal international platform for coordinating humanitarian operations. The EU also help set up large-scale purification systems and pumps for replacing water infrastructure impacted by natural or anthropogenic disasters.

Disaster risk reduction (DRR) framework

Natural and man-made disasters have affected around 1.7 billion people worldwide in the last decade and are becoming increasingly complex and extreme due to climate change and rapid urbanisation. From 1980 through 2013, the economic loss amounted to over 400 billion Euros for weather and climate change-related disasters (Faivre et al., 2018). To advance DRR policy globally, the Sendai Framework for Disaster Risk Reduction (SFDRR) (2015–2030) was developed (Busayo et al., 2020). All EU countries signed SFDRR, and it is endorsed by the European Commission (Faivre et al., 2018). The Sendai Framework targets and addresses DRR and is a successor of the Hyogo Framework for Action (2005-2015). The Sendai framework learned from the Hyogo framework and gives more emphasis on disaster governance (Raju & da Costa, 2018).

Understanding disaster risks means comprehending all dimensions, such as capacity, vulnerability, exposure of assets to risk and behavioural patterns of people, and the environmental risks. Governance for disaster risk governance must be established at the global, regional, and national levels. Disaster risk governance must ensure coherent local and national frameworks of laws as well as define the roles and responsibilities of various actors of public and private sectors. Cultural, social, and health resilience of people can be built by private and public sector investment in measures to reduce and prevent disaster risks. Lastly, enhancing disaster preparedness ensures effective recovery and response. Consequently, reconstruction, rehabilitation, and recovery should be in place before disasters strike (UNDRR, 2022a).

According to UNDRR (2015), the Sendai Framework for DRR has seven targets and four priority areas for action as shown in figure 3. The four priorities for actions are:

1. to understand disaster risks
2. to manage disaster risk by strengthening disaster risk governance
3. to build resilience by investing in disaster risk reduction
4. to effectively respond and build back better by improving disaster preparedness by investing in rehabilitation, recovery, and reconstruction before a disaster strikes.

Further, the seven targets are referred to by alphabetic letters A-G and must be achieved by 2030 (Green et al., 2019):

A. to reduce disaster mortality across the globe significantly.
B. to minimise the number of people affected by disasters globally.
C. to reduce the economic loss to gross domestic product (GDP) caused by disasters by 2030.
D. to reduce the damage and disruption to critical infrastructure and basic services such as education and health facilities, as well as improve their resilience.
E. to increase the number of countries with local and national DRR strategies.
F. to support developing countries through the international corporation.
G. to increase access and availability of early warning systems for hazards.

There are lots of interconnections between the Sustainable Development Goals (SDGs) and the Sendai Framework. For instance, Target A and Target B are connected to SDG 1 of "no poverty", SDG 11 of "sustainable communities and cities", and SDG 13 of "climate action". In contrast, Target C is connected to goal 1 and goal 11. Connection from Target A and Target B to SDG a can be drawn with regards to reducing missing people and deaths would help minimise poverty. Similarly, reducing economic loss would help build sustainable cities and communities - SDG 11 (UNDRR, 2022b).

The EC has developed an integrated and comprehensive approach to DRR over the last decade. The purpose is to fulfil the commitment to the SDGs both within the EU and in developing countries. The EU's communication on the following steps to a sustainable future, strategy for supporting disaster risk reduction, community approach to preventing natural and man-made disasters and approach to resilience highlights the significant contribution of DRR and resilience for EU policies and international agreements (Faivre et al., 2018).
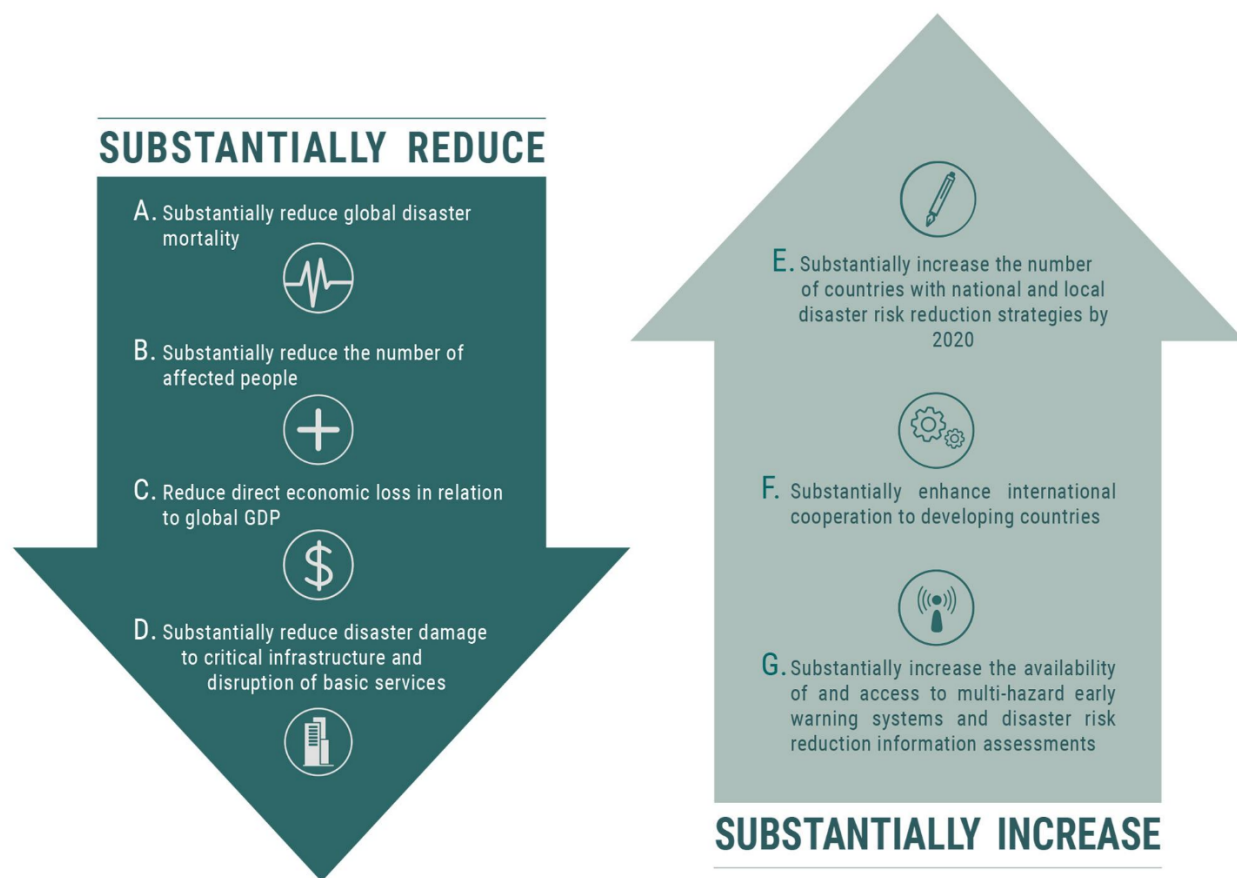
*Figure 3: The seven targets of the Sendai Framework
(Source: UNDRR, 2015)*

Societal Resilience

The UNDRR defines resilience as follows: "in the context of disaster risk, the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including the preservation and restoration of its essential basic structures and functions through risk management" (Bodas et al., 2022, pp. 2). The EU defines resilience as the "ability of states and societies to reform, thus withstanding and recovering from internal and external crises" (Stollenwerk et al., 2021, pp. 1228).

The concept of resilience is not new. The word resilience is derived from the Latin word "*resilire*" which means a rebounding or recoiling thing. Engineering sciences relate resilience to the properties of a spring and its ability to resist and absorb shocks as well as return to its original shape. In the field of ecology, resilience refers to the ability of the natural system to return to equilibrium states.

In social sciences, resilience can take two perspectives: conservative and transformative (Anholt et al., 2021).

Like the definitions and characteristics of resilience in physical and ecological sciences, societal resilience can be defined as the capacity of social groups and communities to recover from or respond positively to crises. More specifically, societal resilience is understood as having three properties, including resistance, recovery, and creativity. Resistance refers to communities' ability to withstand a disaster and its impacts, whereas recovery refers to the communities' ability to pull through a disaster. Creativity, in contrast, refers to a gain in resilience during a recovery process (Maguire & Hagan, 2007).

According to Keck and Sakdapolrak (2013), societal resilience has three capacities: coping, adaptive, and transformative capacity. Coping capacities refer to both absorptive and reactive measures of people's ability to cope and overcome disasters using available resources. In contrast, adaptive capacities relate to preventive or proactive measures of people to anticipate risks, learn from the past and secure well-being at a level before a disaster. While coping capacities are short-term, adaptive capacities are long-term and require strategic planning. Transformative capacity, also known as participative capacity, refers to the ability of people to access resources as well as help from the government and civil society. Societal resilience can also be associated with coping skills, trust, communality, and assuming personal responsibility while preparing for disasters (Bodas et al., 2022).

An array of factors determines societal resilience. These are trust, leadership, collective efficacy, social capital, social cohesion, sense of community, community involvement, existing norms or attitudes or values, communication, information, and resource dependency (Maguire & Hagan, 2007). According to United Nations (2020), there are four key elements for building resilient societies. These are:

1. Understanding multidimensional risks and their contexts.
2. Understanding stakeholders across sectors, risks, and systems.
3. Understanding that systems are interconnected and having a systemic approach.
4. Understanding the resilient capacities of systems, institutions, and people.

The first element requires an understanding of both the systemic nature of risk and how risk and its underlying factors are interlocked. The second element emphasises the need for an inclusive, multi-stakeholder approach to building resilience to include individuals, localities, and communities at different levels. The third element calls for a system approach or a holistic approach to identify risks and their interlinkages. Lastly, the resilient capacities of stakeholders at

different levels (e.g., individual, local, organisational, and national level) may vary and influence one another. Resilience capacities are often characterised by income level, and social and cultural factors critical to building resilience.

Bodas et al. (2022) created a societal resilience index and compared eight countries: Italy, Romania, Spain, France, Sweden, Norway, Israel, and Japan. The index includes the following set of statements, on which 4013 agreed, disagreed or perceived as neutral.

- My government will make the right decision during a time of crisis.
- I have full confidence in the ability of emergency services of my country to protect our population.
- My society has coped well with past crises. I am optimistic about the future of my country.
- In my society, there is a high level of social solidarity (mutual assistance and concern for one another).
- In my society, there is a reasonable level of social justice.
- I have full faith in the ability of my country's health system to care for the population in crisis.
- I have complete confidence in the ability of my government to take care of all aspects relevant to overcoming crises.

Their findings show there are differences and similarities between countries across Europe and outside Europe regarding emergency preparedness and societal resilience. It depends on the level of trust toward emergency and health service agencies and governments as well as the responsibility taken by either individuals or governments. The study concludes that trust is an important component of societal resilience and a predictor for societal resilience. According to the authors, trust can be fostered by transparency, simplicity, timing, and accuracy of risk communication (Bodas et al., 2022).

In terms of responsibility, 68% of the 4013 respondents answered that the responsibility to prepare for emergencies lies on the shoulders of the government and national authorities, whereas only 52% of respondents answered that it falls on the shoulder of individual, family, and community (Bodas et al., 2022).

Wigel et al. (2022) describe a Nordic approach to resilience including four main traits:

a) A whole of-society approach is based on a model in which all relevant actors take part in and contribute to a system of joint preparedness in an inclusive and cooperative way.

b) A whole-of-government approach refers a joint use, cooperation, and coordination of government and public sector resources across sectors in crisis situations.

c) All-hazards approach marks a holistic approach to preparedness in a way that a full array of threats, and their connected and cascading effects, are included in preparedness planning.

d) Societal resilience thinking describes the Nordic understanding of what preparedness is ultimately for and how it should be further developed.

CASE BRIEFS

This section presents a summary of preparedness and security of supply of four case countries included in this study, i.e., Finland, Sweden, Austria, and Italy. The section summarizes the findings of the semi-structured interviews and the literature, including a review of academic papers, public reports and regulations, for each country.

Finland

Overview

The Security Strategy for Society (Security Committee, 2017) is a government resolution that presents the guiding principles of national preparedness and guides preparedness activities in the different administrative branches in Finland. The National Risk Assessment 2018 (Ministry of Interior 2019), on the other hand, describes the risk scenarios that Finland is preparing for. In Finland, the term disaster is not commonly used in documents that describe national preparedness (Meriläinen et al., 2020), but instead the Security Strategy) refers to "disruptions occurring in normal conditions and emergencies" (Security Committee, 2017, p. 9. On an international level, Finland has been an active participant in the cooperation within the United Nations International Strategy for Disaster Reduction (UNISDR) and both Hyogo and Sendai frameworks have contributed to a creation of cooperation and networks between authorities in Finland (Pilli-Sihvola et al., 2018).

Risk assessment

The risk scenarios that were identified in 2018 as the key events that may threaten the vital societal functions and their continuity in Finland (see figure 4) include both natural and man-made risks, such as:

- Information operations
- Political, financial, and military pressure
- Use of military force
- Terrorism and other activities posing a threat to society (large-scale immigration; terrorist act targeting the structures of the society or large crowds; violent, large-scale civil disturbances)
- Disruption of the public economy
- Disruption of the financial system
- Power supply disruptions (major disruption in power supply; severe disruption in the availability of fuels)
- Disruption in telecommunications and information systems – cyber threats (severe disruptions in communications networks and services)
- Disruptions in logistics

- Disruptions in health security (antimicrobial drug resistance; pandemic influenza or similar widespread epidemic; highly infectious severe animal disease; plant hazards – plant disease epidemic)
- Water supply disruptions
- Disruptions in food supply
- Large-scale accidents (maritime multi-sector accident; severe nuclear power plant accident in Finland or Finland's neighbouring areas)
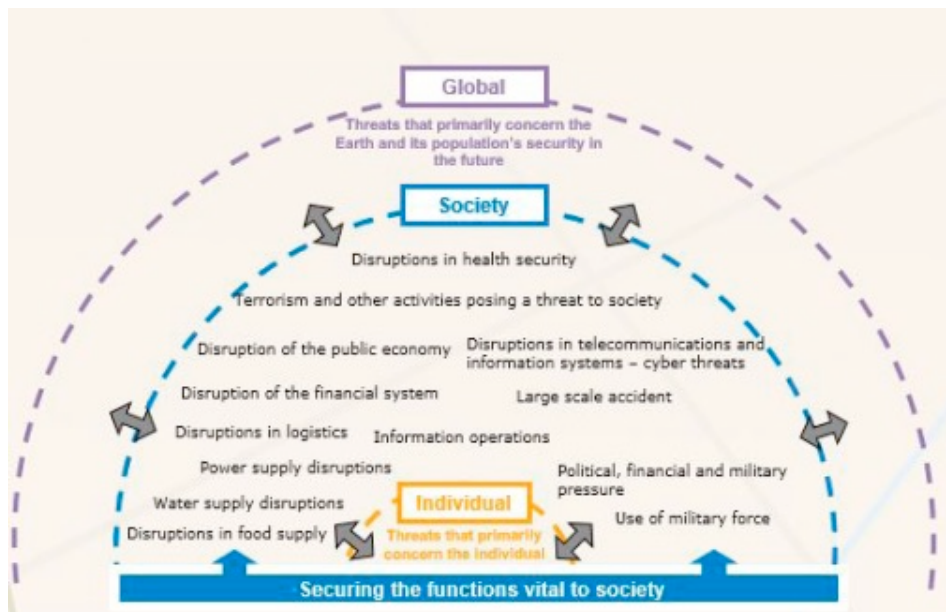
*Figure 4: Key risk scenarios in Finland
(Source: Ministry of Interior, 2019)*

In addition to the national risk assessment, a risk assessment is conducted at the regional level to identify threat scenarios that are most relevant for each region, and which may cause significant impacts if they materialize (Ministry of Interior, 2019).

Disaster preparedness

The essence of crisis preparedness in Finland is described by the concept for comprehensive security, defined as: "*The Finnish cooperation-based preparedness model, in which the vital functions of society are jointly managed by the authorities, business operators, organizations, and citizens*" (Security Committee 2017, p. 7). The holistic approach to crisis preparedness is common to all the Nordic countries (Meriläinen et al., 2020), referred to also as the whole-of-society approach (Wigel et al., 2022). In the words of one interviewee:

> "*I would say it is astonishingly well thought through system. It is a network, and it works on local level, regional county level and on a country level and*

*also as a member of the European Union or UN. I think on all levels, our
preparedness is very good." (P7)*

The cooperation that is established already in normal times contributes to
building of trust which is key element for continuity, collaboration, and
information sharing in times of crises.

*"We know each other and knowing each other is the basis, to my mind, for
any cooperation and when you know the other one, whether they are projects
or you are disseminating information or you are receiving information, those
are the things that build the trust between different partners and I think that
is the strength of our comprehensive security model, whether it concerns
Sendai or other points of view in preparedness." (P7)*

Key actors, roles, and responsibilities

In the spirit of the comprehensive security model, there is no one single body that
oversees DRR in Finland. The closest to this role would be the Ministry of the
Interior Department for Rescue Services, which oversees national disaster
preparedness (Meriläinen et al., 2020). Ministry of Interior responsible for internal
security and safety has a coordinating role and acts as a focal point for DRR in
Finland, while the national documents refer to preparedness instead of DRR
(Meriläinen et al., 2020). In Finland, the whole-of-society approach and shared
responsibility in practice means sectoral approach in preparedness as each
governmental branch is responsible for crisis preparedness in their own sector
(Wigel et al., 2022). Moreover, DDR in Finland is based on principles of self-
sufficiency and locality: responsibilities and roles are the same both in normal and
exceptional conditions and crises are managed at the lowest possible level.
Because of the roles and responsibilities being distributed to multiple authorities
across different administrative sectors and levels, DRR in Finland can be
characterised as polycentric, see figure 5 (Pilli-Sihvola et al., 2018).
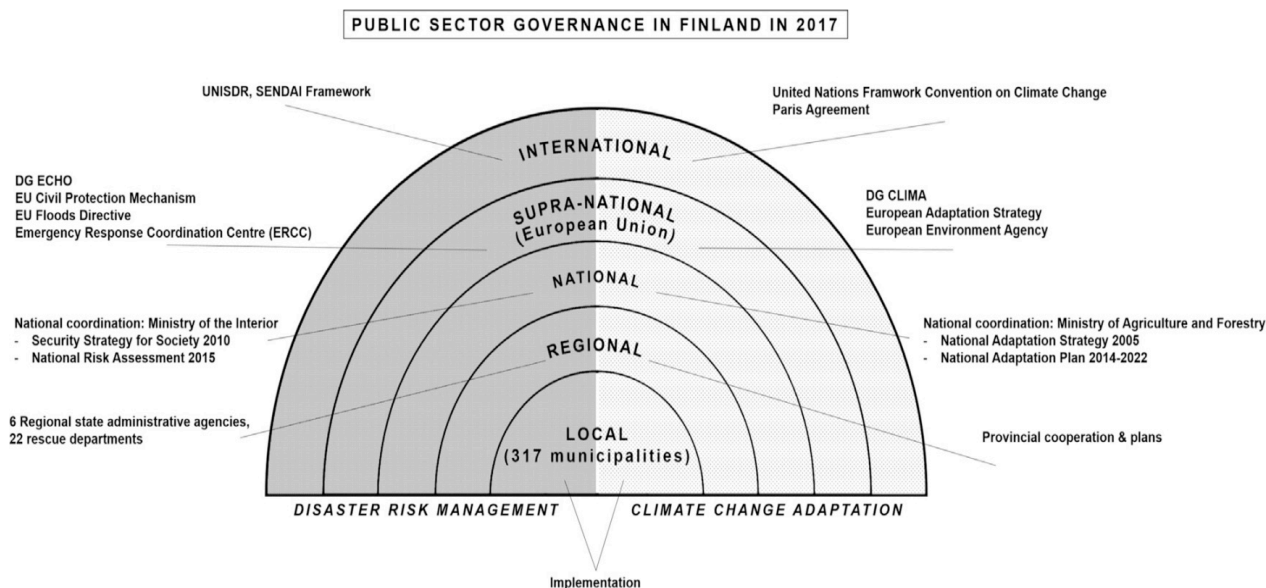
Figure 5: DRR and crisis preparedness in Finland
(Source: Pilli-Sihvola et al., 2018)

The Security Strategy for Society (Security Committee 2017, see figure 6) describes how in accordance with the concept of comprehensive security, the leadership and management of the incidents that constitute a threat to the vital functions of society is based on cooperation between the authorities, local government, administrative branches, ministries, and business operators as well as other security actors. The security committee assists the Government and the ministry in security matters, follows the developments in the Finnish security environment and coordinates preparedness in the framework of the comprehensive security (Security Committee, 2023). The Security Committee consists of 19 members and 5 experts from different administrative branches, authorities, and the business community (Security Committee, 2023).
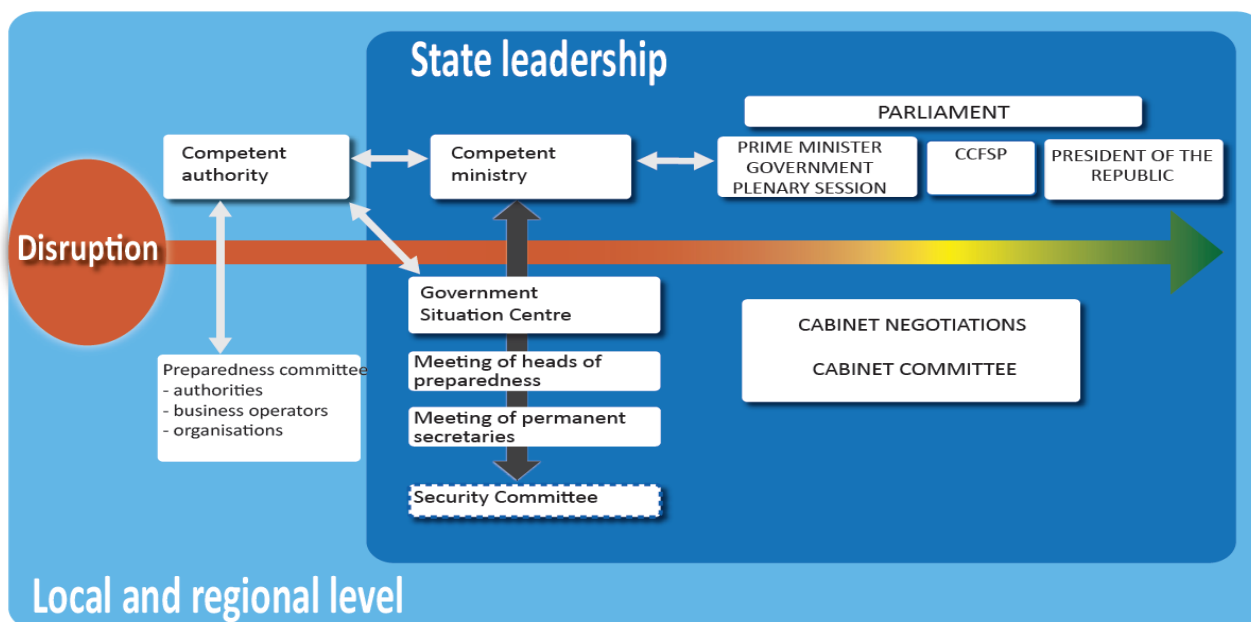
Figure 6: Finnish Model of leadership and managing disruptions (Source: Security Strategy for Society, 2017).

Although the risk assessment is conducted and strategies are drafted at the national level, the basic unit of preparedness in Finland is the municipality (Meriläinen et al., 2020). Within municipalities, duties and responsibilities are distributed, so that the rescue services oversee mitigation, preparedness, and response towards accidents and emergencies while other authorities have the responsibility for preparedness in their own sector. The emergency preparedness act obliges authorities to ensure the continuity of their activities in disruptions of normal conditions, which in practice means that all authorities need to have a preparedness plan for disruptions occurring in normal conditions and emergencies. In between the state (national) and the municipalities (local), there are state administrative agencies that coordinate preparedness and organise preparedness exercises and training (Meriläinen et al., 2020). From the beginning of 2023, the 21 wellbeing services counties organise and supervise rescue and preparedness services in Finland (Regional State administrative Agency, 2023); see figure 7.

In the private sector, preparedness of business organisations is supported by the National Emergency Supply Agency (NESA), which operates under the Ministry of Economy and Employment (Meriläinen et al., 2020); see figure 7. In that context, preparedness is referred to with the term "security of supply", which is ensured via the process of continuity management. While authorities have statutory roles for ensuring preparedness, in the private sector preparedness activities are mainly voluntary (NESA, 2022).

In Finland, NGOs play a significant role in preparedness through the comprehensive security model and often directly support the activities of authorities. The Voluntary Rescue Service (Vapepa) coordinates the activities of volunteers that work for authorities (e.g., police, rescue services, border guard), and has a network of over 50 organisations, such as the Finnish Red Cross (FRC) and the National Defence Training Association of Finland (MPK) (Vapepa, 2022; Meriläinen et al., 2020). The Finnish Red Cross has a statutory role for disaster preparedness in Finland (Act on the Finnish Red Cross, 2000). It complements and supports the work of authorities in disaster preparedness and response (Finnish Red Cross, 2023a).

In the Security Strategy for Society (Security Committee, 2017), citizens are also considered important security actors and have a role in preparedness contributing to societal resilience. In Finland, citizens are expected to cope on their own, using own resources available at the household for 72 hours in the case of an emergency. The citizens' home preparedness is described in the 72 hours concept (Finnish National Rescue Association, 2022a) that explains the level of home preparedness recommended by authorities and NGOs in Finland. The related campaign and materials are powered by the Finnish National Rescue Association (SPEK) and NESA. Preparedness according to this concept is associated with accidents and disruptions that deal with everyday lives of citizens, while traditional civil defense is excluded from this approach (Meriläinen et al., 2020).

International cooperation and Sendai framework

On an international level, Finland has been an active participant in the cooperation within the United Nations International Strategy for Disaster Reduction (UNISDR), and both, the Hyogo and Sendai framework, have contributed to a creation of cooperation and networks between authorities in Finland (Pilli-Sihvola et al., 2018).
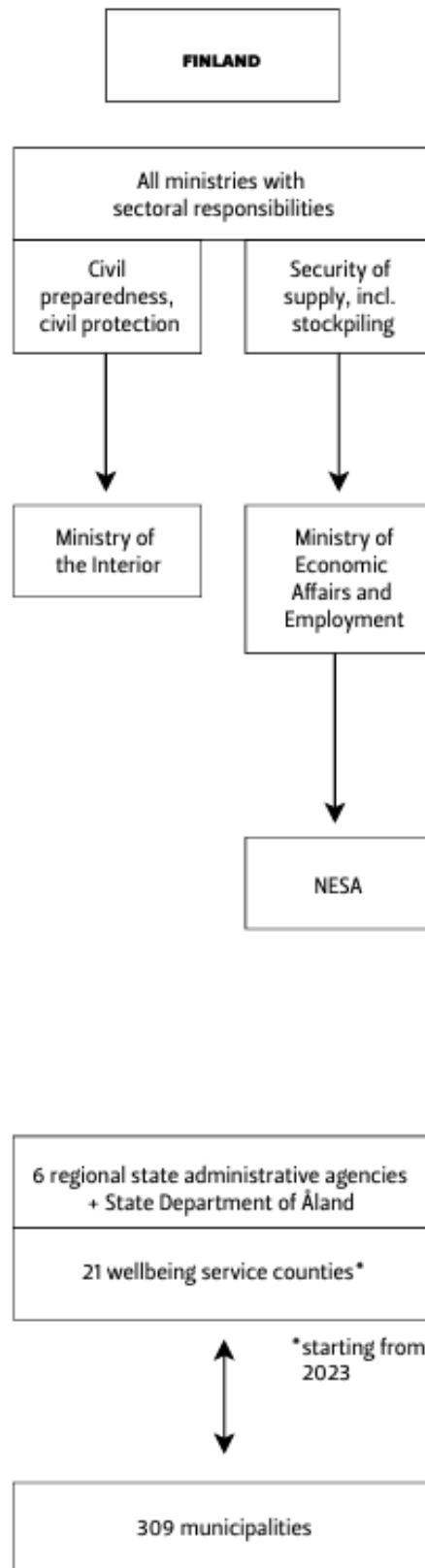
Figure 7: Actors for crisis preparedness and security of supply in Finland
(Source: Wigel et al., 2022)

There is a network of 26 partners involved in the Sendai framework cooperation in Finland. The department of rescue services is coordinating the work, the director general being the chairperson and a senior specialist acting as a referent. The primary aim is to share and distribute information among different parties, while every authority oversees the Sendai-related topics that are in the responsibility of their mandate and administration. The current network started operating in 2022 and, if possible, meets three times a year to exchange information.

Security of supply

Security of supply is defined in Finland as "preparedness for crises and disruptions as well as continuity management so that the production, services and infrastructure necessary for the subsistence of the population, the economy and national defense can be secured during serious disruptions and in emergency conditions" (Ministry of Economic Affairs and Employment, 2022a). A recently launched Government report on security of supply to the Parliament defines the key objectives for developing security of supply in Finland by 2030 (Ministry of Economic Affairs and Employment, 2022). It is the first report of its kind, and thus describes the timeliness of the topic.

Dependency on foreign utilities, especially related to energy sector, and that way on international linkages and networks is a challenge as was proved by the COVID-19 crisis and the recent 2022 full scale Russian aggression of Ukraine with cascading effects on the energy and food security around the world showing the fragility of global linkages and supply chains (Wigel et al., 2022). Current developments in the security of supply work include a further emphasis on the Nordic and Baltic cooperation following the Russian attack to Ukraine. Moreover, Finland's NATO application on the 18th of May 2022 and several ongoing initiatives in the EU impact national security of supply work and the related legislation.

Legal framework, principles, and scenarios

The legal framework for safeguarding the security of supply was set in 1992 (1390/1992). According to this law, the government sets the general objectives that define the necessary level of preparedness considering the basic needs of the population, the national economy and the national defense (Ministry of Economic Affairs and Employment, 2022a). Each ministry is responsible for the security of supply of their own sector while the Ministry of Economic Affairs and Employment oversees the coordination of the preparedness measures and further development of the security of supply work (Ministry of Economic Affairs and Employment, 2022b). The current targets for the security of supply are based on the Government decision issued in 2018 (Ministry of Economic Affairs and Employment, 2022a). The Government decision defines "the starting points, principles and national objectives of the national security of supply measures to ensure the implementation of security of supply in a constantly changing

operating and security environment" considering the Security Strategy for Society and national Risk Assessment (Finnish Government, 2018, p. 1).

Security of supply regulations apply to measures concerning preparedness and security of supply work under normal conditions. The roles and responsibilities of authorities under emergency conditions are defined in the emergency powers act (Ministry of Economic Affairs and Employment, 2022a). There are also several other Government reports and briefings that touch the security of supply work in Finland, including, for example, the recent Government report on the changes in Finland's security environment (Finnish Government, 2022).

In Finland, the security of supply is part of the comprehensive security model as described in the Security Strategy for Society (Security Committee, 2017). Accordingly, preparedness in Finland is conducted in cooperation between different actors and sectors. From the security of supply perspective, interactions among and between different actors (authorities, private sector, NGOs and citizens) in matters involving preparedness on national, international, regional and local levels is crucial (Ministry of Economic Affairs and Employment, 2022a). The whole-of-society approach applies also to the security of supply in a way that each governmental branch oversees developing crisis preparedness and security of supply in their respective sector (Wigel et al., 2022).

The national risk assessment (Ministry of Interior, 2019) guides preparedness in terms of threat scenarios also in the sphere of security of supply. The main scenarios threatening the security of supply include power shortages, cyber-attacks, disruptions in logistics, extreme weather events, information system threats, dangerous infectious diseases, use of military power and terrorism (NESA, 2023c).

Main actors

In Finland, security of supply is based on the collaboration between public, private and third sector organizations (NGOs). Security of supply consists of the ability of companies that operate in critical sectors to respond to exceptional situations, cope with crises and disruptions and recover from them quickly. The ability of business actors to adapt to disruptions and safeguard the continuity of their operations defines the crisis resilience of critical production and services. (Ministry of Economic Affairs and Employment, 2022a.) The private-public cooperation becomes especially important in today's "hyper-connected" world marked by dependency of private sector actors, who operate and manage critical functions of society, on global supply chains (Wigel et al., 2022, p. 20). In the spirit of the comprehensive security model, safeguarding security of supply implies dialogue and interaction among various actors (authorities, private sector, NGOs and individual citizens) in preparedness on a national, international, regional and local levels (Ministry of Economic Affairs and Employment, 2022a).

National Emergency Supply Agency

The National Emergency Supply Agency (NESA) coordinates, promotes and facilitates preparedness measures in the sphere of security of supply in Finland. It operates under the under the Ministry of Economic Affairs and Employment (Ministry of Economic Affairs and Employment, 2022b). It acts together with the National Emergency Supply Organization's sectors and pools and in cooperation with Finnish authorities, and the private and the third sectors. Regarding the stockpiling, NESA works together with relevant organizations to maintain sufficient stocks in preparation for potential crises in Finland. (NESA, 2022a.) It coordinates preparedness coordination between the authorities and businesses and industries (Ministry of Economic Affairs and Employment, 2022b).

The preparedness organization of NESA consists of seven sectors and 23 pools composed of various actors, including private companies. The sectors cover: 1) food supply, 2) energy supply, 3) transport and logistics, 4) health, 5) finance and insurance industry, 6) industry, and 7) other (digital media and private security sector). NESA is also in charge of creating and communicating the security of supply situational picture in Finland. Relevant data are collected from the pools in cooperation with the participating companies. In coordination with the NESA experts from the related fields, the data are analyzed, summarized, and distributed to the relevant parties, including a short summary on the public website. The security of supply situational picture is created in coordination with The Prime Minister's Office in Finland which oversees the situational awareness picture of the whole Finnish society.

Public sector

The Finnish ministries are responsible safeguarding the functions that are critical to society in their respective sectors (NESA, 2022c). Moreover, municipal authorities have statutory duties and tasks for ensuring security of supply and securing the continuity of critical services and functions in their sphere of responsibilities (NESA, 2022). NESA lists public authorities that have an important role in security of supply work in Finland. These include: Ministry of Employment and the Economy; Ministry of Transport and Communications; Ministry of the Interior; Ministry of Defense; Ministry for Foreign Affairs; Ministry of Finance; Ministry of Social Affairs and Health; Ministry of Agriculture and Forestry; Ministry of the Environment; Defense Forces; Centers for Economic Development, Transport and the Environment; Regional State Administrative Agencies; Bank of Finland; Finnish Transport and Communications Agency Traficom; and the National Cyber Security Centre (NESA 2022d).

Private sector and civil society

The businesses take care of a significant proportion of the functions critical to society. Their participation in the security of supply work is partly voluntary and partly statutory. An active involvement of the companies in the security of supply

work is a characteristic of security of supply work in Finland. The foundations for the public-private cooperation were laid already in the war times (World War II) and the following post-war practices. Companies participate in the security of supply work in Finland through the sector and pool organization of NESA. (NESA, 2022c.)

The industry-specific sectors are formed around key areas of security of supply, and they include representatives of different authorities, NGOs, and the most notable companies in their industries. The sectors define the objectives of their own industries' pools and steer, coordinate, and monitor preparedness in their respective fields.

The industry-specific pools, on the other hand, are led by businesses and responsible for the operational preparedness in their respective fields. Together with relevant companies from the field, the pools plan measures for developing security of supply in their respective industries and define which of the companies operating in their fields are critical to security of supply (NESA, 2022c). Every pool has a secretary who is responsible for the day-to-day activities of the pool and coordinates participation of the companies and the activities of the pool. Depending on the pool, preparedness seminars and exercises on organized on a regular basis. Company participation in the pools is voluntary but having seen the benefit of the participation they are willing to do so. As one interviewee describes:

> *"...when you are part of that, you get the information flow and you get the information from the pool that they're collecting and so forth, and what you work with others so you can come up with new ideas and so forth. So, it's quite unique that rival companies can work together, but it's very beneficial and critical to have these companies because they are doing the most of course, the work in the society because they are providing for whatever they're providing."* (P12)

Citizens

From the perspective of citizens, security of supply means that people can continue their daily lives in exceptional conditions and crises with minimal disturbances. In practice, this means that citizens have access to and can purchase basic goods and services which they need. Through preparedness measures, the duration and impact of disturbances can be limited and in cases when services are temporarily disturbed, restoration takes place as quickly and efficiently as possible (Ministry of Economic Affairs and Employment, 2022a).

Moreover, citizens are considered active agents in the security of supply work in Finland. This is in line with the comprehensive security model that the security of supply is part of. Via their own home preparedness activities, citizens also

contribute to the securing the supply in times of disturbances (Ministry of Economic Affairs and Employment, 2022a). As described in the 72 hours concept that defines the level of home (household) preparedness recommended by authorities in Finland, citizens are expected to cope at least for three days (72 hours) on their own should a crisis occur (Finnish National Rescue Association, 2022a). Citizens' interest in home preparedness has grown since the beginning of COVID-19 and further risen after the start of the Russian war of aggression against Ukraine.

International cooperation

International cooperation in the sphere of security of supply is important as supply chains are global and more interdependent than ever before. This is especially true in the case of Finland due to its remote and isolated location and dependency on maritime routes (Ministry of Economic Affairs and Employment, 2022a). Moreover, cascading effects of disruptions may emerge from the international environment, as the COVID-19 crisis, the full-scale war in Ukraine since February 2022 and the following energy crisis have proved. In Finland, NESA provides situational picture of developments influencing the security of supply, including international events. Finland is also a participant in international cooperation on the Nordic, EU and global levels.

On the Nordic level, Finland has a history of bilateral collaboration with Sweden and Norway and has agreements with both countries on economic cooperation in situations of crises (Ministry of Economic Affairs and Employment, 2022a). The purpose of these agreements is to ensure the continuity of exchanging goods and services between these countries in disruptions of normal conditions, and with Sweden extending also to the exchange of information and communication in the fields of trade and security of supply (NESA, 2023a). The current security situation with the war in Ukraine and the application of Finland and Sweden for NATO membership on the 18th of May 2022 have further heightened the importance of Nordic, but also the wider Baltic region cooperation.

Finland has also been participating in NATO Partnership for Peace (PfP) and NATO Civil Emergency Planning (CEP) activities via NESA and governmental body representatives (NESA, 2023b). The recently adopted CER directive to strengthen the resilience of critical entities across the EU will influence the security of supply work in Finland and the EU-level cooperation in the future. Moreover, at the UN-level, the Sendai framework cooperation in Finland extends also to the security of supply with a NESA representative taking part in the related network steered by the Ministry of Interior.

Methods and tools

The security of supply is ensured via different measures. The central measures include financial and economic policies, legislation, stockpiling, preparedness

activities, continuity management, contingency planning, and agreements, including international ones (NESA, 2022b).

Stockpiling

Traditionally, security of supply has meant ensuring the supply of materials, such as grain, which are vital to the functioning of society, by stockpiling them should a major crisis or disruption occur (NESA, 2022b). One aspect of the Nordic whole-of-society approach is that Nordic countries have kept some elements of traditional security of supply and crisis preparedness thinking from the Cold war period, which especially in Finland implies an emphasis on self-sufficiency in security of supply, including material preparedness through stockpiling (Wigel et al., 2022).

Provisions on emergency stockpiling are described in several pieces of legislation, and emergency stockpiling in Finland is carried out in three ways: 1) NESA maintains the national emergency stockpiles; 2) companies and key operators have the responsibility over compulsory stockpiling and 3) relevant companies and NESA have agreements about security stockpiling (NESA, 2022b). NESA does not have stockpiles of its own but the goods to be stockpiled are included in the relevant companies' normal product circulation and stockpiling (NESA, 2022b). Stockpiles are also held by other organisations, for example, the Finnish Red Cross holds a disaster preparedness stock for NESA.

Stockpiling practices in an emergency preparedness and response organization vary according to products, their availability, importance, delivery time and storing capacity:

> *"How we look at it is that the critical items that we should also have in stock, those we are securing so that we keep them in stock. We are not relying on suppliers' capacity to deliver. So, some of the items we always have in stock. And with some items, we are taking basically what we are doing, we are taking the risk that we might run out but those are then the items which are not so critical for our operations." (P10)*

For example, an optimal stock is set, which regarding camp material and shelter equipment includes a capacity for 10 000 people. In normal times, items in the stock are rotated, so that they do not expire by deploying some out and replenishing with fresh ones. So, when it comes to stockpiling, expire dates and products or technology being outdated in terms of product development are challenges. It is a management decision regarding demand in disasters to decide and manage the volumes of the stocks.

Framework agreements and supplier management

Security of supply and the material preparedness in terms of stocks depend also on the supply chains and how well they perform. As one interviewee describes:

"And now with the combination of the war and the sort of, outcomes of corona, the supply times are very long. It is very challenging to actually keep enough stock and we often end up in a situation where we have to say that sorry, we don't have it in stock, but we can get it for you in this and this time." (P9)

Supplier management and relations depend on the actor, sector, products, and services in question. In the emergency preparedness domain of voluntary organizations, for example, for some products the organization may be a small player, including medicine. For some other products, on the other hand, such as tents, the organization may be a significant buyer, and there is keen interest among suppliers to win the bidding process and they may even develop a long-term relationship including joint product development.

In terms of internationalization, also that depends on the product in question. Some items have, for example, international standards and those typically have international suppliers in countries where it makes sense to produce large volumes. Some other items, on the other hand, are procured locally. Challenges with supplier relations are minor and typical that are encountered in other sectors as well: including delays in deliveries or small defects in products. On the contrary, one interviewee points out that suppliers consider a contract with them as an honor:

"But yeah, the suppliers are really honoring the contracts. So, no major challenges there. And of course, there might be delays but we have a delay clause in our contracts so we will reduce the price and so on. It's pretty normal and typical. We try to think carefully from where we order and the quantities and minimize the risks so that we are not giving right away huge contracts to the supplier that we don't know. So far it has worked well." (P10)

Normal practices of tendering and ordering apply according to procurement guidelines. Some items in the field of emergency preparedness are so rare that there are only or two suppliers in the whole world. In such cases, concerning for example some items for a field hospital, contract negotiations are done internationally for several country branches of the same organization. For such items and equipment, there is also a contract for training and maintenance. In the case of emergencies, however, procurement guidelines may give the opportunity of not doing tendering when less than 50 of the procurement comes from public funding.

"So, if we do the procurement with our own funding, we don't have to do the tendering when there is a real emergency, and we don't have the time. But this only applies in the very beginning of the emergency, so, maybe the first one or two months. And then we have to go back to our normal tendering

processes. But it of course helps, if we have things in stock already, in the preparedness stock." (P9)

Framework contracts are difficult to get information about. And in some cases, their usefulness also depends on the product and sector in question, as one interviewee describes:

"At the moment we don't have any framework agreements or anything like that with the suppliers. But even if we had, we couldn't guarantee 100 percent that the particular supplier will always have the goods available. So, from the security point of view it doesn't really make that much more sense there. We are planning to have some framework agreements but those are mainly to ease up the procurement process of certain items." (P10)

Framework contracts are not easy to obtain for items where the demand is not constant, as it could be for many of the emergency items, so such contracts are not appealing for suppliers. Besides price stability, they can be useful for shortening the tendering times, as described above. For organizations operating in several countries, international framework agreements can be used by national branches so that the same price is guaranteed when procuring nationally.

Home preparedness – 72 hours - Could you cope on your own?
The 72 hours concept defines the level of home preparedness recommended by the authorities in Finland and is developed and run by the Finnish National Rescue Association (SPEK) together with NESA (see Finnish National Rescue Association, 2022a). While NESA finances the concept and the related work, SPEK is the co-supervising and implementing partner together with the KOVA (Independent preparedness of households) pool which it is a chair of in the NESA organization. The KOVA pool meets four times per year and there is one person taking care of the 72h work at SPEK.

The concept was launched in Finland in 2016, and the scenarios were based on the National Risk Assessment of 2015. The concept is a living thing and most recently it has been adapted to the energy crisis. The basic idea behind the concept is that with citizen's home preparedness public officials and rescue sector can buy time to initiate their own rescue activities in the case of a crisis.

"…to get less pressure for these officials and the official organizations, we need some kind of a buffer. And the idea there is that, okay, all should be starting during the 72 hours, so the public sector officials need this time to, that people will survive." (P2)

The 72h material consists of a website (Finnish National Rescue Association, 2022a) and two downloadable brochures: Home preparedness brochure (Finnish

National Rescue Association, 2022b) and 72-hour home emergency kit brochure (Finnish National Rescue Association, 2022c). The download has also a printed version, which is available in some public places or during public events, but not distributed to all the households.

> *"…we use this printed material in the trainings, so that people voluntarily take it. So, for example, in libraries, it can be so that you take it, but not so that, take this." (P2)*
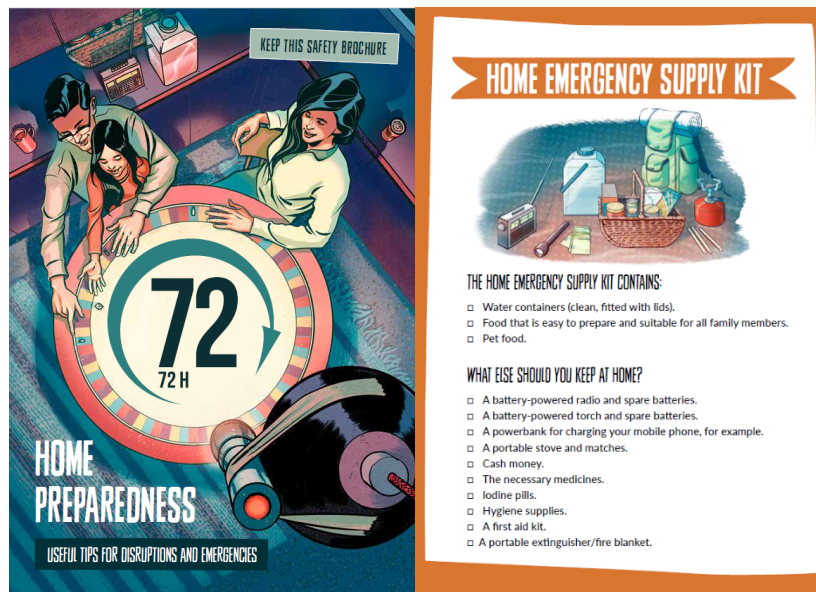
Figure 8: 72h Home preparedness brochure and the home emergency supply kit check list (Source: Finnish National Rescue Association, 2022b)

The 72h brochure (see figure 8) (Finnish National Rescue Association, 2022b, p. 6) provides a check list of what the home emergency preparedness supply kit should contain:

- Water containers (clean, fitted with lids).
- Food that is easy to prepare and suitable for all family members.
- Pet food.

Moreover, it provides a list of other items that one should have at home:

- A battery-powered radio and spare batteries
- A battery-powered torch and spare batteries
- A power bank for charging your mobile phone
- Portable stove and matches
- Cash
- The necessary medicines
- Iodine pills
- Hygiene supplies

- A first aid kit
- A portable extinguisher/fire blanket

The scenarios in which home emergency preparedness may be needed are listed in the brochure, including: an extended power outage, not being able to do shopping due to an illness or accident, a strike (industrial action) or a major accident, public transportation break down, a disruption in food distribution, power outage due to a storm of a flood, a failure in the payment systems. Furthermore, more specific advice is given for water, food and power outages. Since the covid-19 pandemic and the beginning of the Russian war of aggression in Ukraine, there has been an increase of interest among citizens in preparedness activities.

> "…research, what we made on spring, shows that more than one million people made some kind of preparedness action, something what makes their preparedness better. Just not pushing them, but they understand that they should do." (P2)

For the 72h concept, SPEK trains volunteer trainers who give trainings about the 72h concept to citizens and everyone interested. About 400 trainers are listed in the SPEK website and trainings can be ordered by anyone and anywhere, e.g., to a workplace or a public library. This improves the accessibility of the concept and preparedness also to groups that do not actively use internet.

> "…there are people, for example, elderly, who don't necessarily have the access to internet or are not able to use it for other reasons or other issues. But then, we have these 72 hours trainings nationwide, we have about 400 trainers that give this training. So, it's not all on the internet, it's also like face to face." (P1)

The 72h material is available in three languages: Finnish, Swedish and English. It has all citizens as target groups but was especially developed for urban populations who are typically less prepared than rural populations for exceptional circumstances, according to the interviewees.

> "…the style of living is different. You just go stairs down and buy from R-kioski one piece of bread and go back, and you serve your meal. So, to wake up people a little bit, that there can be power shortage or supply shortage." (P2)

Further development of the concept in how to include the needs of vulnerable groups, e.g., children, elderly, immigrants, and disabled better in the concept, is currently in the making. The 72h concept involves a network of partner organizations that take part in the KOVA pool and communicate about the concept in their own networks and among their members. For example, an NGO, the Martha Organization (Martat, 2023), will have a dedicated campaign focusing on preparedness this year. Other partner organizations include, for example, the

Finnish Red Cross, Finnish Food Authority, Finnish Hunters' Association and Rural Women's Advisory Organization (see Finnish National Rescue Association, 2022a).

Since the beginning of the pandemic and the full-scale war in Ukraine, the concept has received increased media attention and has also been included in various communication campaigns and other initiatives involving its partner organizations, such as the Heureka Facing Disasters -exhibition (see figure 9). The exhibition is built around the concept of resilience and invites the visitors to practice their disaster preparedness through, e.g., gamified exhibits and audiovisual art installations (Heureka, 2023a). Heureka, the Finnish Science Centre, is one of Finland's most popular recreational centres, especially among families and school children, and receives on an average 300000 visitors per year (Heureka, 2023b).

Figure 9: Facing Disasters exhibition in Heureka
(Source: Photo by Wille Nyyssönen)

Training

Preparedness training has as its goal to ensure the continuity of societal functions without disturbances in all security conditions (Emergency Services Academy Finland, 2022). The Emergency Services Academy Finland has a statutory role to offer training in preparedness for disruptions of normal conditions and the state of emergency (Act on the Emergency services Academy Finland 607/2006). The main target group of preparedness training by Emergency Services Academy Finland is the personnel of the public administration at local, regional, and governmental levels (Emergency Services Academy Finland, 2022). According to the 13th section of the Act on the

Emergency Services Academy Finland (607/2006), the institute is also in charge of the training of the management and other related personnel involved in the civil defense as described in the 67th section of the Rescue Act (379/2011). This is included in the preparedness training of the Academy. Moreover, the Emergency Services Academy Finland organizes customized trainings for the different administrative branches in cooperation with the respective ministry or a central agency (Emergency Services Academy of Finland, 2022).

The preparedness training offered by the Emergency Services Academy Finland aims to support the actualization of the obligation of the public administration to prepare themselves as defined in the 12th section of the Rescue Act (379/2011). The contents of the preparedness training are drafted in line with the Security Strategy of the Society (Security Committee, 2017), which harmonizes the national principles for preparedness and guides preparedness across different administrative branches in Finland and which serves as a steering document for the preparedness trainings (Emergency Services Academy, 2022b). Moreover, the National Risk Assessment (Ministry of Interior, 2018) guides the content of the trainings.

Trainings offered by the Emergency Services Academy of Finland for the public sector organizations are free of charge. There are five teachers working in the line of preparedness trainings with some local experts invited as guests in local trainings. In practice, municipalities are the primary target group of preparedness trainings offered by the Emergency Services Academy. Three kinds of courses are offered: 1) basic course on preparedness, 2) cooperation in large scale hazards, and 3) preparedness planning. Moreover, trainings can be ordered and can be customized to the needs of the participants. Table-top exercises are typically part of the trainings. Participation in the trainings is voluntary and it is up to the organizations to take part in the trainings.

> *"...they decide themselves and they should be aware that they need to handle the different kinds of disasters and so on. If they don't train, it's hard to perhaps understand and to be prepared so it's a lot of their own actions that do they get the trainings or not. Some municipalities don't take the trainings at all, and I don't know why, it's perhaps there has to be one person who is interested and wants to take the preparedness to the next level and if there's no one that much interested, perhaps they don't ask for trainings." (P3)*

Security of supply is addressed through citizens' home preparedness in the trainings offered by the Emergency Services Academy by discussing citizens' resilience and how every individual should be prepared to cope on their own for 72 hours. Another organization that has a statutory role in offering preparedness training is the National Defense Training Association of Finland (MPK). Established in 1993, it offers training and education for citizens to be prepared for

emergencies in everyday life and under exceptional circumstances. In that way, the MPK supports the preparedness of the Finnish Defense Forces and other authorities and works in close cooperation with volunteer organizations in the field. The MPK has 14 member organizations, including, for example, the Finnish red Cross and the Finnish Rescue Association. (National Defence Training Association of Finland, 2022.) The MPK has a district organization with nine districts including 27 training sites.

Overall, MPK organizes over 2,000 courses annually comprising 10-15% classified as preparedness and safety courses. Courses are organized during weekends, and they are arranged all over the country. MPK trains its own trainers who are act on a voluntary basis. Anyone skilled in their own field and active in volunteer training can become an instructor. Nowadays, there are over 2,000 voluntary-based trainers and more would be needed. MPK employees in training sites support and supervise voluntary trainers. All the courses are registered in the MPK data system. Moreover, MPK cooperates with various organizations and supports e.g., municipalities in trainings volunteers for shelters. The MPK volunteers are also often members of sometimes several other volunteer organizations, for example the Red Cross, which makes the training system cooperative in nature.

> *"This cooperation is one strength. We are a small country, people know each other very well, especially in the small cities. And working together is very important. I think it's our biggest strength, that we are in the same boat, so to say. Everybody understands the importance of this." (P4)*

Preparedness trainings cover basic safety skills, for example, first aid, fire extinguishing, self-defense, and orienteering skills. Exercises and drills are part of the courses MPK organizes. Citizens' home preparedness through the 72h concept is included in the courses dealing with everyday safety. For the security of supply preparedness, in important topic currently is energy where MPK also organizes training on the use of spare electric devices. Interest in preparedness courses has increased lately, as one interviewee describes:

> *"In this state of the world, there are a lot of interest to be in these courses. And many courses are full. Our typical size of one course is 30 participants. So, that's not much. It comes easily full. And people are very eager to get more information and more education and knowledge of these things. We are… Some time ago, no one was interested. It was a very boring thing, to talk about, for example, home emergency supply or that kind of things. But not anymore." (P4)*

Finnish National Rescue Association (SPEK) trains volunteers who provide training about the 72h concept. SPEK is an expert organization focused on

preparedness, accident prevention and rescue services. SPEK has 42 member organizations, over 100 cooperative networks and states as its vision to "a safe and crisis-proof society" in cooperation with its members. The main task areas of SPEK include safety communication, preparedness training, and participation in societal debate and advocacy. (Finnish National Rescue Association, 2023.) SPEK is an NGO with approximately one third of its funding coming from its own sources. Being a central organization SPEK has an interface function and acts in cooperation with various organizations, both public and private sector (Finnish National Rescue Association, 2023). Regional rescue associations are members of SPEK. Individuals' preparedness and everyday safety solutions being at the focus on SPEK activities, citizens' home preparedness is at the heart of SPEK activities (Finnish National Rescue Association, 2021).

The Finnish Red Cross is also an important player in the field of preparedness training. This covers training of volunteers (Finnish Red Cross, 2023a) and the Red Cross IMPACT training for international delegates (Finnish Red Cross, 2023b). In the field of logistics, for example, logistics ERU trainings are organized for experts who would like to be deployed in international missions. Moreover, trainings for nurses, doctors, technicians and so on, are organized for the usage of the field hospital equipment during international deployments. Based on a need, similar exercises are organized with other stakeholders both nationally and internationally. For example, for a field hospital, there could be an exercise involving the participation of local authorities or Nordic partners. Every year, internal trainings are also organized on a variety of topics for all personnel. Training of international delegates and the experiences gained during international deployments can be seen as an added value of expertise for the national preparedness as well:

> "…every time we deploy, it's like a test to our equipment it's a test to our system and of course, every time you'll learn something, like okay, this machine doesn't work when it's -20 degrees and all this. So, there is a lot of learning every time when we deploy. Doesn't matter if it's international real deployment or if it's this kind of exercise deployment to somewhere in Finland or neighboring country." (P10)

Several interviewees describe that the recent crises put a pause on exercises. In the words of one interviewee:

> "Well, they were happening, I would say, every second or third year before Covid but Covid put a stop on those. And now after Covid everybody's been focusing on the Ukraine response, so there haven't been those kinds of exercises now for a few years." (P10)

In the private sector, the National Emergency Supply Agency (NESA) funds and supports trainings and exercises for businesses that are relevant to securing the supply of essential societal functions and services through their sector and pool organization. The pools that are managed by businesses run exercises and trainings themselves. The trainings and exercises are supported by both in-house and outsourced expertise, and of the related sector institutions. The pool secretary oversees organizing with the help of an organizing team. The exercises are run in cooperation with key stakeholders of the sector in question, including ministries, NGOs, and companies.

The scenarios vary and it is up to the pool to decide the scenarios that need to be included in the exercises. Depending on the pool, the number of exercises conducted annually varies from one exercise every second or third year in the case of a big pool where it takes almost a year to plan an exercise and another year to conduct it, as it consists of several parts, to several smaller exercises a year. They range from table-top exercises to simulations and full-scale exercises – many of them are conducted in a hybrid format since the beginning of the covid-19 pandemic. Annually, more than 20 exercises may be conducted and can include 300-400 participants per exercise. The number of participants depends on the sector and scenario, and the related interdependencies, in question. For food sector, e.g., with long supply chains and many interdependencies, involvement of different kinds of partners is relevant.

> *"...food sector, there's a large cohesion because you need to produce the food and then process it till then distribute it and sell it, distribute to the stores and then sell it so they are mostly working together because it's a very important chain." (P12)*

Typically training and exercises go hand in hand, as in the case of exercises conducted in the digital sector, where typically the actual exercise consists of 3-4 parts and is preceded by a training and preparation phase where the goal is to create capabilities needed to participate and engage in the actual exercise that then lasts up to three days and is further followed by an evaluation and reporting phase.

Areas of further development that were mentioned in the interviews included the creation of common threat scenarios across different sectors and pools and that could be further customized to the needs of the sectors and pools to save resources as scenario development is a very time-consuming process. Moreover, international dimension could be further emphasized and better included in the exercises in the future. A better coordination and cooperation also nationally in organizing exercises and that way better using of common resources was called for in the interviews, not only in terms of timetables but also in terms of goal setting and identifying specific capabilities addressed in each training in order

not to duplicate efforts of strain the resources of some individuals whose expertise may be needed in various exercises in different sectors. Currently crisis exercises are conducted in Finland by ministries, governmental institutes, such as the Cyber Security Centre, regional authorities, defense forces, rescue services, NGOs, and by companies themselves.

So, typically organizations that organize exercises themselves, also take part in exercises organized by other actors. For example, NESA, besides organizing exercises within its own sector and pool organization, takes part in the exercises organized by other partners: such as those organized by the Finnish Red Cross, including the Pisara exercise testing communities' preparedness for water shortages, or an IFRC organized international exercise hosted by the Finnish Red Cross for a large-scale migration event in 2022, also including several public sectors partners. The importance of training is well captured in the words of one interviewee stressing the need of continuous interaction, testing, learning, and improving of the emergency management system even in the case of a well-functioning system as in Finland:

> *"...even the fact that we have a relatively, or even very well-functioning system, doesn't mean that it shouldn't be improved, and it shouldn't be practiced. So again, referring to this exercise and training aspect that [name of another interviewee] was talking about in the beginning, I think it's really important that we continuously keep training, I mean, keep talking, keep communicating, keep training and keep exercising. Because that's how it's best done and best tested. And then, hopefully, after all the training and exercises, we again are little bit better prepared when the next one comes. And it will come. We all know it." (P13)*

Another actor included in the preparedness training, focused on logistics, is Hanken School of Economics, HUMLOG Institute, which is partner in the CORE project and WP4 leader. Hanken offers Master of Science (MSc) Studies in Humanitarian Logistics, preparing humanitarian and crisis response professionals and conducting research in this area.

Societal resilience

The interviewees were given the UN definition of societal resilience and asked to describe how they see their work and organization contribute to societal resilience in Finland. The following themes emerged from the interviewees and are described below.

Comprehensive security model and networking

According to the interviews, societal resilience in Finland is built around the comprehensive security model, which is the disaster management framework

that Finland uses, as it cultivates participation, cooperation, and trust among different parties and across various levels and sectors of the Finnish society.

> *"I would say that what we call the comprehensive security model of Finland, which consists of different partners, and this network works, like said, locally, regionally and then nationwide and internationally. The stakeholders or partners, they are from the citizens who are represented by voluntary organizations. Then we have cooperation with training, education, research, like this your core project, and then other authorities and then the private sector. So, I would say this is a very well working network and it makes our society very resilient so I would say the preparedness works well." (P7)*

Regarding the security of supply work, the preparedness organization of NESA built around the sector and pool system, which also covers the public-private cooperation, is described as a source of societal resilience. Moreover, cross-sectoral cooperation around the Sendai framework was also seen as an added-value for the societal resilience. The role and importance of civil society for societal resilience as an ability to bounce back and continue working and living after an emergency is also mentioned.

Citizens' home preparedness

Citizens' home preparedness, including instructions and advice from authorities, is also described to be a source of societal resilience: self-sufficiency and preparedness gives a feeling a safety and security. Knowing what to do oneself and what the authorities do in case something happens also helps encounter negative emotions and worrying.

> *"We do talk about every person's own resilience in every situation, that how they are prepared at home for example, can they handle every situation for three days, for example if there's no water or electricity and so on that are they prepared themselves, in that sense." (P3)*

Moreover, the interviewees mention the communication activities in promoting preparedness among citizens and engagement also on a community level.

> *"We have been involved in many preparedness and kind of advocacy for preparedness campaigns, kotivara [another concept for home preparedness in Finnish] and many others where our branches are working in the communities to see how they are prepared and what kind of individual preparedness steps they should take. That is the one side of it." (P10)*

Moreover, preparedness is terms of material supplies as well as adequate knowledge to help oneself and others, is seen as a source of confidence in the future and that way linked to the recovery and ability to look into a future beyond the crisis.

"…when a person knows that I have food for several days, for example, at least for those three days, or I know that despite this event, I have ways and resources to act. Then a person is more peaceful and that peacefulness of one person increases peacefulness in that family and then in the whole community. So, the confidence that we can make it and we will make it also tomorrow. And although this feels bad now, some issue, it is not the end of the world." (P5, Translation from Finnish)

Material preparedness and stockpiling

Material preparedness and stockpiling is described as a source of societal resilience: if a crisis or disturbance to normal conditions happens, there is preparedness to help the society keep running.

"…have this stockpiling that would be used in a sense in a case that we don't get logistics working, that imports are not running properly, so that we would have something to keep the society working as long as possible, as normal as possible." (P12)

Structural (systemic) preparedness & legislation

In the interviews, the structural context and legislation are mentioned as factors influencing societal resilience. It is described how resilience comprises helping capacity but also the ability to receive help when needed. In developing countries, the scenario of receiving help is often overlooked.

"We have to look at the Finnish legislations for example, if we want to import emergency assistance. How do the customs react to that and how, if we have foreigners coming and working in Finland as international delegates, how are they allowed to operate here? So, you have to turn the lens around. And this is something quite new to us because we've always been thinking how do we help instead of how do we receive. But there is the option that if we do need international assistance, we can ask for it." (P9)

Organizational preparedness

Preparedness at the organizational level is described in the interviews as a source of societal resilience. It is embedded in the organizational culture and practices as ways of doing things in a way that it is beneficial from preparedness perspective. That includes also organizational learning, in-house expertise and knowledge that also guarantee sufficient skills and self-sufficiency to manage crises.

"And of course, every choice we make, we always think of it, does it make sense in preparedness side. For example, when we are buying new vehicles, we can't buy fully electronic ones because in the resilience and disaster preparedness wise it might be risky to have that one because then you would definitely need to have the generators to back up that you are able to move. So, this

kind of you know, every choice we make, we also think, does this make sense in preparedness wise. And what activities we do ourselves, what we outsource. Sometimes it might be 50/50, does it make it sense to do it yourself or do you outsource it. In those cases, we most likely still keep doing that ourselves because then by doing it yourselves you keep that learning, you keep that know-how inhouse. So, in the case of emergency that you have to do it yourself, you don't start from the scratch." (P10)

Organizational preparedness also comprises individuals' expertise that is built upon previous experiences of crisis situations and deployment into disaster zones. This is manifested in an ability to act, make decisions, and keep calm in situations of crises. A flexible organizational culture and a way of working is described as a contributing factor to organizational preparedness and resilience.

"I would say that you need to have the words resilience and serendipity in the same sentence. So, this positive, seize the day type of... Whatever positive phenomenon occurs, it also allows us to learn and change very rapidly and be very flexible. You would need both." (P8)

An organization's own capabilities, resource management and material preparedness are also regarded as sources of resilience.

"Because you have your own operational capabilities. You have your own resource management. You have your own contractual everyday life management. And it allows you to better deal with no matter what happens. You're better off with it than without it." (P8)

Training

The goal of preparedness training is described as to make society more resilient by increasing the resilience of the different societal actors.

"...in these days we talk about resilience and that's our main goal, that municipalities and authorities and even every person would be resilient so that we would be just fine if something happens." (P3)

As societies are made of individuals, the importance of individual preparedness and training of citizens is also stressed.

"In my view this is what our work is all about [contributing to resilience]. I mean when we strengthen the resilience of individuals, and communities are made of individuals. And municipalities, cities and the nation are comprised of communities. The more we can respond to the ability of individuals to meet different challenges, that way we can support the collective resilience of the society." (P6, translation from Finnish)

Knowledge that is gained though trainings is described as a source of resilience.

"I understand that every training education builds up resilience, in part. And when whoever takes part in our courses, like cybersecurity or whatever, she or he are, after that, better prepared in that theme. If you don't know anything, if you haven't got any education training or any information of these things, you are very 'unresilient', as I say. [Laughing] It's not good for our society if people are not aware of these things. It helps our society to cope over crisis if we well know." (P4)

Training is also linked to psychological coping and inner strength in terms of trust and confidence which is needed to recover fast and be resilient in crises.

"How fast you recover from setbacks, it requires experience from previous setbacks. That you have been able to cope from previous setbacks also, that increases resilience. That kind of creation of trust and hope and confidence, those things take one forward. That yes, we can make it." (P6, translation from Finnish)

Sweden

Overview

In Sweden, disaster management is guided by an all-hazard approach (EC, 2021). Like other countries in the Nordic region, Sweden applies a whole-of-society approach to be prepared for disaster (Wigell et al., 2022). The Swedish Civil Contingencies Agency (In Swedish: Myndigheten för Samhällsskydd och Beredskap, MSB) is responsible for preparedness on the national level. On a regional level, the county administration (in Swedish: Länsstyrelsen) is responsible, while on the local level, the individual municipalities (in Swedish: Kommun) are responsible. When it comes to healthcare during a crisis, the healthcare regions (in Swedish: Region) are responsible. In a time of crises in Sweden, all authorities and agencies retain their responsibilities (EC, 2021).

The disaster management system in Sweden is governed by three underlying principles: responsibility, parity, and proximity. The responsibility principle refers to the responsibility of an actor under normal circumstances is the same as the responsibility of an actor during a crisis. The parity principles require that the organization and localization of activities be the same under normal circumstances and crises. The third principle of proximity establishes that a crisis must be managed at the location of the crisis as well as by those who are close to the crisis and by the lowest governmental level (Petridou, 2020).

In Sweden, disaster preparedness has gradually become more important in recent years in the aftermath of many crises, including COVID-19, forest fires, floods, drought etc., contributing to an increased risk awareness. Before the end

of Cold War, Sweden was one of the most crises prepared countries in the world, but afterwards, Sweden became a country which could survive only a week in case of war (FIIA, 2020). Sweden uses and applies the term "total defence", which combines both civilian and military aspects by considering both defence planning as well as preparation for the war (Wigell et al., 2022). Total defence refers to wartime preparedness and maximum readiness with the overall goal of defending Sweden in times of disaster or war (MSB, 2022c).

Figure 10 (adapted from Wigell et al., 2022) shows national actors' responsibility in Sweden during a disaster. Figure 10 also provides an indication of the stakeholders involved in disaster preparedness. The authorities of Sweden are characterized by pluralism and can be categorized into three different administrative levels: local, regional, and national. The national level consists of government, parliament, and central authorities. The regional level consists of county councils which link local and national levels. Emergencies in peacetime are overseen by governments with coordinative bodies and crisis councils. They provide instructions, statements, and directives for all state authorities. However, crises are considered local irrespective of their administrative and geographic scopes. As a result, 290 Swedish municipalities have considerable power over disaster management in their respective areas of operation (Sparf et al., 2022).

MSB plays a central role in disaster preparedness and is responsible for the coordination of public safety, civil protection, civil defence, and emergency management during and after a disaster. Until October 1, 2022, there were 47 designated authorities to coordinate issues related to civil defence. After October 1, 2022, it will be 60 disaster preparedness authorities, including 21 county administrative boards and 39 other preparedness authorities (Wigell et al., 2022).
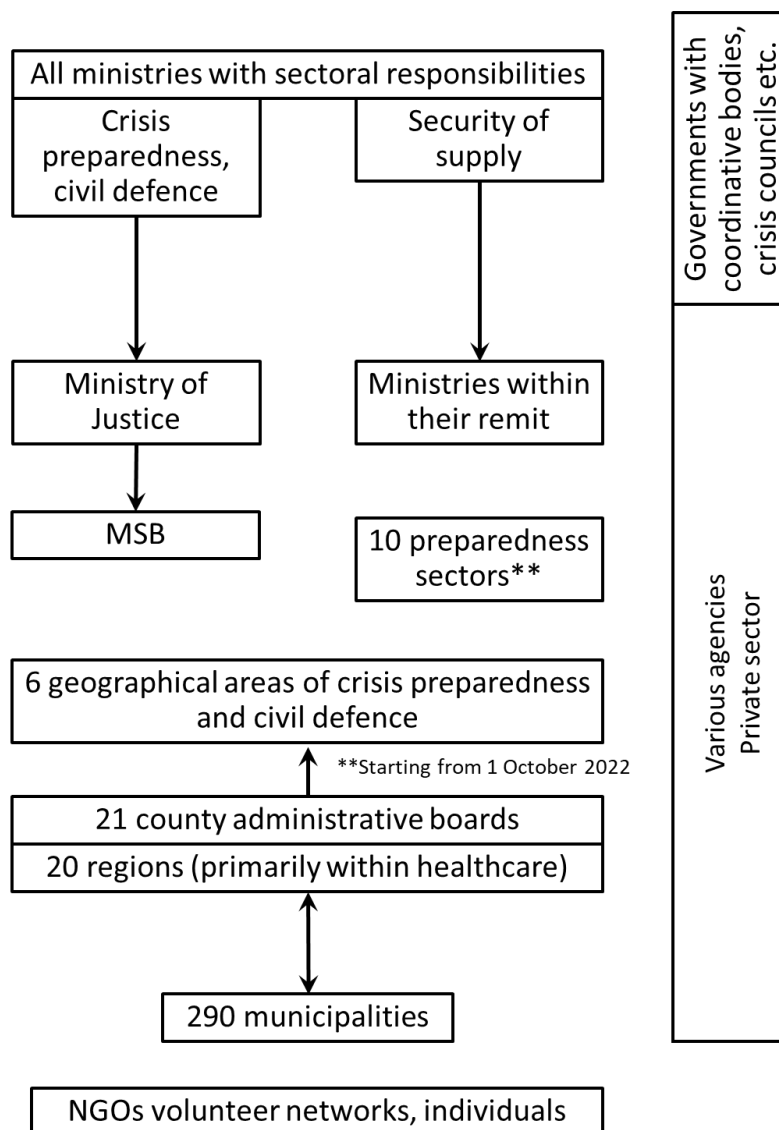
*Figure 10: Map of stakeholders for disasters preparedness in Sweden
(Source: Wigell et al., 2022)*

Risks consideration

Sweden maintains a continuous risk management process for assessing national risks. Cross-border assessments are also conducted from time to time jointly with other Nordic countries (EC, 2021).

According to the hazards and risks page of krisinformation.se, (2022b) the following risks are considered and need preparedness for depending on where one lives in Sweden.

- Risk of fire and fire bans
- Drinking water
- Chemical accidents
- Extreme heat

- Food and drinking water
- A heightened state of alert and war
- Life-threatening injuries
- Nuclear accidents
- Power outages
- Snowstorms and extreme cold
- Terrorist attacks
- Transport disturbances
- Water shortage and drought
- Floods
- Disasters and Incidents

Each of the above risks also has a dedicated page to describe what to do if a risk occurs. For instance, if there is a water shortage, the municipality will deploy water tanks or have pre-assigned sites to fetch water. Also, it is advised to store water in case of large-scale power outages.

Disaster preparedness

In Sweden, the current disaster preparedness system is considered underdeveloped and going through a massive reform currently, which was decided by the Swedish Government on 19th of May 2022 (Wigell et al., 2022). Disaster preparedness is referred to in the Swedish system as crisis preparedness. However, to have consistency in this report, we are using term disaster preparedness instead of crisis preparedness. Disaster preparedness is defined as the ability to resist, prevent, and manage emergencies. This ability is developed through the organisations and structures as well as training and practices that are created before, during, and after a disaster (MSB, 2022c). The preparedness level varies between sectors and domains (Wigell et al., 2022). Preparedness starts with a whole-society approach meaning that everyone in the society will individually and jointly take responsibility in their respective areas and will work toward preparing the society for a disaster. The work of disaster preparedness takes place at the national, local, and regional, as well as at the EU and international levels (MSB, 2022c).

On October 3, 2022, krisinformation.se, (2022) platform released an announcement about the current reform. Along with the term disaster preparedness, another term is readily applied in Sweden, which is civil preparedness and refers to both crisis preparedness and civil defence. The aim of civil preparedness is to prepare civil society in Sweden against all kinds of disasters and risks. It also includes the protection of basic values with regards to community functionality, people's lives, laws, democracy, human rights, freedom, economic and environmental wellbeing and national sovereignty (MSB, 2022c).

The new system of disaster preparedness has ten emergency service sectors (krisinformation.se, 2022a). These are:

1. financial security
2. electronic communications and post
3. energy supply
4. financial services
5. supply of basic data
6. health, care, and nursing
7. food supply and drinking water availability
8. public order and security
9. emergency services and protection of civilians
10. transport

Sixty authorities will cover ten emergency sectors listed above. Six county administrative boards Örebro, Norrbotten, Östergötland, Stockholm, Skåne, and Västra Götaland County have the responsibility to coordinate the work within civil defence with the other county administration boards within their respective civil defence area (civilområden). Among the above emergency sector, three are considered the most important. They are, a functioning electricity supply, access to clean drinking water, and transport infrastructure. The goal for the emergency authorities is to withstand risks and threats to prevent vulnerabilities, perform their duties and manage peacetime crises during normal times and in a crisis.

Prepositioning and security of supply

Sweden had a large total defence structure and stockpiling during the Cold War. However, it abandoned it in the 2000s (Wigell et al., 2022). Because of the lack of a direct military threat, there was a drastic reduction in the defence budget, as well as emergency stockpiling of items such as food, medicines, and oil. The emergency stocks were sold, donated, or burned. For example, the number of field hospitals was reduced to two from 50 hospitals and 7.3 million protective masks were burned. Facilities were demolished, sold, or sealed off (FIIA, 2020). However, due to COVID-19 and followed by 2022 the full-scale Russian invasion on Ukraine, Sweden has slowly started to rebuild emergency stocks.

Sweden has the rescEU medical stockpile commissioned by the EU, among other countries such as Germany, Romania, Greece, Belgium, Denmark, Hungary, Slovenia, Finland, and the Netherlands. RescEU is a common reserve capacity of the EU which aims to boost the preparedness and response abilities for various types of disasters, such as pandemics and forest fires. EU member states can request assistance on PPEs from the Emergency Response Coordination Centre in Brussels. RescEU stockpile in Sweden is managed by MSB. The stockpile includes stocks of medical equipment such as ventilators and PPEs including facemasks and gowns. MSB established a warehouse in Kristinehamn

municipality in cooperation with the European Union External Action Service. Sweden also stores shelter stockpiles and aerial forest fire capacities for rescEU (MSB, 2022b).

MSB defines supply security as supply readiness. Supply readiness is further defined as "the ability to provide the population with the goods and services needed for its survival in crisis, heightened preparedness and ultimately war. It is also the ability to provide socially important activities, civil as well as military, with the goods and services needed for their functionality" (MSB, 2022b). According to MSB's website, in December 2020, the Riksdag decided on new targets for civil defence, which is reflected in the total defence bill "Total Defense 2021-2025", where government writes the following:

> *"To a large extent, private actors own and are responsible for many of the most important social functions, which include the production and transport of necessary goods and services. Business life is thus of central importance for total defence and for supply readiness. Public actors should, in close dialogue with private actors, assess the need for preparations to ensure reasonable preparedness. It can refer to, among other things prioritization and distribution of resources as well as other necessary measures such as producing or storing products and materials" (MSB, 2022b).*

Sweden applies the principle of responsibility for ensuring the security of supply and maintaining emergency stock which means whoever is responsible for something in everyday life is also liable in the event of a crisis and must ensure their supply chains. In some cases, exceptions are made to this principle. How it is handled is decided from area to area based on the conditions in different sectors (MSB, 2022b).

In Sweden, there is currently no government emergency food storage, and no designated government authority is responsible for ensuring access to food. The Swedish Food Agency coordinates national crisis and contingency planning for drinking water and food supply after primary production. They support responsible actors in their planning to be able to offer food and water regardless of social disruption (MSB, 2022b). It has been found that at the municipal level, some municipalities have distribution centres to coordinate different product flows and minimize the need for transport to, from and between the municipality's administrations. The goods are delivered to the distribution centre and from there to the respective customers in the municipality. The distribution centre facilitates receiving of goods in the municipalities only once or twice per week (Värnamo, 2022).

Furthermore, at the regional level, some regions maintain some equipment related to fire services, shelters, and kitchen.

"We have four vehicles to get out in the forest. So, we can start tents for...so people can stay in with beds and heat. And we have portable kitchens with a lot of food. So, we have quite a lot, but that's quite unique. It's not many of the counties that have that" (R2)

For medicines and healthcare equipment, healthcare providers, regions, private hospitals, and municipalities are responsible for ensuring the security of supply. Regions must have plans for disaster medical preparedness, which include medical equipment for personnel, consumables, and medicines. The Public Health Agency is responsible for the emergency storage of infection-prevention drugs for influenza pandemics and infectious diseases, such as antiviral drugs and antibiotics. The National Board of Health and Welfare manages a contingency stock of medicines and healthcare equipment, for example, beds, spare parts, and ventilators (MSB, 2022b).

Apart from the above, our interviews revealed that there had been a push towards bringing the production of critical items to Sweden.

"It's not just storage, it's also that we have to have the production inside our own country. We should be able to produce some [critical items] by ourselves." (R2)

To ensure the security of its energy supply, Sweden has international agreements with the international energy agency (IEA) and the EU. Sweden has fuel stocks equivalent to 90 days of oil imports to cope with disruptions in the world market. This is managed within the regular supply chain; the stocks are held as reserves by certain actors. The Swedish Energy Agency then checks that the actors manage the warehouses and that all costs are charged to end users (MSB, 2022b).

Home preparedness – "If crisis or war comes"

On top of preparedness by state authorities, Sweden also emphasises home preparedness. In 2018, all households in Sweden received a brochure about disaster preparedness called "Om krisen eller kriget kommer"(MSB, 2018). The brochure is also available in English and titled "If Crisis or War Comes"(MSB, 2022a) (see figure 11). This brochure gives citizens guidelines on emergency preparedness, including what to do if a war breaks out. Citizens are also informed about who will be helped first in case of a social emergency and recommendations on what they need to have (e.g., food, warmth, water). According to the brochure, the purpose is to help people get prepared for "everything from serious accidents, extreme weather and IT attacks to military conflicts" (MSB 2018, 3). The brochure covers emergency preparedness information and advice, with separate chapters on false information and terrorist attack. Moreover, it describes the Swedish total defence system and warning systems in use in Sweden.

Figure 11: Disaster preparedness brochure
(Source: MSB, 2019)

The brochure offers a comprehensive check list of home preparedness items and advice regarding food, water, warmth, and communication (see figure 11) (MSB 2018, pp. 10-11).

In a more recent application, the krisinformation.se website, (2022), citizens are advised to prepare for the following items:

- Food and cooking
- Drinking water
- Heating
- Communication
- Medicines and first aid kits
- Toilet visits and hygiene
- Lighting (e.g., flashlights and candles)
- Money (a small amount of cash in different denominations)
- Transportation (if possible, keep the car fully refuelled)

Each point above has a separate web page on what to do when a disruption happens. For instance, to ensure water supply, Swedish citizens are advised the following:

- To allow for three to five litres of water per person per day for people as well as have consideration for pets.
- To store drinking water in bottles or cans to be prepared for a power outage.
- To freeze water in bottles so that they can be used as an ice pack when necessary.
- To keep a container for water at home to fetch water if necessary.
- To boil contaminated water.

The MSB received an assignment from the Swedish Government to develop a preparedness brochure that would be distributed in the printed form to all Swedish households. This was in line with the Swedish tradition of informing the public and it was the fourth time a national preparedness brochure was launched. The commission also included a content of what should be included in the brochure. The content was then further developed in consultation with various stakeholder groups representing the society at large, including civil society, public sector, municipalities, regional and national agencies, and including people of different ages, professions, and different kinds of households. Moreover, the content was published in 14 languages, including official minority languages, sign language and braille, it was also available online for downloading electronic (pdf) version.

Originally, the brochure advised people to have emergency preparedness for "some days" to cope on their own in the case of an emergency. Later, in 2021, the Swedish Government decided that the expected home preparedness should be one week. The brochure has the whole Swedish nation as its target group but was especially developed bearing in mind people with low level of previous knowledge on preparedness and how the Swedish systems works. It was written in simple language including easy and short sentences and basic expressions. The basic concept and message in the brochure is that every individual has the responsibility to take care of him/herself and of their loved ones and help other nearby in case of a crisis or a war.

> *"You can't expect to get all that you need and all the help immediately from the society if something happens. You have also responsibility." [...] You should be able to handle yourself and your own basic needs without support from society for one week." (P11)*

The brochure is used and actively communicated during the annual emergency preparedness week in Sweden. It is organised in the autumn in the last week of September. During this week, municipalities in cooperation with various organisations organise different activities for the purpose of informing the inhabitants about local threats and risks and how to prepare for them. Printed copies are also distributed during this week. According to an interviewee, it is

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74

thanks to the wide participation of stakeholders from all levels in the development of the brochure that the brochure is still widely used, vivid and alive.

> *"…when I got questions from other countries, what is your most important suggestions to us if we are planning to also plan a brochure for the public? And that is to involve as many stakeholders as possible from the society. That is extremely important." (P11)*

Despite the wide support that brochure received, some points for further development were also noticed. Namely, although the format was customised to meet different literacy needs of various categories of vulnerable groups, and translated into multiple languages, including sign language and braille, the content itself needed further adaptation, for example, to provide correct advice for those with a hearing disability.

> *"We have quite a big dialogue with organisations in Sweden that collect people with different disabilities. And we have had that almost since we distributed the brochure. But also since the pandemic started. But we are still working with special advice for people with deafness or blindness or if you are dependent on a wheelchair or whatever. But it has taken a long time and we are still not there. One thing is that we are very few in my part of the agency. So, we haven't got enough resources to work with that, I'm afraid. But we have started the work, but it takes a long time, I'm afraid so." (P11)*

After the beginning of the full-scale Russian invasion on Ukraine in February 2022, there was a heightened interest in the brochure and preparedness information shown in thousands of downloads from the MSB website as well as requests for the ordering of the printed version.

Besides the brochure, the website (www.krisinformation.se/en) with updated and current preparedness information for citizens and including, e.g., films, fact sheets and different kinds of information materials, and the emergency preparedness week, there is currently a travelling mobile container exhibition targeted for the youth education on emergency preparedness (see figure 12).

Figure 12: Travelling emergency preparedness exhibition in Sweden "Afraid or prepared".
(Source: Photo by Melker Dahlstrand / MSB)

The exhibition targets the youth aged 15-17. It will be touring through Sweden for three years starting in 2022. The exhibition stops outside the school buildings and is visited during the school hours. In the exhibition, the pupils can learn about their responsibilities, home preparedness, different threat scenarios and how to act during a crisis.

> *"So, this is a way to reach young people. Young people is a target group that is quite hard to reach. But now we are actually visiting them where they are in their daily lives. That is in school. So, we are coming to them instead of asking them to visit a certain website or so." (P11)*

Besides the MSB, in Sweden there are civil society organisations, altogether 18, which are tasked to inform people about preparedness for crises and for war. MSB provides financing so that these organisations can arrange courses and trainings for their own members, but also for the public, including e.g., information evenings and home preparedness trainings. Moreover, the MSB provides preparedness materials for schools to support the preparedness education in schools which for the moment is voluntary in Sweden.

Figure 13: Travelling emergency preparedness exhibition targeted at youth in Sweden (Photo by: Melker Dahlstrand / MSB)

Framework agreements and supplier management

In the Swedish preparedness landscape, it is now understood that companies own a large part of the resources needed to secure the supply of goods and services, both in crises and war. Therefore, during 2022–2023, some authorities, namely the Coast Guard, the Swedish Transport Agency, the Swedish Aviation Agency, the Swedish Medical Products Agency, the Swedish Meteorological and Hydrological Institute, the Norwegian Veterinary Medical Institute, and the Swedish Police Agency, are implementing various projects to strengthen their own and Sweden's supply preparedness (MSB, 2022b).

According to MSB, (2020), an example of one such project is now being conducted by the Swedish Transport Administration. The aim of the project is to increase the ability of roads and railways to function to ensure access to products and services that are important in crisis and war times. In the project, dialogues with suppliers and companies are being carried out, and agreements are being drafted to identify and ensure access. Through the agreements, companies are made aware of their roles and responsibilities during crisis time.

From the interviews at the municipality level, it came through that collaboration happens with volunteer organisations before and during a crisis.

> "...in just the case of Ukraine, we had a coordination with the church, so the church was the one to handle all these voluntary requests and when they came in, what they could help with, what they had to offer and we had contact with the church to tell us what they had to offer, what can we get from it." (R1)

Such coordination with the church is informal in nature and without formal agreements or contracts. Moreover, at the municipality level (kommun), informal coordination is present in abundance. Public sector authorities, private businesses, and volunteer organizations have regular meetings at normal times to brainstorm what to do when a disaster strikes. These informal meetings are arranged to better collaborate with different responsible stakeholders during a disaster. In these meetings, the capacities of different stakeholders are identified so that when a crisis comes, municipalities are aware of who to seek help from. According to krisinformation.se, (2022c), there are 18 such organizations in Sweden that belong to one of the following types: voluntary defence organizations, voluntary resource groups, and religious communities. Citizens of Sweden are encouraged to join these organizations and get involved to help during a crisis actively.

Training

At the national and international levels, MSB is responsible for providing training and exercises for individuals, public authorities, and organisations (EC, 2021). In the MSB's website (MSB, 2022a), there are at least 19 courses listed on the topic of crisis preparedness, including courses on community protection and preparedness, crisis preparedness and total defence, and crisis communication. The crisis preparedness and total defence course give knowledge about society's crisis preparedness and total defence so that the course participants can contribute to the work of preventing and managing a crisis.

There are also professional training programs in prevention and operations on different levels for fire and rescue services personnel. The in-person courses are given at the MSB College in Sandö and Revinge (EC, 2021). There are also online, and web-based courses listed on MSB's website. For instance, basic safety protection training via the web (MSB, 2022a). MSB also offers customised training for local authorities and the private sector. Furthermore, international training programmes on different levels, such as operational, tactical, and strategic levels, are organised in collaboration with the EU and the UN (EC, 2021).

At the municipality level, several different types of training are organised, such as fire drills, Cardiopulmonary resuscitation (CPR), life-supporting drills, and

emergency response drills. These training sessions are primarily attended by personnel from municipalities. However, any private organisation willing to receive such training can also procure it.

> *"We train in basic fire drills. Basic CPR, life supporting drills. We are supplying trainings in emergency response drills. We have drills in crises management, and that is mainly for the municipalities, but we even have a lot of questions from private companies that are interested in buying these drills and conduct them" (R3)*

Other non-profit organisations, such as the Swedish Fire Protection Association, which works for greater fire safety in Sweden, also organise around 200 training sessions for about 4500 participants each year. The training topics vary from fire-safety management and systematic fire-safety work to topics like fire safety planning and flammable substances. (Brandskyddsföreningen, 2022.)

Apart from training, several exercises are also organised. For instance, the Total Defence Exercise 2020 started in November 2019 and continued in 2020 and 2021. The main objectives of the exercise were to protect the civilian population and vital functions as well as resist an armed attack. The participating organisations are 60 public authorities and volunteer organisations (MSB, 2022g). There are also systematic practice activities where participants can practice crisis preparedness and civil defence as well as find partners and build joint working methods and cost-effective solutions (MSB, 2022d).

Disaster risk reduction framework

MSB in Sweden has commissioned a study titled "Sweden and the Sendai Framework for Disaster Risk Reduction 2015-2030: A Gap Analysis"(MSB, 2021). The purpose was to analyse the extent to which Sweden has implemented the Sendai Framework for Disaster Risk Reduction 2015-2030's 59 measures at the local and national levels. This enables Sweden to understand its ability to meet global targets. The result of this report reveals that Sweden has made significant progress in developing a national DRR strategy. However, still there are challenges that negatively affect the performance of Sweden regarding most of the measures. According to the MSB (2021), Sweden needs a more comprehensive understanding of its risks which means having oversight, coherence, and clarity. It also requires increase in funding for actors with greater responsibilities for DRR. Furthermore, it needs to include vulnerable and marginalised groups into DRR policies.

Our interviews also confirm Sweden's adoption of the Sendai framework as well as its efforts to have a national DRR strategy.

> *"The way we have implemented the Sendai Framework, we had the national platform for disaster risk reduction, a co-ordinating platform, but that was*

when the Hyogo Framework for Action was in place. And the Sendai Framework has a broader concept. It covers both small-scale disasters, large-scale disasters, and more slow coming disasters, biological, chemical, natural disasters, while Hyogo Framework fraction had the focus on natural disasters. And from that coming also other disasters. So, we say, that we have implemented it through all the crisis management system we have in Sweden" (R5)

Societal resilience

It has been found in literature how important resilience is for Sweden and how the security of supply helps to enhance resilience (Wigell et al., 2022). However, we could not find a definition of societal resilience adopted by Sweden. The conceptualisation of resilience and what it means to the Swedish system of disaster preparedness came forward during the interviews. For instance, the following quote reflects that concept of resilience is very much related to society's ability to keep functioning irrespective of the crisis at hand.

".. and that society keeps on working, so … the resilience that we can keep working. We never stop, no matter what happens, we have to keep on going with the things that are not allowed to stop, like healthcare, it can't stop because then people start to die" (R1)

According to Wigell et al. (2022), the high level of trust in the Nordic society also helps to enhance societal resilience. This was evident in our interviews as well. The following quote from a respondent defines resilience as a puzzle while different organisations, government authorities and private companies play a role in finding the pieces of the puzzle.

"Well, it's like a puzzle. You have to have all the pieces in place to build complete puzzle. And we're trying to find all these pieces. So, our organisation plays one role, other authorities, organizations, private companies play their role to withstand all the basic services. It's not only the governmental authorities that have a role to play. It's citizens, its organizations, its private companies, its authorities, so we have to be aware all of us and know who is responsible for what and help out" (R5)

Societal resilience is also built around the individual citizens' resilience which comprises their home preparedness to cope materially on their own in case of a crisis, in Sweden for one week. That is related to having the necessary knowledge and information which is acquired through preparedness communication, including the preparedness brochure and the related materials, campaigns and information channels, to be able to act to protect oneself and others in different crisis situations. Another aspect to resilience, as one interviewee aptly describes,

is engagement and the ability of the individual to practice resilience in their daily lives though interacting with others, neighbours, family and friends:

> *"We want people to be engaged in the Swedish preparedness. That means that we try to support and motivate people to talk about preparedness questions with their neighbours, at their work, in school, in the civil society as a whole. Our goal is that questions of preparedness should be a part of the daily dialogue. It shouldn't be something exceptional or that you are only talking about or thinking about when it happens. It needs to be part of our daily lives." (P11)*

Italy

Overview

The Italian Department of Civil Protection plays a fundamental role in ensuring assistance to the public by collating and coordinating the national resources in case of emergency (Italian Civil Protection Department, 2021). The activities carried out in civil protection are as follows:

- collaborating with regions and autonomous provinces
- drafting and coordinating the national plans for risk scenarios
- testing effectiveness of national plan risk scenarios through drills
- coordinating the service's intervention in national emergencies of national interest
- promoting risk prevision
- defining criteria to identify seismic zones
- developing general guidelines for training activities in the areas of civil protection

These governance levels are shown in Figure 14.

Italy is exposed to many natural and man-made risks (Righi et al., 2021). Hence, civil protection in times of emergency requires human resources, means, competencies, and operational and organizational capacities to be ready to intervene in an effective and timely manner. Consequently, civil protection in Italy is not a responsibility of a single administration but a function assigned to the National Civil Protection Service, which is an integrated system.
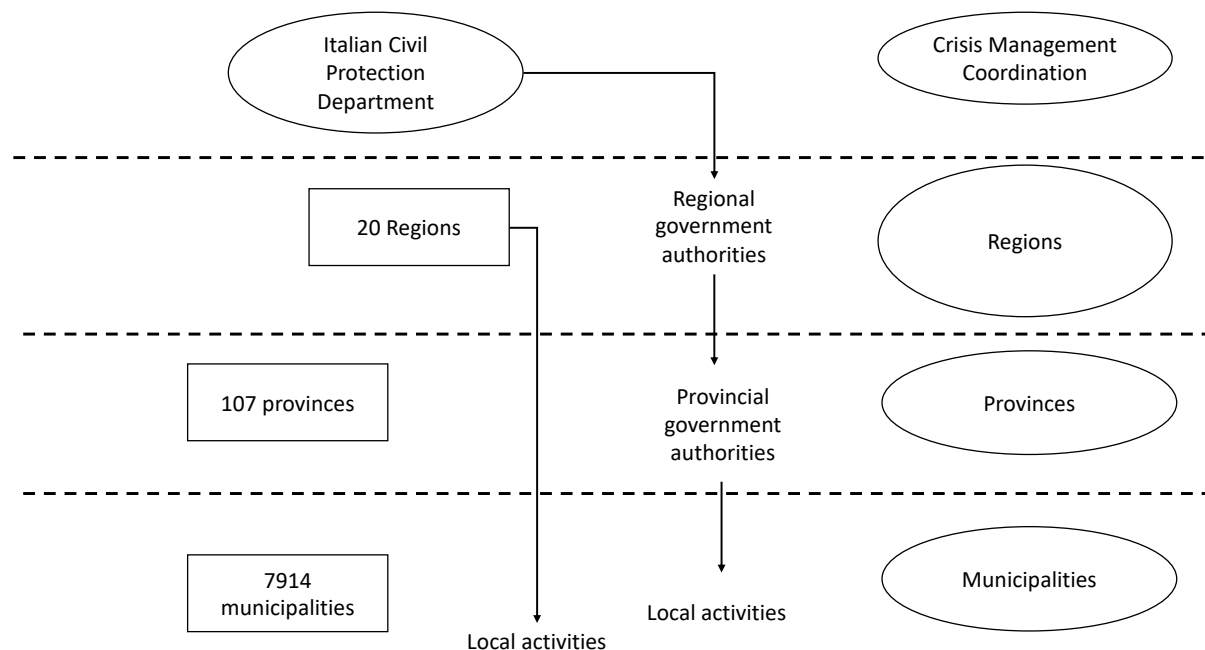
Figure 14: Organisation of crisis governance in Italy

The National Service, headed by the Department of Civil Protection, consists of all levels of government: local authorities, regions, provinces, and the State. The mayor is the first Civil Protection authority within the Municipality and has as a task to issue warnings and to manage localized situations, using the resources and manpower at the municipal level. If the Municipality is unable to cope on its own, the Province, the Government's territorial Offices – i.e., the Prefectures – and, subsequently, the Region intervene to support managing the situation. In the event of more serious and widespread emergencies, the national level takes the lead: in that case, the intervention becomes the direct responsibility of the Prime Minister, operating through the Department of Civil Protection (Civil Protection Department, Presidency of the Council of Ministers, 2005). Many organisations are coordinating under the umbrella of the national service system, including private companies responsible for essential services such as communication, transport, and service networks. The government organisations responsible for civil protection include:

- National Fire Brigades,
- Police Forces,
- Armed Forces,
- National Health Service,
- scientific community,
- organised civil protection volunteer service,
- National Corps of Alpine and Speleological Rescue,
- Italian Red Cross,

- National System for Environmental Protection and
- organisations responsible for national-level meteorological services (Protezione Civile, 2018).

This was also evident from our interview:

> *"We have an umbrella structure that is called Italian Cell Protection Department that is under the Prime Minister Cabinet." (R9)*

The above organisations are also part of the operating structure. Guidelines for emergency management are issued by the Prime Minister's office. The purpose is to regulate different stakeholders involved in the national service system. Under the guidelines, regions are responsible for their own disaster preparedness planning. They organise and participate in civil protection activities at the regional level and support local organisations (Tani & Larossi, 2012). Coordination centres at different levels are key for disaster preparedness. When there is a local emergency, the local Mayor activates the Municipal Operations Centre (in Italian Centro Operativo Comunale COC). In case a municipality is failed to manage the emergency, the rescue coordination centre at the provincial level (in Italian Centro Coordinamento dei Soccorsi CCS) is chaired by the prefect (delegate of the government on site) or his delegate takes charge. The responsibility shifts to the regional level if the provincial level cannot handle the emergency (European Commission, 2021).

Risks consideration

The national risk assessment report (Italian Civil Protection Department, 2018) published by the Italian civil protection department considers the following risks:

- seismic risk
- volcanic risk
- tsunami risk
- hydro-geological/hydraulic risk and extreme weather events
- droughts
- forest fire risk

According to the report, Italy is very prone to natural disasters. From earthquakes to volcanic eruptions and floodings, Italy has been hit by a sequence of disasters causing very high social and economic costs for the country. According to our Italian respondent, in Italy, volunteer organisations prepare for all types of risks.

> *"We prepare for all the kind of risks that we have in Italian territory that covers more or less, I would say everything apart hurricanes" (R9)*

Prepositioning and security of supply

COVID-19 pandemic impacted the Italian national healthcare system heavily. It prompted Italian healthcare to diversify preparedness strategies. For instance, additional wards are added in hospitals to increase hospital capacity, and funds are quickly provided to regional stock supplies of medical equipment and PPE (Lamberti-Castronuovo et al., 2022).

Citizens' preparedness – I don't take risks

Italy has a booklet "The Civil Protection for Families" (see figure 15) which provides emergency preparedness guidance and advice for citizens and households (Civil Protection Department, Presidency of the Council of Ministers Protection, 2005). The booklet was published in 2005 and is available as a download online. The booklet starts by describing the civil protection system in Italy and concludes by introducing the rationale behind the booklet: the household being "the first organisational element" of the system, and an active participant, not just a passive user (Civil Protection Department, Presidency of the Council of Ministers Protection, 2005, pp. 3-4).

> *"If you are aware of the possible hazards concerning the territory where you live, if you know how and where to get information, if you know how to get organized in order to face a critical moment you live in a safer way and the Civil Protection can function at its best. Indeed, because you are the first player in this system: you are the one who must know how to be vigilant, to give warning, to cooperate with rescue services."*
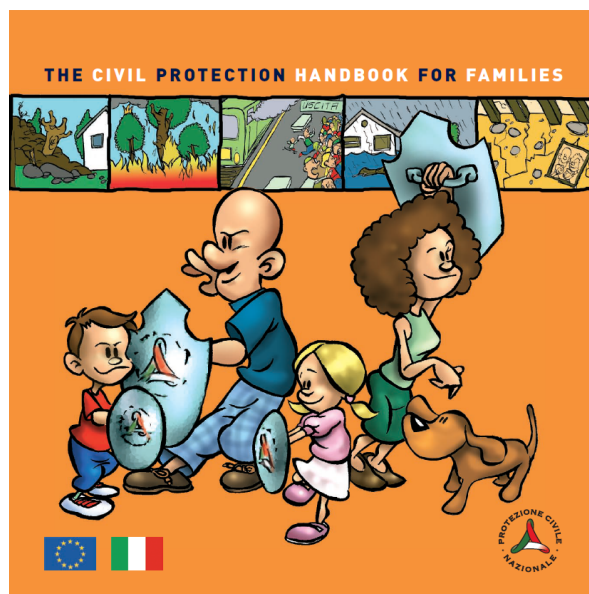
*Figure 15: Civil Protection Handbook for Families in Italy
(Source: Civil Protection Department, Presidency of the Council of Ministers, 2005)*

Moreover, the household is invited to make a civil protection family plan that covers the five chapters of the booklet: 1) knowing the risks, 2) knowing how to get information, 3) getting your family organised, 4) knowing how to ask for help, and 5) emergency and disability. Most of the booklet (all together 68 pages) goes to describing the possible risks and providing scenario-based advice, including for: earthquakes, volcanic eruptions, landslides, floods, seaquakes or tsunamis, road conditions, snow and avalanches, water shortages, heat waves, forest fires, domestic fires, blackouts, industrial hazards, flu epidemics/pandemics, terrorist attacks. Regarding home preparedness and the emergency supply kit, "getting your family organised" chapter includes a list of essential items that need to be ready if a household needs to evacuate in case of an emergency:

- clothing: at least 1 change of clothes per person, which should be comfortable, suited to the season, and should always include a raincoat and windbreaker.
- basic equipment: matches, electric torch with spare batteries, cloths, nylon bags, adhesive tape, disposable plates, tumblers and cutlery, knife, tin and bottle openers, gas cooker.
- food and drink: water (at least 1 litre/day per person) and non-perishable foods such as: energy bars, dried fruit, salt, sugar, tea, coffee, precooked or freeze-dried foods, etc.
- essential medicines, a photocopy of the corresponding medical prescriptions and a first-aid kit
- spare keys
- money and telephone cards
- photocopies of the most important identification documents

If a household faces a situation in which it needs to stay indoors, in addition to food supplies, plenty of drinking water, either bottles of mineral water or in water tanks, is advised. A time frame given for home preparedness, is "for as long as possible" (Civil Protection Department, Presidency of the Council of Ministers, 2005, p. 51). Language versions available are Italian and English.

"I don't take risks" is a national communication campaign directed at citizens in Italy with the purpose of increasing awareness of risks and creating preparedness for how to respond to them in case of crises (Civil Protection Department, Presidency of the Council of Ministers, 2023a). The campaign is implemented locally via civil protection volunteers who are recruited and trained on risk knowledge and communication to become vehicles of information to other citizens. Every October during a weekend titled "Days in the city square" these volunteers set up information points in their local city squares to talk about risks affecting the territory and to illustrate the contents of the campaign material. In

2020, the event took place in 300 towns with 700 groups of volunteers involved. The events aim to be interactive:

"It is not a leafleting operation that takes place in the squares. Volunteers do not just drop off information materials to people, but stop and talk to them, illustrate the characteristics of the risks and also explain the risks through specially designed set-ups - the totem pole, the flood tent and the timeline - while remaining available for any questions and clarifications. It is a real exchange of knowledge and information, a shared path of knowledge to discover the history of the territory and the good practices that every citizen can and should adopt to safeguard against risks." (Civil Protection Department, Presidency of the Council of Ministers 2023a)

Moreover, throughout the year similar dissemination events "special squares" are organised during exercises, workshops, events, and relevant initiatives at the national or regional level. During the COVID-19 pandemic the square events also reached a digital dimension: volunteers created internet-based squares on the most popular social networks, Facebook and Instagram, to engage in risk communication through, for example, videos, interviews, information on good practices, insights on risks, and photos of trainings. (Civil Protection Department, Presidency of the Council of Ministers, 2023a.) The campaign also includes fact sheets focused on the most prominent risks that citizen preparedness in Italy is needed for, including, earthquake, tsunami, flood, Vulcano, Stromboli, and Phlegraean Fields. The leaflets describe the risks and provide instructions and advice for how to act before, during and after an event. (Civil Protection Department, Presidency of the Council of Ministers, 2023c.) A video describing home emergency kit, as part of the I don't take risks campaign, is based on the scenario of evacuation and what needs to have ready to take with oneself (Civil Protection Department, Presidency of the Council of Ministers, 2023d).

Figure 16: Home emergency kit in Italy
(Source: Civil Protection Department, Presidency of the Council of Ministers, 2023d)

The "I don't take risks campaign" is promoted and implemented by the Italian Civil Protection Department, INGV - National Institute of Geophysics and Volcanology, Anpas - National Association of Public Assistance (who initially proposed the idea in 2011), ReLUIS - Inter-University Consortium of Earthquake Engineering Laboratories and CIMA Foundation, in agreement with the Conference of Regions and Autonomous Provinces and Anci - National Association of Italian Municipalities (Civil Protection Department, Presidency of the Council of Ministers, 2023b.) The campaign materials are available in Italian, partially covered in English also.

Framework agreements and supplier management

According to Acquistinretepa, (2022), Italy has implemented several purchasing tools, such as framework contracts, a dynamic purchasing system, framework agreements and an electronic marketplace. Several things, including electricity, natural gas, fuel and heating oils, can be bought using a framework contract. The public administrations in Italy use these framework contracts (in Italian Convenzioni) to acquire or rent goods and services. These contracts have a specific duration as well as a particular quantitative amount that suppliers need to supply. The Italian public administration also uses a digital market which is called a dynamic purchasing system (Sistema dinamico di acquisizione - SDA), to procure goods and services. Healthcare products can be purchased through this

digital market system. Suppliers are pre-qualified for the system, and then they can apply to the tenders published by the public administration.

The public administrations in Italy also use framework agreements to acquire goods or services. Framework agreements have framework contracts for each specific order or tender and can be given to one or more suppliers. The Italian public administrations also use an electronic marketplace where requirements for goods and services are posted. Like the dynamic purchasing system, suppliers are pre-qualified and then can apply for the goods and service requests posted by the public administrations.

Training

Training and exercises for civil protection are carried out in collaboration with the components of the National Civil Protection Service and the operational structures and participated by bodies and administrations responsible for an emergency. At the national level, training and exercises are organised by the Civil Protection Department. The department also carries out training activities and exercises related to the components and operating structure of the national service system. It also organises international training events and exercises within the EU Civil Protection Mechanism. At municipal, provincial, and regional levels, local authorities, Prefectures, and regions carry out the exercises (European Commission, 2021a).

In Italy, since the scholastic year 2020-21, the subject of Civil Protection has been taught as part of the compulsory course of Civil Education. An English version of an Italian text entitled "Civil Protection in Italy - Institutional Textbook for School Teachers" was published in 2022 to be shared with an international audience of teachers. The book was originally aimed at teachers, who work with students from 6 to 19 years old, as a resource of information on a variety of topics including historical, technical, scientific, operational, and policymaking. One of the objectives of the book is to educate the citizens in a way that they can assume their role and responsibility and perceive themselves as members of the National Civil Protection Service. Increased risk awareness and risk aware behaviour are seen as components of societal resilience. (Dolce et al., 2020.) Moreover, other approaches and efforts in the field of education on risk reduction include a course by the University of Modena and Reggio Emilia titled "EmTask" and Reggio Emilia from experience acquired in emergency management due to natural disasters such as earthquakes, floods, and landslides (Righi et al., 2021). The EmTASK Course offered additional skills to those who already operate in the field of civil protection (e.g., army personnel, firefighters, public security corps, civil servants, civil-protection operators, hospital attendants, cultural-heritage operators, and volunteers), and was also open to the public. However, the course ran twice only, and there is a shortage of similar courses available.

The National Institute of Oceanography and Applied Geophysics - OGS has been engaged in educational and training activities since 2017. A project titled CEDAS: building Census for seismic Damage Assessment was developed by OGS to train high school students on seismic risk identification, assessment, and mitigation. The content of the training includes:

- fundamentals of exposure assessment and data collection,
- data manipulation, statistical analysis, plotting and interpretation.
- basic risk-related concepts (exposure, vulnerability, risk) (Scaini et al., 2022).

Volunteer organisations also play a key role in training for emergency preparedness. For instance, the Italian Red Cross has trainings for volunteers, who are members of the Red Cross, as well as the public. The emergency preparedness training for volunteers includes knowledge on forecasting, prevention, risk management and emergency response. It also focuses on development of adequate preparedness to ensure an effective and timely response to national and international disasters and emergencies. Some of the training modules available for Red Cross volunteers are Emergency module level, Aquatic Safety Certification (Emergenza Livello Modulo Certificazione Sicurezza Acquatica CSA), Operator level course, Disaster Risk Reduction and Adaptation to Climate Change (Livello Corso per operatore Riduzione dei Rischi da Disastro e Adattamento ai Cambiamenti Climatici DRRCCA), CRI Operator course, Emergency Response (Corso per Operatore CRI di attività di Emergenza OPEM), Refresher course for CRI Operator course, Emergency Response (Corso Di Aggiornamento (Mantenimento Qualifica) Per Operatore Cri Di Attività In Emergenza OPEM- AGGIORNAMENTO), etc. (CRI, 2023).

Disaster risk reduction framework

In Italy, DRR is a function of Italian Civil Protection. Table 2 represents the risks that are managed by the civil protection of Italy (Dolce & Bucci, 2022).

Table 2: Risks managed by civil protection in Italy
(Source authors)

Responsible Authority	Risks
Types of risks for which the Italian civil protection system acts.	seismic volcanic from tsunamis hydraulic hydrogeological from adverse weather phenomena from water deficit forest fires
Types of risks for which the responsible bodies are identified by specific laws. However, the action of the civil	chemical nuclear radiological technological

protection system can also be carried out for these ones.	industrial transport environmental health uncontrolled re-entry of objects and space debris

The DRR function in Italy by civil protection is not only emergency management but also includes risk prevention as well as forecasting of risks. The responsibilities of civil protection also are to recover from the disaster and restoration of normal living conditions for the populations affected by a disruption (Dolce et al., 2020). According to Dolce & Bucci, (2022), there are a number of challenges to meeting the target set by the Sendai Framework and the Sustainable Development Goals. These are as follows: Italy will be likely to switch from a single-risk approach to a multi-risk assessment. However, there is uncertainty about how this transition will be achieved. Moreover, there needs to be more knowledge on how to measure societal vulnerability. It is critical to characterise because understanding how the disruption affects vulnerable people and groups will allow civil protection authorities to prepare in advance. Another challenge is how to communicate information on civil protection risks to vulnerable people, both in normal times and during disasters. Apart from the above challenges, there is a need to explain the role of regions in DRR planning to create a common national framework to guide managerial, operational, and strategic actions (Giuliani et al., 2021). According to Righi et al., (2021), disaster risk reduction in Italy can be achieved using a comprehensive approach that connects and integrates all the actors involved in mitigating and managing disaster risks as well as preventing a forecasting disaster risks and their consequences.

Societal resilience

According to Bodas et al. (2022), trust, which is an important predictor of societal resilience, is high in Italian civil protection agencies. Table 4 shows how Italian respondents scored different indicators of the societal resilience index. As can be seen in Table 4, 51% of Italian respondents (N=500) said they have full trust in the Italian health system, whereas 46% of the respondents have trust in emergency services.

Table 3: Italy's distribution of agreement ("agree" and "strongly agree") with items comprising the Societal Resilience Index
Source: Authors

To what extent do you agree with each of the following statements relating to your country in the context of emergency preparedness	Italy
Full confidence in government's abilities during emergencies	31%
Full faith in the health system	51%

Comparative analysis and case briefs of preparedness and
security of supply
D 4.2

Full faith in emergency services	46%
Optimistic about the future of my country	36%
Society coped well before	42%
Government will make right decisions	47%

Austria

Overview

At Federal level in Austria, one single authority, namely, the Federal Ministry of Interior is responsible for transregional and international disasters. The Federal Ministry of Interior oversees national disaster and crisis management, civil protection, international disaster relief and crisis response. Within the ministry of interior, Department II/ORK/10 – Crisis Management, Situation Information and Control Centre Matters is responsible for civil protection, the coordination of National Crisis and Disaster Management (SKKM), Federal Alarm Centre and Federal Warning and Alarm System, International Civil Protection and Disaster Relief, basic and advanced education, and training within disaster management (BMI, 2023).

Figure 17: Main players in Austrian Disaster Management system, SKKM - National Crisis and Disaster Management
(Source: Bundesministerium Inneres, 2023))

Figure 17 shows main players in the Austrian disaster management system, including operational organisations, authorities, citizens, science, economy, and national authorities. The federal provinces take care of mitigating, eliminating, and combating the effects of disasters. This responsibility is defined by the disaster relief acts of the Federal provinces. It includes disaster declaration as well as command and control structure in the Federal provinces, districts, and municipalities (Bundesminsterium Inneres, 2023).

Austria is a federal republic and has nine independent federal states or provinces and 2,100 municipalities (EC, 2023). The Federal Crisis and Disaster Protection Management has two fundamental principles: the principle of solidarity and the principle of subsidiarity. The first principle ensures that in case of emergencies, all governmental levels will tackle the challenges together. The second principle refers to a bottom-up approach where the crisis management start with the lowest or the local level. Provincial authorities are responsible for natural and

other types of disasters and federal state departments are responsible for financial recovery and prevention measures (Driver, 2015).

Risks consideration

There are several risks considered in Austria. According to Driver, (2015), these are as follows:

- Industrial accidents
- Miscellaneous accidents
- Transport accidents
- Avalanches
- Floods
- Heat waves
- Cold waves
- Earthquakes
- Storms

Of the above risks, the most prominent ones are avalanche and flood as frequency of these two accidents are much higher than that of the other risks. This was evident during our interviews.

> *"We have avalanches every winter; floodings yeah, every two or three years."* (R8)

However, Austria has a multi-hazard approach to disaster preparedness and management. According to our respondents:

> *"We have a multi-hazard approach in Austria. So, we are not focusing on one type or the other type of disaster." (R7)*

Prepositioning and security of supply

In Austria the term "Disaster Preparedness" refers to all actions to prevent and combat the hazards and damages that could result from a potential disaster. Disaster Preparedness is a task that relates to both governmental authorities and rescue organizations (emergency relief services). The provincial disaster relief acts and regulations lay down the operational preparedness measures of the authorities. The main preparedness measures focus on command-and-control structures and respective management and coordination tasks. These include training, exercises, development of disaster management plans on municipality, district, and provincial level as well as technical equipment and staffing of the command-and-control structures. Furthermore, warning and alerting of the population is covered by these acts and regulations. The authorities provide basic financial resources for rescue organizations and the necessary legislative framework.

The disaster management authorities have the following responsibilities:

- the development of disaster management plans (including special contingency plans)
- the development of external emergency plans by the disaster management authorities (district administration authorities) for hazardous facilities (Seveso directive)
- setting up command and control structures to support the head of operation
- setting up and maintaining facilities for alerting the public: provincial alarm centres (LWZ) have been set up in the Federal Provinces, and the Federal Alarm Centre (FAC) has been established at the Federal Ministry of the Interior
- training of disaster management personnel
- exercises: a separate directive on exercises in the area of radiation protection has been developed

The Federal Ministry of the Interior has issued a series of public guidebooks on Civil Protection. In the frame of the National Crisis and Disaster Management (SKKM), the Ministry of Interior offers two training courses for emergency and rescue organizations: one in legal and organizational principles, and another on command and control in disasters.

Weather has a significant influence on disaster preparedness. Meteorological warnings are available through the Central Institute for Meteorology and Geodynamics. Extreme weather events are available on the Meteoalarm website (https://www.meteoalarm.org/en/) for most of the European countries. In addition, Austria has a nationwide warning and alerting system and a radiation early warning system.

Many activities of the rescue organizations, the Austrian Civil Protection Association, the Safety Information Centers (SIZ) and the Children's Safety "Olympics" "SAFETY-Tour" form disaster preparedness measures. At the European level, in the Union Civil Protection Mechanism a separate chapter has been devoted to preparedness. The Emergency Response Coordination Centre (ERCC) has been established for the coordination of emergency measures; it is managed by the European Commission. The capability to mobilise and dispatch expert teams has been set up. The Member States identify, in advance, experts that could be dispatched as members of expert teams to meet priority intervention or support needs based on a request for assistance.

A training programme for Civil Protection and emergency management personnel as well as a system for exchange of experts has been set up, whereby individuals may be seconded to other Member States. At the request of a

Member State, a third country or the United Nations or its agencies, the Commission may deploy an expert team on site to provide advice on preparedness measures.

Citizens' home preparedness – Crisis-proof household

In Austria, the Austrian Civil Protection Association provides information and education to help citizens prepare for crises. It is an umbrella organization of civil protection organizations in the federal states of Austria and serves as a contact point for the population and public institutions in the field of crisis preparedness. (Austrian Civil Protection Association, 2023a.) Three main areas are covered: radiation protection, household preparedness and blackouts (Austrian Civil Protection Association 2023b). The topic of home preparedness is introduced as and "insurance for exceptional situations" (see figure 18). The basic "recipe" for home preparedness is described to include the following elements: 1) identifying scenarios that may affect one's household, 2) stockpiling according to scenarios identified, 3) discussing the preparedness plan with family and neighbours, and 4) updating the plan and checking up on the household preparedness regularly. The recommended timeframe for home preparedness is minimum of 10-14 days (Austrian Civil Protection Association, 2023c).
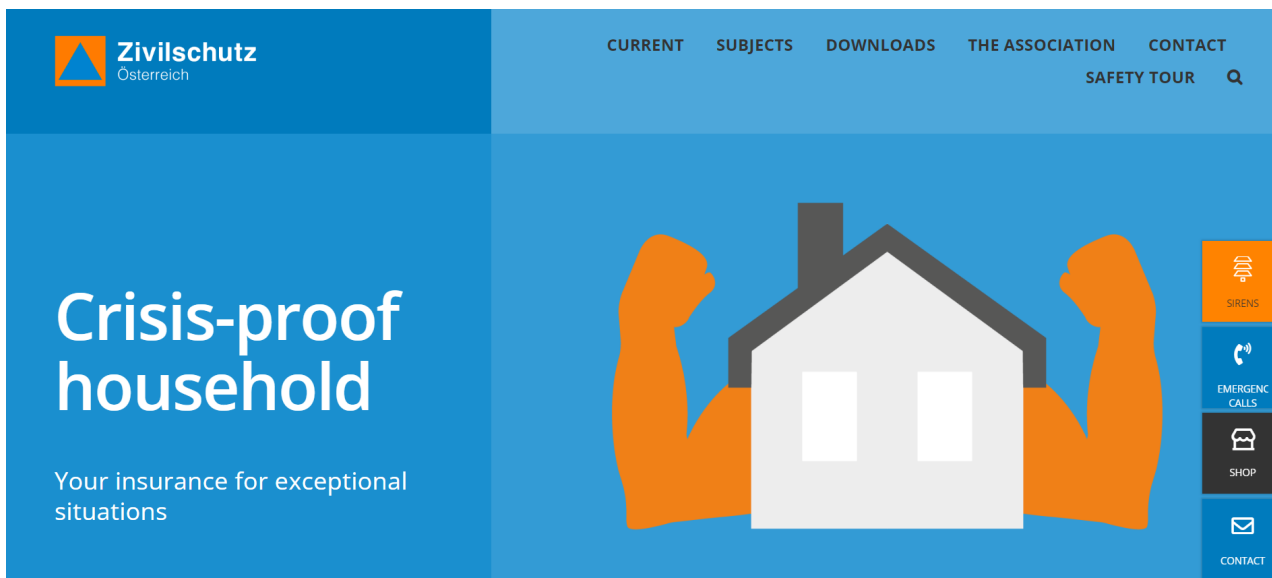
*Figure 18: The home preparedness website in Austria
(Source: Austrian Civil Protection Association, 2023c)*

More detailed information regarding the crisis-proof household is given regarding the household preparedness plan, which covers actions for relevant scenarios per member of the household, emergency collection point and responsibilities per household member in an emergency. An emergency (evacuation) baggage check list is provided for situations where one needs to

evacuate or leave the home. For communication and staying up to date with crisis-related information, an emergency radio that works with, e.g., batteries is recommended. For household emergency food supply, examples are provided including quantities for two weeks in the following categories: water and drinks, vegetables, legumes and fruit, grain products and potatoes, mild and dairy products, fats and oils, fish, meat, sausage, and eggs, fatty, sweet and salty, baby food and pets. Other topics covered include light, heating, and cooking in the case of disturbances, household pharmacy, hygiene products, and waste and wastewater (Austrian Civil Protection Association, 2023c). Brochures and a check list for the crisis-proof household are available as downloads or can be ordered as print versions for free at the webpage https://zivilschutz-shop.at/ where various products needed for household preparedness can also be purchased (Austrian Civil Protection Association, 2023d). The website and downloadable materials are available only in German language (see figure 18). Annual security days are organized by the civil protection associations on the 26th of October, which is the Liberation Day and a public holiday in Austria. "Security islands" are set up in the cities, and preparedness information is shared and distributed.

Figure 19: The crisis-proof household brochure and the downloadable check-list for home supply (Source: Austrian Civil Protection Association, 2023d)

The Austrian Red Cross has a significant role in the national crisis management system and is also a trusted and well-known party for preparedness communication among the Austrian population. Although there is no preparedness training as such for citizens, according to the interviews, people in Austria are on an average quite well prepared, as people are actively engaged in voluntary work and have gone through the related trainings.

> "…we have in Austria a very volunteer-centred approach. So, our community, in general, is keen to be volunteers somewhere. With the Red Cross, we have, as said, those 80,000, the Fire Brigade has 240,000 volunteers in Austria. So, if you combine those, it's almost half a million people who are trained in Austria. And if you see a total population of 9 million, then you can be sure that, you know, the outreach is quite enormous." (R7)

Moreover, basic training on resilience is provided in schools starting from the age of six years as part of the curriculum by the Austrian Red Cross. To get a driving license, people also have to pass first aid training.

Austrian Red Cross also provides preparedness related information through its communication activities. For example, through the Team Österreich App, which is openly available for a download for anyone interested. The app has three functions: 1) preparedness advice, 2) warning in the case of crises and 3) providing help via the digital interface. The first provides, for example, check lists for preparedness and preparedness advice. Through the second function, official crisis warnings and weather warnings can be received. Third function enables the app user to assist rescue services via, for example, providing situational or localised crisis information, via, e.g., photos (Austrian Red Cross, 2023a).

COMPARATIVE ANALYSIS

This deliverable was defined to map the way security of supply is organised within the disaster management, and DRR frameworks of selected EU countries. This followed a purposeful selection focusing on differences in preparedness and DRR mechanisms with regards to pre-positioning, training, framework contracts, and supplier management. The purpose was to establish the links of these activities to the targeted societal resilience of these case countries. Next, the findings of the comparative analysis are presented in the sub-sections that follow.

Preparedness systems

The Finnish system of disaster preparedness is based on a whole-of-society approach and the concept of comprehensive security, which is outlined in the Security Strategy for Society (Security Committee, 2017). Accordingly, preparedness activities covering the vital functions of society are jointly managed by the authorities, business operators, organizations, and citizens. Also, the security of supply is covered in the comprehensive security model. Finland has a national coordinating agency for security of supply work, that is the National Emergency Supply Agency (NESA), which operates under the Ministry of Economic Affairs and Employment. Cooperation among different actors is covered by the sector and pool organization of the NESA.

Sweden, similarly to Finland, is built on a whole-of-society approach, has a coordinating agency for crisis preparedness and civil defense, that is, the Swedish Civil Contingencies Agency. The security of supply, on the other hand, belongs to the sectoral responsibilities of the ministries within their remit, and there is no agreed definition of or concrete goal for security of supply. The concept of total defense is central for the Swedish system, including also civil defense, that is societal preparedness for a war or a threat of war. Preparedness for emergencies in Sweden is said to form the basis of resilience to war.

In Italy, crisis preparedness is part of civil protection. It consists of an integrated system, National Civil Protection Service, which crosses levels (national, regional, province, local) and sectors, including also private and third sectors. It is coordinated and directed by the Department of Civil Protection. The principle of subsidiarity means that disasters are managed at the lowest possible level, as in the other case countries (similar to principles of locality and proximity). In Austria, which is a federal state, the responsibility lies within the federal states. On the national level, the Ministry of the Interior is in charge of coordination, which is ensured by a national coordinating committee.

Citizens' home preparedness

Key communication materials for citizens' home preparedness in the four countries were compared (see table 4). The materials analysis covered: **72h –**

Home Preparedness: useful tips for disruptions and emergencies -brochure in Finland; **If crisis or war comes** -brochure in Sweden; **Civil Protection handbook for Families** in Italy and the **Crisis-proof household** -website in Austria. The points of comparison cover: when published and by whom, recommended length of independent coping, terms used, contents, scenarios, emergency home supply kit, target group and vulnerability considerations, language versions, additional materials.

In Finland the brochure is powered by the Finnish National Rescue Association (SPEK) and the National Emergency Preparedness Agency (NESA) together with a network of NGOs and public agencies and was published in 2017. The Swedish brochure was published in 2018 by the Swedish Civil Contingencies Agency (MSB) at the request of the Swedish Government and in consultation with various stakeholder groups representing various sectors of society. The Italian booklet dates to 2005 and was published by the Italian Civil Protection Department in cooperation with Valle d'Aosta Civil Protection. The Austrian preparedness material was published by the Austrian Civil Protection Association.

In the Finnish preparedness material, the terms used to describe a crisis include "disruptions" and "emergencies" while the Swedish brochure, as the title indicates, is focused on "crises" including military conflicts and even "war". Italian booklet has an orientation on risks and refers also to emergencies. The Austrian material refers to crises and emergencies.

The Finnish brochure is focused on home preparedness and provides tips for disruptions and emergencies. It comprises sections on how disruptions may impact the everyday life; the contents of the home emergency supply kit; information and advice regarding water, food, and power outage; information and communication, including device needed and where to get information; helping neighbors who may need help; security of supply, including description of independent home preparedness. The Swedish brochure, on the other hand, has a different focus, as the title already indicates, "If crisis or war comes", and besides emergency preparedness information and advice, it provides a description of the Swedish total defense model and warning systems.

The Italian booklet is a handbook and that way more substantial than the other preparedness materials here compared. It consists of 64 pages, and has dedicated sections on risk information and advice covering a wide range the risk scenarios Italians may be confronted with; how to get information – describing sources of preparedness and emergency information; getting your family organized – including a five-point plan for household emergency planning; Knowing how to ask for help – including advice on how to call for help in an efficient and timely manner; Emergency and disability – describing

considerations which need to be taken into account when assisting people with specific needs.

Table 4: Comparative analysis of home preparedness communication materials in the four case countries

Point of comparison	Finland	Sweden	Italy	Austria
Title of the home preparedness brochure and/or website	72h – Home Preparedness: useful tips for disruptions and emergencies https://72tuntia.fi/wp-content/uploads/2020/01/Home-preparedness-brochure.pdf	If crisis or war comes https://rib.msb.se/filer/pdf/28706.pdf	Civil Protection handbook for families https://www.protezionecivile.gov.it/en/pubblicazione/civil-protection-families	Crisis-proof household https://www.zivilschutz.at/thema/krisenfester-haushalt/ (via google translation)
When published and by whom	A network of NGOs and public agencies, led by NESA and SPEK in 2017	MSB in 2018	Italian Civil Protection Department in cooperation with Valle d'Aosta Civil Protection, in 2005	Austrian Civil Protection Association, year not specified
Time span for home preparedness	72 hours	"Some time" (7 days from the website)	"As long as possible"	14 days
Term used for crisis	Disruptions and emergencies	Crisis and war	Risk, emergency	Crisis, emergency
Topics covered	- How disruptions may impact your everyday life (examples)	- Emergency preparedness - Total defense	- Knowing the risks - Knowing how to get information	- Crisis preparedness - Contingency plan - Emergency luggage

	- Home emergency supply kit - Information and communication - Helping neighbors - Security of supply	- Warning systems	- Getting your family organized - Knowing how to ask for help - Emergency and disability	- Communication - Food - Light, heating & cooking - household pharmacy - Hygiene products - Waste & Wastewater
Scenarios	Disruptions involving - water - food - energy (power outage)	- "Everything from serious accidents, extreme weather and IT attacks to military conflict" - Information influencing - Different kinds of attacks against the country, including terrorist attacks	- Risks: earthquakes, volcanic eruptions, landslides, floods, seaquakes or tsunamis, road conditions, snow and avalanches, water shortages, heat waves, forest fires, domestic fires, blackouts, industrial hazards, flu epidemics/ pandemics, terrorist attacks	- Any crisis scenario - Power outage, radiation and avalanche mentioned - Every family is asked to identify scenarios relevant for them
Home supply	p. 6	p. 9-10	p. 51	See website for details

Target groups	Young adults living in cities (from interviews)	Segments of the population who are not well-informed (from interviews)	Every member of the household / family (from children to grandparents)	Whole population
Vulnerability considerations	Helping neighbors in need of help (an aged person, single parent, illness)	No mentions in the booklet, but broad language coverage, including sign language and braille	Disabilities well covered, a dedicated section	Vulnerable groups not addressed
Role of citizen	Voluntary /prepared citizen	Responsible citizen	Citizen / family as a member of the civil protection - risk-informed citizen / family	Prepared household
Languages	Finnish, Swedish, English	14 languages (+ sign language, braille)	Italian, English	German

Additional materials	Website: 72 Hours https://72hours.fi/en	Website: krisinformation.se https://www.krisinformation.se/en (Emergency information from Swedish authorities)	Website: I don't take risks https://iononrischio.protezionecivile.it/en/ (National communication campaign)	Downloads (In German): https://www.zivilschutz.at/wp-content/uploads/2022/11/Folder-Bevorratung.pdf (Crisis-proof household)
Special focus / different from others / other remarks	- Addresses security of supply: preparedness is part of it - Addresses societal resilience says that home preparedness creates preconditions for resilience	- Includes a description of the total defense system of Sweden - Addressed citizens saying it is their "responsibility" to prepare - Invites people to talk about the brochure with others	- Handbook -format – richer in text and information - Includes making a family plan of civil protection. Home emergency kit is included in that but otherwise not given much attention.	- Includes making a family contingency plan - Invites families to discuss their plan within the household and with people around them - Several detailed check lists

The Austrian preparedness material is available only in German, and the analysis is based on a machine-translation of it. The material is focused on the household, and includes sections on crisis preparedness – and what is consists of; contingency plan for the household for crisis situations; emergency luggage – check list for important documents; communication – where to receive information and the device needed; food supply – including examples of quantities in different categories for 14 days; light, heating, and cooling – related advice for emergency situations; household pharmacy – including a check list; hygiene products – items needed; waste and wastewater – instructions for disruptions involving water and waste.

The approach to scenarios covered in the preparedness materials varies. The Finnish material is focused on disruptions involving water, food, and energy (power outage). Moreover, on the website, there are additional advice regarding sheltering indoors, infectious diseases and reliability of information and online safety. The Swedish brochure, on the other hand, also includes scenarios of various attacks against Sweden, including terrorism, and has a dedicated section also on false information. The Italian booklet, on the contrary, is very specific on a whole range of risks from natural hazards to industrial accidents and terrorism including the emergency advice for each. The major part of the handbook focuses on those topics (pp. 7–45). The Austrian material on the crisis-proof household, on the other hand, invites the household to identify the potential risks that are relevant for them. On the website, power outage and radiation protection are additional topics addressed besides household preparedness.

Regarding the home emergency supply, Finland, Sweden, and Austria have a similar approach of proving check lists of items that every household should have available covering water, food, warmth, communications, and other items, such as cash, medicine, personal hygiene, and print out of important personal documents. However, there are also some small differences, e.g. the Austrian preparedness material includes several detailed check lists, including a detailed check list for personal documents, while in the Finnish material this is not addressed at all. In the Italian and Austrian preparedness material, the emergency baggage serves as a starting point for expanding and putting together the home emergency supply, while in the Finnish material the scenario of being evacuated and having to leave the household is not considered. In the Italian preparedness material, the home supply is included only as one point in the family emergency planning and is not dedicated much attention to.

The recommended period of independent preparedness and having home supply varies in the four countries. In Finland, the period covers three days, and, in Austria, 14 days are recommended. In Sweden the booklet uses a neutral expression "some time", although currently the official recommendation is one week. The Italian preparedness booklet suggests home preparedness "for as long as possible".

Regarding the language coverage and accessibility, the Swedish material is available in 14 languages, including minority languages. The Finnish preparedness material is available in the two national languages, Finnish and Swedish, and English. The Italian booklet was translated into English, while the Austrian material is only available in German. The language coverage relates to questions of inclusiveness and vulnerability in terms of reaching minorities. Regarding target groups, home preparedness materials are generally targeted for every citizen with the whole population as their aimed audience. However, through the background interviews we could establish that the Finnish material was developed bearing in mind especially young, urban adult population who are generally not well prepared for emergencies. This is reflected also in the visual style of the preparedness material. In the case of Sweden, on the other hand, the special target group were uninformed people with low levels of knowledge and interest in preparedness. Simple language and easy sentences were used considering the needs of those target groups. The Italian preparedness handbook, on the other hand, has a different tone. Despite being addressed for each member of the household and families "from children to grandparents", and having a popular visual style and outlook, the language of the main text, on the other hand, is not adapted to reflect the same principle, but contains a lot of information and seems to be targeted for an engaged audience.

Regarding vulnerability considerations, the Italian Civil protection handbook takes the most inclusive approach as it includes a full section on emergency and disability with both generic instructions and disability specific advice for emergency procedures. Both Italian and Austrian preparedness materials include the making of the family emergency plan in their preparedness advice. The Swedish and Austrian preparedness materials, on the other hand, encourage interaction about preparedness with family members and people around them. The Finnish material makes a link between home preparedness and societal resilience by saying that the former creates preconditions for the latter.

Prepositioning

The four case countries have very different perspectives when it comes to prepositioning emergency supplies. Finland does not focus on creating a top-down system of prepositioning and centralized holdings but focuses on decentralization with frequently updated guidelines and systems. The Finnish cooperation-based preparedness model, in which the vital functions of society are jointly managed by the authorities, business operators, organizations, and citizens. The whole-of-society approach and shared responsibility in practice are based on the principles of self-sufficiency and localization. The idea here is to be consistent in defining that the responsibilities and roles are the same both in normal and exceptional conditions for the relevant stakeholders. In Finland, the security of supply is based on the collaboration between public, private, and third

sectors. NESA, the public institution at the centre of coordination and planning, works together with relevant organisations to maintain sufficient stocks in preparation for potential crises in Finland. However, NESA does not have stockpiles of its own but the goods to be stockpiled are included in the relevant companies' normal product circulation and stockpiling. As the first responders' citizens are expected to cope on their own for 72 hours in the case of an emergency. Citizens are considered active agents in the security of supply work in Finland.

Sweden also has a similar system of the preparedness and prepositioning. Until recently, Sweden did not consider high level of military threat and, thus, there was a drastic reduction in the defence budget as well as emergency stockpiling of items such as food, medicines, and oil. However, due to COVID-19 and the full-scale Russian invasion on Ukraine in 2022, Sweden has slowly started to rebuild emergency stocks. While Sweden does not have large stockpiles, they are a part of the RescEU medical stockpile commissioned by the EU. RescEU is a common reserve capacity of the EU which aims to boost the preparedness and response abilities for various types of disasters. Sweden also emphasises home preparedness. In 2018, all households in Sweden received a brochure about disaster preparedness called "Om krisen eller kriget kommer" (MSB, 2018). The brochure is also available in English and titled "If Crisis or War Comes". This stems from the principle of responsibility for ensuring the security of supply and maintaining emergency stock which means whoever is responsible for something in everyday life is also liable in the event of a crisis and must ensure their supply chains. To a large extent, private actors own and are responsible for many of the most important social functions, which include the production and transport of necessary goods and services. Business life is thus of central importance for total defence and for supply readiness. In Sweden, there is currently no government emergency food storage, and there is no designated government authority responsible for ensuring access to food.

Like Sweden and Finland, Italy also focuses on the building reliance at household levels by encouraging the households to have necessary items stockpiled at home to prepare against any emergency. The "Civil Protection for Families" provides emergency preparedness guidance and advice for citizens and households. Austria, on the other hand, focuses on the principle of solidarity and the principle of subsidiarity, when it comes to the disaster preparedness. Thus, the households are expected to play a major role in the prepositioning or stockpiling. The basic "recipe" for home preparedness is described to include the following elements: 1) identifying scenarios that may affect one's household, 2) stockpiling according to scenarios identified, 3) discussing the preparedness plan with family and neighbours, and 4) updating the plan and checking up on the household preparedness regularly. For household emergency food supply,

examples are provided including quantities for two weeks including water and drinks, vegetables, legumes and fruit, grain products and potatoes. The comparative analysis is summarized in table 5.

Training

The training programs preparing the first responders, civilians, government organizations, and business is an essential part of the preparedness activities. Every country has a different mechanism to achieve this, however with some similarities.

In Finland, the Emergency Services Academy has the statutory role to offer training for preparedness for disruptions and state emergencies. Training programs are primarily provided for personnels in public administration at local and regional levels of the government. This is to ensure that the government machinery is prepared for any adverse events and to actualise their obligations of public administration. These trainings are offered free of charge for Finland's public administration organizations. In line with Finland's 72-hour security of supply program, the citizens are also offered training programs to help them with preparedness activities by NGOs. The Finnish Red Cross is also an important player in the field of preparedness training. This covers training of volunteers and international delegates. In the private sector, the National Emergency Supply Agency (NESA) funds and supports trainings and exercises for businesses that are relevant to securing the supply of essential societal functions.

In Sweden, MSB is responsible for providing training and conducting exercises for individuals' public authorities and organizations. MSP offers a range of customised training programmes for local authorities and private sector depending upon their needs area of activity. Furthermore, Sweden also has various international training programmes for different levels such as operational tactical and strategic, which are offered in collaboration with EU and UN. Apart from the training organizations speed also organizes exercises and simulations help various stakeholders prepare disaster or disruption.

Table 5: Comparative analysis of prepositioning for four case countries
Source: Authors

	Finland	Sweden	Italy	Austria

Philosophy and rationale	• Government, businesses, organization, and citizens are all key players.
	• Shared responsibility the whole system.
	• Local capabilities and self-sufficiency is the key for normal and exceptional conditions
	• Security of supply needs collaboration between private and public entities.
		• Drastic reduction in defense budget due to reduced external military threat and emergency stockpiling of essential commodities.
		• COVID-19 and Russia-Ukraine war has led to reassessment of this strategy and need to have internal emergency stock.
		• Agencies responsible for services in normal condition are also responsible for it in emergency conditions as well.
		• Decentralization of responsibility
		1. .
			• Pre COVID-19, it was highly decentralized with high levels of decentralization based on the regions.
			• Has strict judicial, legal, and bureaucratic demarcations for operating zones.
			• While the federal government oversees formulating general guidelines, allocating funding, and ensuring essential levels of assistance (LEAs), 20 regions have complete autonomy in organizing and managing services in their territories
				• Works on two principles
				  o Principle of solidarity (centrality)
				  o Principle of subsidiarity (localization).
				• Home preparedness should include.
				  o Identification documents
				  o Emergency stockpiling
				  o Ensuring family and dependents are aware of the plan.
				  o Review and updating the preparedness plan.

Role of public organization	• NESA along with other organization ensure sufficient stock is maintained for potential crisis. • NESA maintains the national emergency stockpiles through,	• Sweden relies on rescEU (a common reserve capacity of EU) medical stockpile commissioned by the EU. • In Sweden, there is currently no government	• Emergency preparedness guidance and advice is given by the Civil Protection for Families organization.	• Austrian Civil Protection Association is the nodal agency to provide information and education to the citizen to help them prepare for a crisis.

	o Companies and key operators have mandates for compulsory stockpiling. o relevant companies and NESA jointly decide on the levels of the stockpiles. • NESA does not own stockpiles but is in advisory role to direct type and quantity to be held in compulsory stockpiles	emergency food storage, and there is no designated government authority is responsible for ensuring access to food.		
Role of citizens and private actors	• Citizens are expected to be self-sufficient for 72 hours after an emergency. • Citizens are active players and the first line of respondents.	• Private actors are responsible to critical social functions incusing transportation and food. • Sweden also emphasizes on home preparedness	• Encourages the families to maintain an emergency supply kit including essential items including items that might be needed if there has to be an emergency evacuation.	• Encourages the household to carry enough emergency supplies for individuals and pets.

In Italy, training and exercises for civil protection are carried out in collaboration with the national civil protection service and various other operational structures and participating bodies. At the national level, these trainings and exercises are organised by the civil protection department. This department also carries out various other training and exercises which are related to the components of the operating structure of national service system. Furthermore, various educational organizations have also contributed to developing courses and training programmes prepare national emergencies such as disasters floods and earthquakes. The volunteer organization also plays a significant role in Italy in developing capacity within the community. Organizations such as the Italian Red Cross contacts regular knowledge sharing and training exercises among their volunteers which includes knowledge on forecasting risk management and emergency response.

In Austria, the federal ministry of the interior is responsible for the training and capacity building. The ministry issued a series of guidebooks on civil protection for all stakeholders. The national crisis and disaster management authority and MOI offers training programs for emergency and rescue organizations both in legal and organizational principles. The main points of comparative analysis are summarised in table 6.

Framework agreements and supplier management

The framework agreements and the supplier management for emergency stockpiling in each of the cases countries depend on their individual disaster preparedness strategies. In Finland, the supplier management and relations depend on the actors involved, sectors, products, and services in question. For certain items like medicines, voluntary organization maybe a small player, while for other items such as tents, the key suppliers might be interested to get into bidding for long-term contracts which might even include joint product development based on the buyers' specifications. In case of certain products which needs to meet international standards, these suppliers are often international in nature who can supply in large volumes when required. However, for certain products, there are only limited suppliers across the world and countries might not need to order a huge quantity. In this case, multiple countries for a consortium to negotiate together and bet a better overall deal.

Sweden tries to focus on the procurement of essential commodities to ensure that the essential services are not disrupted. As part of this, Sweden carries out frequent dialogues with suppliers and companies and agreements are drafted such that the essential services are not hampered, and the partners are to ensure that the services are rendered on time. Through the agreements, companies are made aware of their roles and responsibilities during crisis time. On an informal basis, the churches in Sweden play a significant role and, without any formal contracts, the churches help to mobilize resources and material when the need arises.

Table 6: Comparative analysis of training for the four case countries

Finland	Sweden	Italy	Austria
• The Emergency Services Academy Finland plays the key role in providing training under normal and emergency situations. • Training usually provided to the public administration at local, regional and governmental levels. • Training usually covers basic safety skills, for example, first aid, fire extinguishing, self-defense, and orienteering skills. • Finnish Red Cross also offers training for volunteers and international agents. • Funding for the training programs usually come from National Emergency Supply Agency (NESA) • exercises and simulations are offered for business on securing the supply of essential societal functions and services under emergency.	• MSB is the nodal agency for providing training to individuals, public and private organizations. • These training programs are customized for recipient groups. • Specialized program in prevention and operations during emergency for fire and rescue services personnel. • International training programs are also offered in association with the EU and the UN • Apart from training, several exercises are also organised.	• Training and exercises are carried out in collaboration with the components of the National Civil Protection Service • Academic institutions (Univ. of Modena) also play a part in developing curriculum for training modules. • Other institutes like National Institute of Oceanography and Applied Geophysics - OGS has been engaged in educational and training activities. • Volunteer organisation also play a key role in training for emergency preparedness.	• National Crisis and Disaster Management (SKKM) offers training programs for emergency and rescue organizations. • Offers training in legal and organizational principles. • Federal government also release guidebooks for citizens as a part of awareness and training.

Italy, on the other hand, has a more centralized purchasing function. Italy has implemented several tools including long-term framework contracts with suppliers to ensure low-cost dynamic purchasing is possible in the need of a crisis. These contracts are usually awards based on a bidding process often conducted over an electronic marketplace. The public administration uses these contracts to both procure or rent the required goods when the need arises. While the contracts are awarded through a bidding process, the participating suppliers need to be pre-qualified to provide the products according to specified standards. Framework agreements have framework contracts for each specific order or tender and can be given to one or more suppliers. One of the common applications for this kind of centralized procurement is seen it the health care sector. However, during the COVID-19 pandemic, this centralized procurement was seen as a one of the major bottlenecks in procuring ample amount of personal protective equipment for the healthcare providers.

Austria, being a member of the EU and benefits from various EU-level emergency response mechanisms and policies. The EU has established several policies and regulations aimed at ensuring the security and resilience of critical infrastructure, such as the European Programme for Critical Infrastructure Protection (EPCIP) and the EU Directive on the Security of Network and Information Systems (NIS Directive). Austria has its own emergency response policies and plans in place, which are developed and implemented by the federal government and the nine provincial governments. Although Austria does not have specific framework agreements or contracts in place for ensuring essential supplies and services during emergencies, it has mechanisms and policies that aim to ensure the continuity of essential services and supplies during emergencies. These include national emergency response plans and emergency stockpiles.

Table 7: Comparative analysis of framework contract and supplier management

Finland	Sweden	Italy	Austria
• Supplier management and relations depend on the actor, sector, products, and services in question. • Some items have, for example, international standards and those typically have international suppliers in countries where it makes sense to produce large volumes. • Normal practices of tendering and ordering apply according to procurement guidelines. • Contract negotiations are done internationally for several country branches of the same organization. • Framework contracts are not easy to obtain for items where the demand is not constant, as it could be for many of the emergency items, so such contracts are not appealing for suppliers.	• Dialogues with suppliers and companies are being carried out, and agreements are being drafted to identify and ensure access. • Through the agreements, companies are made aware of their roles and responsibilities during crisis time. • Church is informal in nature and without formal agreements or contracts. • Public sector authorities, private businesses, and volunteer organizations have regular meetings at normal times to brainstorm what to do when a disaster strikes.	• Italy has implemented several purchasing tools, such as framework contracts, a dynamic purchasing system, framework agreements and an electronic marketplace. • The public administrations in Italy use these framework Contracts (in Italian Convenzioni) to acquire or rent goods and services. • The Italian public administration also uses a digital market which is called a dynamic purchasing system (Sistema dinamico di acquisizione - SDA), to procure goods and services. Healthcare products can be purchased through this digital market system. • Suppliers are pre-qualified for the system, and then they can apply to the tenders published by the public administration. • Framework agreements have framework contracts for each specific order or tender and can be given to one or more suppliers.	• Has no specific framework agreement or contracts (as of 2021) • Benefits from the European Civil Protection Mechanism for coordinated disaster response. • EU policies for critical infrastructure protection apply to Austria as an EU member state. • Has its own emergency response plans for continuity of essential services. • These plans cover a range of emergencies including natural disasters, pandemics, and terrorist attacks. • Measures for food, water, energy, and medical care are included in Austria's emergency response plans. • Has national-level policies and mechanisms to ensure essential supplies and services are not disrupted during emergencies

CONCLUSIONS

There are different approaches to secure security of supply and preparedness for disasters. This section looks at some commonalities and best practices identified in the literature and cases analysed, taking a broad approach, as details related to supply chains are discussed in the earlier section.

Be prepared for all scenarios

Based on the documents analysed and the cases, it is possible to see that there is a need for an all-hazards approach, being prepared for all scenarios possible, with the risk registry prepared at national level. Such a list of potential disasters ranges from those that have a high likelihood of occurrence, or are even annual, (like avalanches in Austria), to those which have a lower likelihood, but still cannot not be excluded in certain areas (e.g., large forest fires, further pandemics, etc.). Risks need to be monitored and updated on a regular basis by national authorities in cooperation with international and research organisations and communicated to other actors that are members of the preparedness network. This is especially important in the case of international supply chains when a disaster or a conflict in one area results in goods shortages in the EU (for example, an earthquake in Japan).

However, there are also pitfalls of such an approach, when there is a perception of low-risk environment, for example in Sweden the old "Cold War" civil defence system was reduced, despite being needed some decades later. Thus, a decision to reduce preparedness level should be taken with great care, as it takes time to rebuild the system back to past levels.

Consider multiple risks

There are differences in approaches between countries in relation to terms used and whether or how to include conflicts, or even a full-scale war into preparedness scenarios and disaster frameworks, in addition to natural disasters. However, both natural and man-made disasters influence supply chain flow and security of supply. For example, Sweden with the "total defence" preparedness system, and the brochure distributed to each household "If Crisis or War comes!" approaches crisis preparedness in a more holistic way. It can be argued that this approach, that does not exclude conflicts, is in fact closer to the reality as there are complex emergencies, that interlink natural and man-made disasters. This is especially relevant as, for example, conflicts are triggered by climate change, or wildfires could be the result of terrorist-motivated arsons, and the landscape of potential threats is even more complex when "hybrid threats" (Giannopoulos et.al 2021) are included in the national risk register. As such, "hybrid threats" covering a much wider set of risks, than natural disasters and traditionally understood conflicts, also need to be taken into consideration when preparedness actions are planned and executed.

Polycentric system of system

When looking at four analysed cases, the target model should include everyone, every actor and its system (i.e., an organisation, and a network of organisations). There is central national (or federal) governments and its institutions, which can be further supported by higher level international organisations that are able to assist national governments, but also the national level should be linked to the lower, municipal, organisational, and finally household and individual levels. Only the systems that have multiple actors, each of them working on their own, and in cooperation with others, allows creation of societal resilience.

Involving households and individuals, preparedness as part of life routine

Each analysed country includes individuals and households in their system of preparedness, moreover they are considered active actors. They are the ones who are also taking actions for their own preparedness, including their relatives and friends. As it was pointed by one of the interviewees, the aim is to have preparedness as a topic that is discussed among family members and co-workers. Thus, building a preparedness culture should be a goal. This could be done by already involving children and teenagers, through education and awareness building, as it is already done in Italy to some degree. Educating members of a society positively influences availability of goods and allows time to restore supply chain flows. This is not only through the reduction of "panic buying" but also by the ability of citizens to live on "prepositioned" goods in their own homes, as indicated by the preparedness leaflets.

Keep supply chains running!

It is possible to observe that theoretically there can be two extremes of roles of the government in managing the security of supply under emergencies. The first comprises the full involvement of all sectors and people, without the need for the government to intervene as supply chains are resilient enough to sustain shocks under a disaster, while in the other extreme option, the government steps in when a disaster happens and handles everything from a centralized control. However, in practice, either extreme in its pure form might not be available in any country, but a hybrid form with more affinity towards one of the extremes.

As those are two extremes, the countries analysed in this report are somewhere in-between. In the first case, the government level is acting as a facilitator, that is helping other actors to be as resilient as possible, through cooperation, training, etc. In the second option, there is a tendency to create a system that is duplicating the system that may fail, by the creation of an alternative network by government agencies. Keeping supply chains running, making them as resilient as possible, reduces the need for an intervention in case of disasters. Thus, strengthening supply chains should be a key factor for the security of supply.

Facilitate or duplicate? Prepositioning, training, supplier management and contract frameworks

The choice between the two approaches (facilitation vs. duplication) has implications for prepositioning, training, supplier management, and contract frameworks. The first approach needs close cooperation by government agencies with all actors involved in the provision of certain services, creating links between the state level and other organisations, facilitating links between actors within the same sector, providing risk analysis, training, and facilitating regular joint exercises, as well as contracting goods as part of stocks managed and replenished by those organisations involved. In such a solution, government agencies are acting as a facilitator, helping other supply chains to be resilient, taking proactive actions to increase resilience of each organisation, and the system of supply, thus reducing the need for intervention.

The second approach requires the national agency to act as a buyer and, at the same time, as a logistics operator by procuring goods from the market, storing, handling, and replenishing them, reducing obsolesce, then finally, as an organisation that distributes stored goods to those that need them. In such a case, the agency is replicating already existing networks, however the problem with such an approach is that it might not be activated for a long time, means that the performance under stress is not known, as it was visible during the COVID-19 crisis.

It seems that the solution when the state organisation acts as a facilitator, helping others to be prepared, and, at the same time, covering costs of goods that are contracted, but stored as part of an inventory, is better. However, there is also an emergency stock available, ideally distributed as close to the point of consumption as possible, with a stock that is "prepositioned" by households in their own homes, as well as those at municipal and regional levels, or held by non-state actors (NGOs).

Private sector competition

Private sector companies have their own initiatives to maintain a flow of goods and services, and to keep business and supply chains running. However, they are preparing for risks that are most probable. Also, commercial actors might not see the threats coming, especially those risks forthcoming from geopolitical risks, climate change, or technological advances. This is especially relevant for international supply chains with sourcing in regions such as Asia or Africa. There are threats that can influence every company in the industry, or region, including those which under normal circumstances compete one with another. As in the case of Finland, even competing companies, can cooperate for better preparedness, as they acknowledge that the whole sector, and each individual

company, can be negatively influenced, or potentially influenced, by emerging threats. In such cases, companies decide to work together, cooperate, despite competition, moving towards competition.

Civil society organisations and NGOs

As the role of individuals and households was already discussed, it is important to acknowledge the role of the voluntary sector, NGOs, that are important actors and part of the state preparedness network. They play important roles, from education, through training and exercises up to participation in the response in disasters abroad, gaining valuable experience and transferring knowledge about disaster response from other regions and contexts into the EU. Such actors also serve as a link between the household and individual level and the regional and national authorities. They can also act as a link to international organisations in case of a need (such as Red Cross) utilising experience from joint humanitarian interventions abroad.

Based on the analysis, it is possible to see that there are two dimensions in disaster preparedness. First is the scope, this means the need to involve every actor in the network and being prepared for both natural and man-made disasters. The second is time referring to a continuous approach to preparedness, and involvement of society regardless of their age, starting from the primary and secondary school education level. When both dimensions are acknowledged, preparedness becomes part of daily activities, in organisations and lives of individuals.

Comparative analysis and case briefs of preparedness and
security of supply
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Comparative analysis and case briefs of preparedness and
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APPENDIX
ANNEX 1

Research Project sCience and human factor for Resilient society (CORE)
Interview Guide for WP4|T4.2

Introductory questions/ background of the interviewee
1. Please tell us about yourself
   a. Name
   b. Designation
   c. Role and responsibilities
   d. Job history / experience in the sector + in the sphere of disaster preparedness
2. Please tell us about your organization
   a. Its role in disaster preparedness
   b. Its role in disaster response
   c. Its role in enhancing/ increasing the security of supply.
   d. Its role in improving societal resilience.

Disaster management / DRR framework (national - governmental organizations)
1. How would you describe your national system of crisis preparedness?
2. Which disaster management or DRR framework is used in country x?
   a. Which are the guiding policy frameworks and strategies and what is their role (e.g., to what extent international frameworks are implemented)?
   b. What is the related legislation?
   c. How are they like – please describe them.
   d. How and to what extent / in what ways is Sendai framework implemented in country x?
   e. When and how (in what situations) is the disaster management or DRR framework activated?
3. How is the preparedness process organized / coordinated among sectors and levels of administration (horizontally and vertically)?
   a. Is disaster preparedness centralized (national level) or decentralized (regional, local level)?
   b. Who (which agency) has the leading role in preparedness?
4. What is country x preparing for (crisis, war, disruption etc.)?
   a. What types of disasters is each EU country, covered by CORE partners, preparing for (more specific scenarios)?
5. Who is involved in the preparedness process?

      a.   EU/ UN / INGO
      b.   Other stakeholders for preparedness
6.   What are the current challenges that country x faces in disaster preparedness? What needs to be further improved?
7.   What are the strengths of country x in disaster preparedness?

Preparedness (other organisations)
1.   What does preparedness mean to you (How do you understand preparedness?)? How is preparedness defined within your organisation?
2.   For what types of disasters is your organisation preparing?
3.   How is your organization preparing for any particular type of disaster (e.g., COVID-19)?
4.   Why is your organization preparing in a certain way?
5.   What are the challenges your organization faces in preparing for a disruption? What needs to be further developed?
6.   What are your organization's strengths in disaster preparedness?

Security of Supply (national – governmental organisations)
1.   How do you define / understand the term security of supply?
2.   How would you describe your national system of security of supply? What are the central elements?
3.   How is the security of supply organized / included in the disaster management / DRR framework described previously in country x?
      a. How is security of supply described / defined in country x?
      b. What is the related legislation?
      c. What does security of supply include in country x?
         i. What sectors does it cover?
      d. What is the guiding policy document / strategy for preparedness concerning security of supply (if different from the overall disaster management framework)?
         i. What crisis scenarios does it cover?
         ii. How are they implemented (related preparedness planning)?
      e. Who is involved / Which are the main players for security of supply preparedness?
         i. Other stakeholders involved?
      f. How is the preparedness process organized / coordinated among participants?
         i. Who (which agency) has the leading role in preparedness?
4.   How is cooperation and coordination organized? (models, organizational structures
5.   What are the current challenges that country x faces in the sphere of security of supply? What needs to be further developed? How?

6.   What are the strengths of country x in the sphere of security of supply?

Security of Supply (other organisations)
1.   What does security of supply mean to you? How is preparedness defined within your organisation? How do you understand security of supply?
2.   What does your organization do to ensure security of supply?
3.   How does your organization ensure security of supply at country level?
4.   What are the key challenges for ensuring security of supply? What needs to be developed? How?
5.   What are your organization's key strengths in ensuring security of supply?

Societal resilience (national – governmental organisations)
1. What is the targeted societal resilience of country x?
    a. How is societal resilience described / defined in country x?
    b. Please describe the relationship of disaster preparedness and societal resilience in country x.
    c. How does security of supply preparedness contribute to societal resilience of country x?

Societal resilience (all organisations)
1. Give a definition of societal resilience (UN definition) and ask interviewee to describe how she/he perceive that the activities (for which the person was interviewed for) contribute to societal resilience
    a. United Nation's International Strategy for Disaster Reduction (UNISDR): "The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions".
    b. Please describe how you / your organization contributes to societal resilience previously described.

Crisis communication preparedness (focus on the security of supply)
1.   What kind of approach is adopted in crisis communication preparedness in country x? How would you describe your national crisis communication preparedness?
    a. What are the guiding strategies and policy documents?
    b. What is the related legislation?
    c. How is it included in the general disaster management / DRR frameworks?
    d. How is it included in / relate to the security of supply preparedness? Is there a separate strategy for the security of supply preparedness for crisis communication?

     e. Who is the leading agency?

     f. What other actors and stakeholders are involved? What is the role and contribution of each agency?

     g. What are current challenges / needs for further development in the field of crisis communication preparedness (keeping in mind the security of supply)?

2.   What is communicated to citizens about preparedness in country x?

     a. What scenarios are included?

     b. What does preparedness cover?

     c. What communication means and channels are used (e.g., preparedness brochure, crisis portals/websites, campaigns, formal/civic/professional education, social media mobilisation) to communicate about preparedness with citizens?

     d. How are the needs of vulnerable groups considered? (e.g., minorities, age groups, children, elderly, handicapped) Which vulnerable groups are considered?

     e. Who is the leading agency? What other actors and stakeholders are involved?

     f. What are the challenges in communicating about preparedness with citizens?

     g. What is the role of citizens in crisis communication preparedness?

3.   How is preparedness for inter-agency communication in the supply chain / crisis management network organized? How would you describe…?

     a. Who is the leading agency?

     b. What other actors and stakeholders are involved?

     c. How is cooperation with the news media included?

     d. What are the challenges for inter-agency communication in country x?

4.   72 hours concept

     a. How would you describe the 72h concept?

     b. What is the purpose of 72h concept? How was it developed? Why was it developed? When was it developed?

     c. What does it consist of? For whom is it targeted? Why?

     d. How was the visual / style decided and developed?

     e. Who oversees the implementation? Is the implementation evaluated / monitored?

     f. Which organisations are involved? Who is in charge?

     g. Are there any challenges involved? What could be done to further develop / improve the concept or its implementation? How? Please describe if there are there any challenges in practice. Please describe the strengths. What could be done to improve it.

Training

1. How would you describe preparedness training in your country? (main organisations, existing collaborations etc.)
2. What kinds of trainings (including drills and crisis exercises) are done to prepare for disasters? (a) nationally / b) by your organisation) What competencies are covered?
3. Are there separate trainings in the context of the security of supply?
4. Who provides training and for whom?
5. Do you have internal resources to give the training?
6. How are competences tested (exercises done + how often)?
7. What challenges do you face to conduct the training?
8. What are the strengths of preparedness training in your country? What needs to be further developed? How?

Prepositioning

1. What are the goods you preposition to ensure security of supply?
2. How goods are prepositions?
3. Where are goods prepositioned?
4. What are the key challenges during prepositioning of goods?
5. What are your organization's key strengths for prepositioning goods for major disruptions?

Framework Contracts

1. What kinds of contracts do you have with your suppliers?
2. What is the typical length of these contracts?
3. How do contracts help to prepare for the disaster?
4. How do contracts ensure security of supply?
5. How do contracts help in prepositioning?
6. Do contracts specify any relevant trainings?
7. What are the key challenges in designing/ managing contracts with suppliers?

Supplier Management

1. How many suppliers do you have?
2. Where are these suppliers located (local versus global)?
3. What kinds of relationships do you maintain with your suppliers?
4. How do you measure performance of the suppliers?
5. What are the key challenges for supplier management?

Other

1. Is there anything we did not ask and that you deem relevant and would like to add?
2. What in your view are central themes and/or considerations that interviewers should consider in their project?
3. Which other actors and experts do you recommend us to interview?
4. Can we get back to you via email if we notice, e.g., after conducting more interviews, that some information is missing?

ANNEX 2

List of interviewees, including their position, organisation type, country, and duration of the interview in minutes.

Position/ Role	Organisation type	Country	Duration of interview (in min)
Preparedness coordinator	Municipal authority	Sweden	61
County administration	Regional authority	Sweden	54
Disaster management and civil protection	Municipal authority	Sweden	55
Disaster management expert	Municipal and regional authority	Sweden	60
Head of natural hazards section	National authority	Sweden	60
Preparedness Coordinator	Municipal authority	Sweden	63
Head of volunteer organisation	International volunteer organisation	Austria	92
Head of task Force Crisis Management	National authority	Austria	54
Head of International Emergency	International volunteer organisation	Italy	64
Civil Protection	Municipal authority	Italy	63
Managing Director	Association of agencies responsible for natural hazards	Switzerland	77
Chief Technical Officer	Knowledge-based institution	France	77
Director	Emergency/disaster preparedness organisation	Finland	74
Communication specialist	Emergency/disaster preparedness organisation	Finland	74
Head Instructor	Emergency training organisation	Finland	54
Head of Training and Education	Emergency training organisation	Finland	60
Volunteer trainer	Emergency training organisation	Finland	72

Volunteer trainer	Emergency training organisation	Finland	72
Senior specialist	Ministry	Finland	45
Head of logistics	Public enterprise	Finland	98
Head of Procurement	International volunteer organisation	Finland	60
Head of Logistics	International volunteer organisation	Finland	48
Risk communication expert	Emergency/disaster preparedness organisation	Sweden	89
Exercise coordinator	Emergency/disaster preparedness organisation	Finland	66
Senior specialist	Emergency/disaster preparedness organisation	Finland	82
Senior advisor	Emergency/disaster preparedness organisation	Finland	82

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